MAYNOOTH LINE TRANSPORT STUDY DRAFT FINAL REPORT

NTA
Údarás Náisiúnta Iompair
National Transport Authority

Clifton Scannell Emerson Associates

SYSTRA

MAYNOOTH LINE TRANSPORT STUDY

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1. INTRODUCTION

1.1 Background and Study Requirements

1.1.1 The National Transport Authority (NTA) in collaboration with Iarnród Éireann (IÉ) have commissioned Clifton Scannell Emerson and Associates (CSEA) and SYSTRA Ltd. to undertake the Maynooth Line Transport Study (the Study).

1.1.2 The Study requires a multi-modal transport assessment of the implications of permanently closing six level crossings (illustrated in Figure 1.1, overleaf) along the Maynooth rail line, namely Ashtown, Coolmine, Porterstown, Clonsilla, Barberstown and Blakestown. The Study examines options for their full or partial replacement with new infrastructure and the impacts across walk, cycle, public transport and private car.

1.1.3 The permanent closure of the level crossings on the Maynooth Line is a fundamental part of the DART Expansion Programme, included in the "*National Development Plan 2018-2027*". DART Expansion comprises a number of constituent elements to expand the heavy rail capacity, frequency, and connectivity in Dublin City Centre and throughout the GDA and to transition to a more sustainable traction power supply.

1.1.4 The Study utilises the NTA's multi-modal East Regional Model (ERM), along with calibrated and validated local area models to assess the impact of the crossing closures on pedestrians, cyclists and private car users, including the potential requirements for replacement infrastructure.

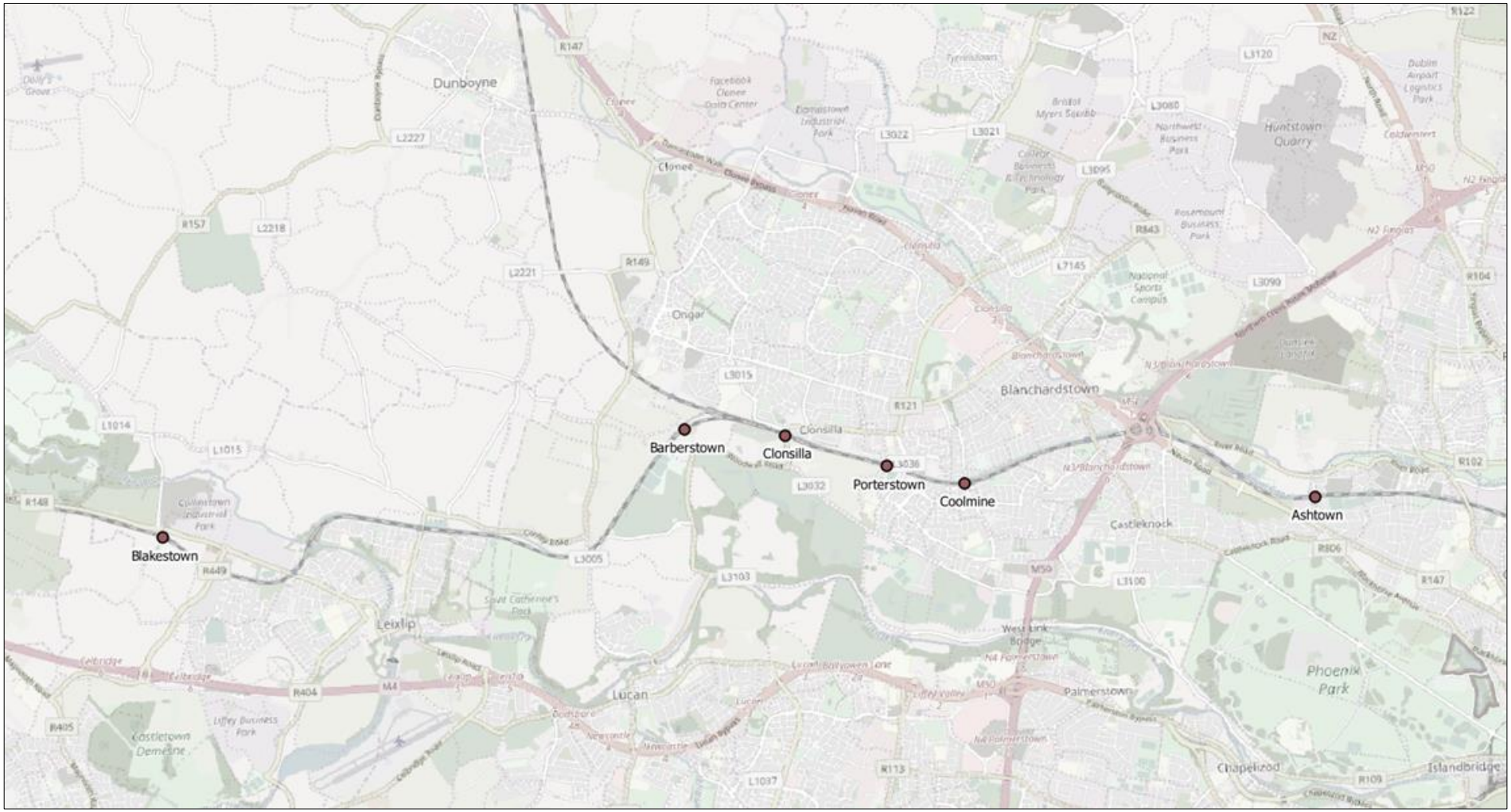
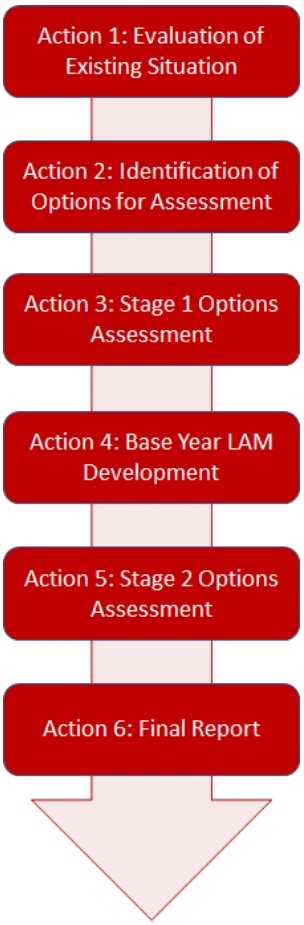


Figure 1.1 Maynooth Rail Line Level Crossing Locations

1.2 Outline of Study Approach

1.2.1 The overall methodology for the Maynooth Line Transport Study is comprised of the following elements:



- **Action 1 Evaluation of Existing Situation**: A baseline study is undertaken to gain an appreciation of current conditions within the area and at the level crossings, including an assessment of their quality and potential issues associated with their closure. This includes:
  - A site visit to each of the level crossings;
  - Review of the current level of rail service along the Maynooth Line and the resultant pattern of level crossing closure;
  - A review of all national, regional, and local planning policy and guidance documents relevant to the study area; and
  - A review of traffic survey data collected in the study area.
- **Action 2 Identification of Options for Assessment:** A number of options for testing are developed, focused around variations in the provision of replacement infrastructure at the level crossings.
- **Action 3 Stage 1 Options Assessment:** The options identified in Action 2 are assessed using the NTA's East Regional Model (ERM), with analysis of key performance indicators (KPI's) used to generate initial recommendations.
- **Action 4 Base Year LAM Development:** Local area models (LAM) are developed for the N3/N4/M50 boundary area, and the network surrounding the Ashtown level crossing. These models provide a more detailed representation of the local road network and zone system. They are calibrated and validated to traffic count data in accordance with Transport Infrastructure Ireland's (TII) *Project Appraisal Guidelines (PAG) for National Roads Unit 5.1 – Construction of Transport Models (October 2016)* to ensure they provide a robust representation of the existing road network.
- **Action 5 Stage 2 Options Assessment:** The test options are re-assessed in the calibrated and validated LAMs to support the identification of the preferred option/options and recommendations of this study.
- **Action 6 Final Report:** A final report is generated that fully details all elements of the project to date, summarising the assessment carried out, the process of comparative analysis and presenting of recommendations from the study.

1.3 Purpose of this Report

1.3.1 The *Maynooth Line Transport Study Stage 1 Options Assessment Report* focused on Actions 1-3 outlined above, and presented the results of the Stage 1 Options Assessment carried out using the ERM.

1.3.2 This report focuses on the re-testing of the level crossing replacement options within calibrated and validated Local Area Models (Action 4 and 5) to further inform, and finalise, the conclusions and recommendations of the Maynooth Line Transport Study.

1.3.3 In summary, this report includes the following chapters:

Chapter 2 – Review of Planning and Policy Documents

Chapter Two provides an overview of relevant National, Regional and local polices, and guidelines, along with previous studies undertaken in the area, which were used to inform this Maynooth Line Transport Study.

Chapter 3 – Baseline Transport Assessment

Chapter Three evaluates the current traffic conditions experienced at the Maynooth line level crossings, including a review of existing pedestrian and cycle infrastructure/facilities.

Chapter 4 – Assessment Methodology

Chapter Four provides an overview of the methodology used to assess the impact of closing the level crossings along the Maynooth rail line to vehicular traffic, along with pedestrian and cyclists.

Chapter 5 – Options for Assessment

Chapter Five provides an overview of the road based options tested as part of the Maynooth rail line level crossing closure study. The options include different variations in the provision of replacement infrastructure for vehicular traffic at each crossing point.

Chapter 6 – Road Based Assessment Results

Chapter Six outlines the results of the road based assessment of the Level Crossing Closure Options tested using the Local Area Models.

Chapter 7 – Pedestrian and Cyclist Assessment Results

Chapter Eight provides an overview of the analysis undertaken to determine the impact of the proposed level crossing closures on pedestrians and cyclists.

Chapter 8 – Summary and Conclusions

Finally, Chapter Eight provides a general summary of this report including the key conclusions and recommendations.

2. REVIEW OF PLANNING & POLICY DOCUMENTS

2.1 Introduction

2.1.1 The following chapter provides an overview of relevant National, Regional and local polices, and guidelines, along with previous studies undertaken in the area, which were used to inform this study.

- **National Policies/Plans**: Provide information on future targets for population and employment, and identify specific schemes such as DART expansion which should be prioritised to support this growth in a sustainable manner;
- **Regional Strategies/Schemes:** Include information on a number of schemes proposed to support walking, cycling and public transport use which are likely to impact on the level crossings such as DART Expansion, the Royal Canal Urban Greenway, Bus Connects, and upgrade of the wider GDA cycle network;
- **Local Plans:** Provide information on specific development plans in close proximity to the level crossings along the Maynooth line. Growth in population, employment and education at these locations could lead to an increase in the requirement for north-south connectivity across the rail line.
- **Previous Studies:** Results and recommendations from previous studies carried out in the area have been used to inform the Maynooth Line Transport Study, particularly regarding the identification of options for replacement infrastructure.

2.1.2 Table 2.1 below outlines the key documents reviewed within the following sections.

Table 2.1 Planning and Policy Documents

National Level
▪ National Planning Framework – Ireland, Our Plan 2040 ▪ National Development Plan, 2018-2027 ▪ Smarter Travel: a Sustainable Transport Future; 2009-2020
Regional Level
▪ Transport Strategy for the Greater Dublin Area (2016-2035) ▪ Regional Planning Guidelines for the Greater Dublin Area (2010-2022) ▪ Fingal County Development Plan (2017 – 2023) ▪ Draft Regional Spatial and Economic Strategies (RSES) ▪ Royal Canal Urban Greenway
Local Level
▪ Ashtown-Pelletstown LAP ▪ Hansfield SDZ ▪ Barnhill LAP

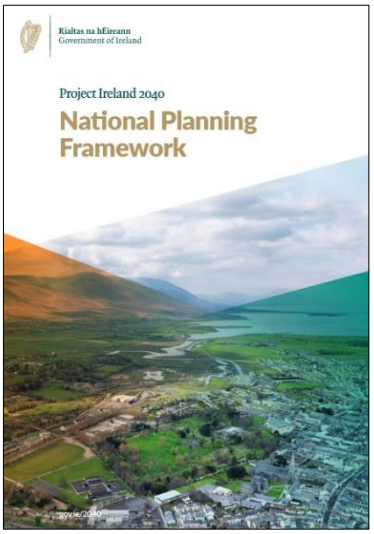
Previous Studies

- Maynooth Line – Urban Level Crossings. December 2011
- Ashtown Level Crossing Closure – Traffic impacts. December 2011
- Proposed Closure of Porterstown Road Railway Level Crossing
- Maynooth Rail Line Upgrade - Traffic Implications Report. March 2012

2.2 National Policy & Strategies

Ireland 2040 Our Plan: National Planning Framework

2.2.1 The National Planning Framework (NPF) outlines the new strategic planning and development strategy for the whole of Ireland and all its regions for the next 20 years. The document co-ordinates national, regional and local authority policies and activities through one central strategy, providing a reference point to adhere to.



2.2.2 NPF key enablers for growth in Fingal and Dublin Metropolitan area are as follows:

- Delivering key rail projects including DART Expansion and MetroLink .
- Developing of a better bus system, with better orbital connectivity and integration with other transport networks.
- Delivery of a Metropolitan cycle network.
- Relocation of less intensive land uses from inside the M50 ring road and from the existing built up area.
- Improving access to Dublin Airport, including improved public transport access, connections from the road network from the west and north and in the longer-term consideration of heavy rail access to facilitate direct access from the rail network in the context of potential electrification.

National Development Plan (NDP) 2018-2027

2.2.3 The National Development Plan sets out the investment priorities that underpin the successful implementation of the National Planning Framework (NPF). This will guide national, regional and local planning and investment decisions in Ireland over the next two decades, to cater for an expected population increase of over 1 million people.

2.2.4 The National Development Plan demonstrates the Government's commitment to meeting Ireland's infrastructure and investment needs over the next ten years, through a total investment estimated at €116 billion over the period.

2.2.5 The investment in public transport programmes set out in the plan is inclusive but not exhaustive as per list below:

- Delivery of priority elements of the DART Expansion Programme including investment in new train fleet, new infrastructure and electrification of existing lines.
- Continued investment in bus and train fleets, as well as infrastructure.
- Delivery of the full BusConnects programme for all of Ireland's cities.
- Transition to low emission buses, including electric buses, for the urban public bus fleet.
- Complete construction of Metro Link.
- Delivery of comprehensive cycling and walking network for Ireland's cities.
- Supporting programmes of rail and bus station improvement/development, traffic management investment, passenger information programmes, public bicycle share schemes, accessibility enhancements and similar.

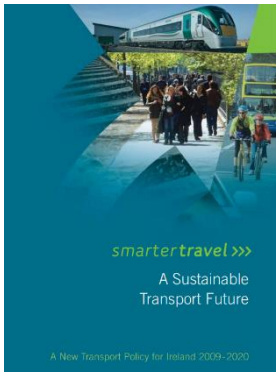
2.2.6 The DART Expansion Programme consists of a number of investment projects that will significantly expand the heavy rail capacity, frequency, and connectivity in Dublin city centre and throughout the GDA. These projects include the following elements:

- City Centre Enhancements to increase capacity;
- Removal of level crossings, re-signalling and electrification of the Sligo Line from Connolly to Maynooth;
- Electrification of the Cork Line to Hazelhatch and completion of 4 tracking from Park West to Heuston;
- Extension of electrification of the Northern Line from Malahide to Drogheda;
- Expansion of fleet and depot facilities; and
- In the longer term, the DART Underground Project, consisting of a 7.6km underground tunnel through Dublin city to link the Northern Line to the Cork Line.

Figure 2.1 Proposed Public Transport Network 2027

Smarter Travel: A Sustainable Transport Future 2009-2020 (DTTAS, 2009)

2.2.7 This National Government policy outlines clear targets to:



- Address the current unsustainable transport and travel patterns and to reduce the health and environment impacts of current trends.
- To deliver a sustainable transport system in line with climate change targets.
- Reduce work related commuting by car from a current modal share of 65% down to 45% by 2020.
- Increase commuting by alternative sustainable modes to 55% by 2020.

2.2.8 The document outlines five **key** goals necessary for achieving sustainability in transport. These are:

- Reduce overall travel demand and commuting distances travelled by car.
- Improve economic competitiveness through maximising the efficiency of the transport network and alleviating congestion and infrastructure bottlenecks.
- Reduce reliance on fossil fuels and thus improve security of energy supply.

- Minimise the negative impacts of transport on the local and global environment by reducing air pollutants and Greenhouse Gas emissions attributed to travel.

- Improve accessibility to transport and improve quality of life with an emphasis on people with reduced mobility and those experiencing isolation as a result of a lack of transport.

2.3 Regional Plans & Strategies

NTA Transport Strategy for Greater Dublin Area 2016-2035

2.3.1 There are a number of key transport infrastructure measures proposed by the NTA Greater Dublin Area (GDA) Transport Strategy which now form a part of the Government's Project Ireland 2040 - National Planning Framework (NPF) and National Development Plan (NDP) 2018-2027.

2.3.2 These key infrastructure measures include DART Expansion, MetroLink, Luas, and BusConnects. These schemes, which will support the delivery of an environmentally sustainable low-carbon public transport system, will ensure that public transport will be able to meet the significant growth in passenger demand for public transport services in the Eastern and Midlands Region by 2040.

DART Expansion

2.3.3 The DART Expansion Programme consists of a number of constituent elements that will create an expanded, linked and interconnected electrified DART network, with significantly improved network capacity for the metropolitan area, the GDA and the outer Regions. Initial investment will deliver the non-underground tunnel elements of the programme using the recently opened rail link and existing connector tunnel under the Phoenix Park.

2.3.4 The initial investment will focus on buying additional fleet for the DART network and measures such as city centre capacity enhancements, re-signalling, junction modifications and station changes to provide expanded services. The next stage will be to provide fast, high-frequency electrified services to Maynooth and the M3 Parkway on the Maynooth/Sligo Line, to Drogheda on the Northern Line, and to Celbridge/Hazelhatch on the Kildare Line.

2.3.5 DART services will continue to be provided on the South-Eastern Line as far as Greystones. It will also include new stations to provide interchange with bus, Luas and Metro networks.

2.3.6 This integrated rail network will provide a core, high-capacity transit system for the region and will deliver a very substantial increase in peak-hour capacity on all lines from Drogheda, Maynooth, Celbridge/Hazelhatch and Greystones.

MetroLink

2.3.7 The MetroLink project is a high frequency/high capacity urban railway service that will run between Swords and Charlemont, connecting important key destinations such as Dublin

METROLINK

Airport, and City Centre, creating fully integrated public transport in the Greater Dublin area.

2.3.8 The objective of MetroLink is "to provide a safe, high frequency, high capacity, fast, efficient and sustainable public transport light rail service connecting Swords, Dublin Airport and Dublin City Centre."

Bus Connects and Core Bus Corridor Project

2.3.9 Bus Connects is a programme aimed at overhauling the current bus system in the Dublin region by:

- building a network of "next generation" bus corridors on the busiest bus routes to make bus journeys faster, predictable and reliable;
- completely redesigning the network of bus routes to provide a more efficient network, connecting more places and carrying more passengers; and
- developing a state-of-the-art ticketing system using credit and debit cards or mobile phones to link with payment accounts and making payment much more convenient;

2.3.10 Figure 2.2, overleaf, illustrates the proposed new Bus Connects network of services in the vicinity of the Maynooth line level crossings. As shown in Figure 2.2, route 252 is the only service proposed to travel via the existing level crossings (Clonsilla) under the re-designed bus network.

2.3.11 As part of the Bus Connects implementation, a Core Bus Corridor (CBC) is also proposed between Blanchardstown and the city centre. This will facilitate improved priority along this route for buses, and assist in providing increased headways and efficiency. It should be noted that DART Expansion, and the proposed level crossing closures along the Maynooth line, will not impact on the delivery of the Blanchardstown to City Centre CBC

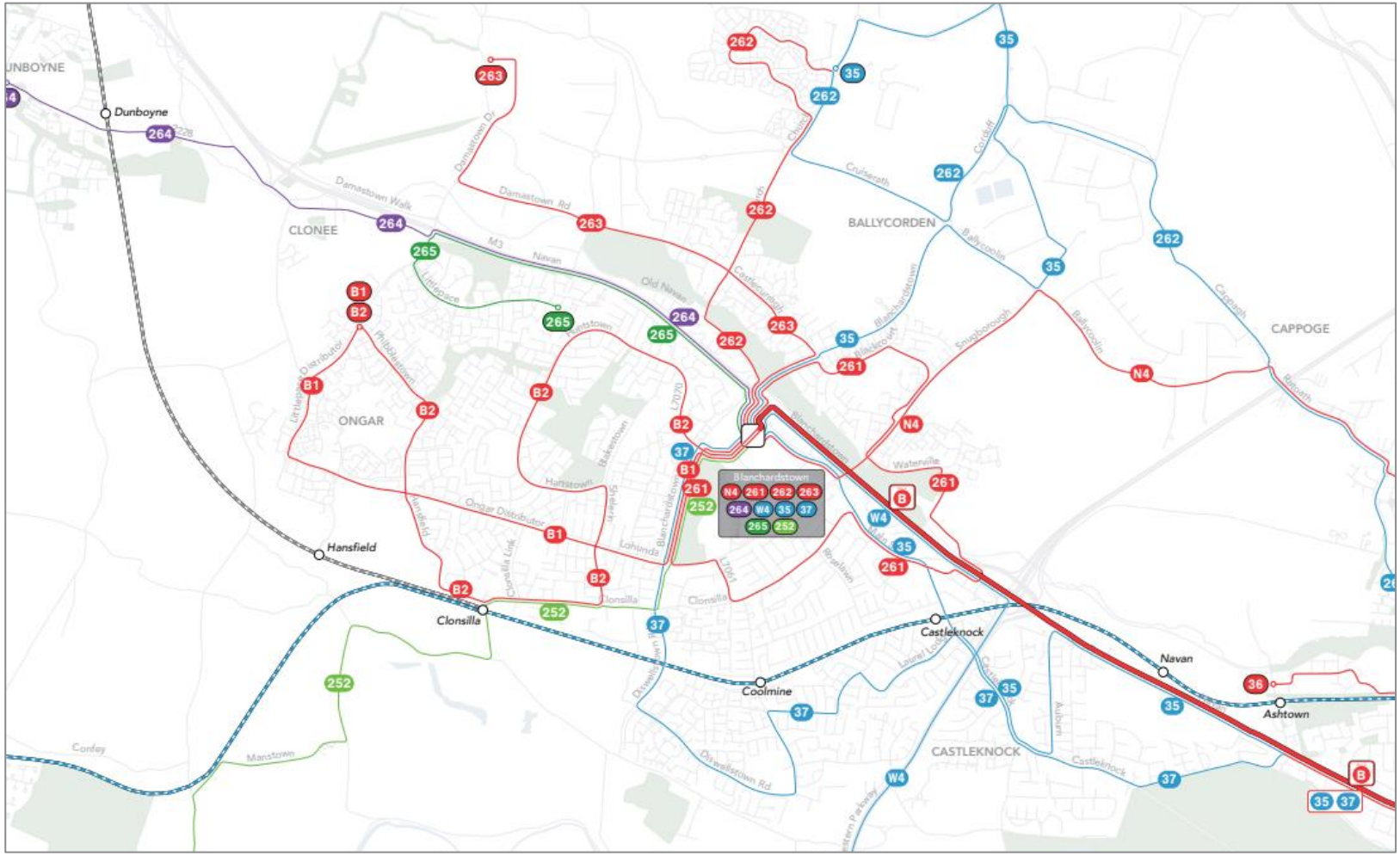


Figure 2.2 Proposed Bus Connects Network

Greater Dublin Area Cycle Network Plan

2.3.12 The Greater Dublin Area Cycle Network Plan sets out a 10-year strategy to expand the urban cycle network from 500km to 2,480km. The overarching ambition of the scheme is, by 2021, to increase the numbers who commute by bike to be the same amount as those who commute by bus.

2.3.13 The network will consist of a series of primary, secondary and feeder routes as well as greenways routes. These routes will comprise of a mix of cycle tracks and lanes, cycleways and infrastructure-free cycle routes in low traffic environments. To compliment the investment in the cycle network, the cycle network plans also provide for:

- Sufficient on and off street public cycle parking at key urban destinations such as bus/rail stations, schools and large workplaces.
- The expansion of the bike share scheme in Dublin City and the introduction of similar schemes across the Greater Dublin Area.
- The implementation of a comprehensive cycle route signage programme in conjunction with the development of the cycle network.

2.3.14 The proposed network of primary, secondary and greenway routes that will help support cycling in the vicinity of the studied area is shown on the Figure 2.3, overleaf.

2.3.15 The plan includes the development of the Royal Canal Greenway. The Sligo line is immediately parallel to the Royal Canal from City Centre to Maynooth. The canal towpath is paved from North Strand Road as far as Ashtown, with a good quality gravel surface from there to Blanchardstown. This path is in use by cyclists as a de-facto cycleway at present. A number of design studies are underway to develop a high quality cycle track along the canal westward to Maynooth, as the Royal Canal Urban Greenway which is on Public Consultation process at the moment. Details of this study are outlined later in this section.

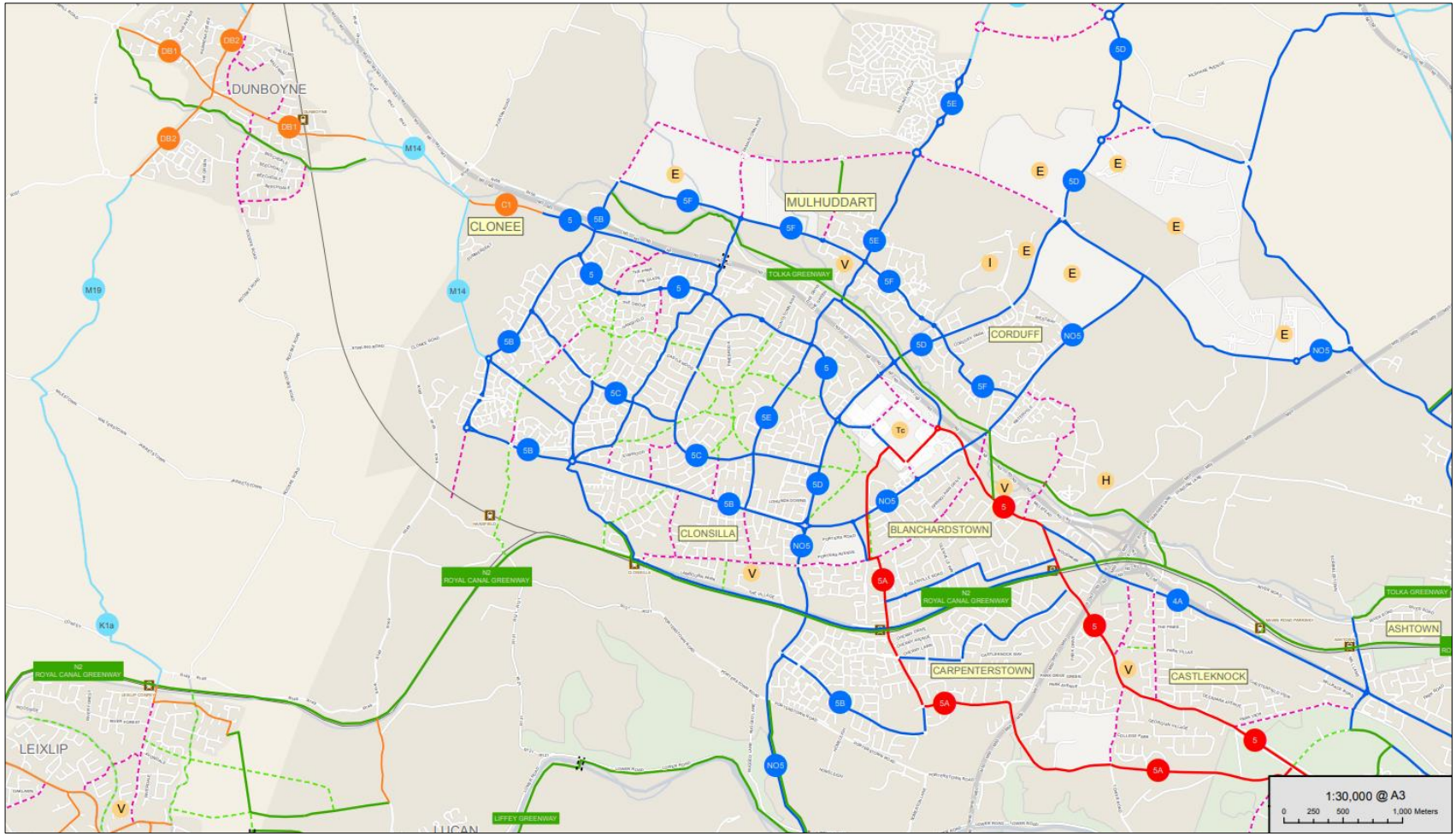


Figure 2.3 Greater Dublin Area Cycle Network Plan

Fingal Development Plan 2017-2023

2.3.16 The Fingal Development Plan (FDP) 2017-2023 is a 6-year strategy outlining the Council's vision for long term development of the County as an integrated network of vibrant, socially and economically successful settlements and communities. With sustainability at its core, the plan seeks to develop and improve the social, economic, environment and cultural assets of the county as it is viewed that sustainable human life cannot be achieved without sustainable local communities.

2.3.17 Fingal is the fastest growing local authority in Ireland and due to its location, is strategically important for employment. Improving transport within Fingal is seen as key to the future economic, social and physical development of Fingal and the plan seeks to ensure these developments are sustainable. Despite the emphasis on sustainable development, the plan accepts that some essential journeys must be made by car.

2.3.18 The main aims of the Development Plan relating to transport are as follows:

- To protect and improve the quality of the built and natural environment.
- To ensure the provision of adequate housing, necessary infrastructure and community facilities.
- To incorporate sustainable development, climate change mitigation and adaptation, social inclusion, high quality design and resilience as fundamental principles, cross cutting and underpinning the Development Plan.
- To promote an appropriate balance of development across the County, by developing a hierarchy of high quality, vibrant urban centres and clearly delineated areas of growth, and favouring expansion in areas nearest to existing or planned public transport nodes.
- To ensure an adequate supply of zoned lands to meet forecasted and anticipated economic and social needs, while avoiding an oversupply which would lead to fragmented development, dissipated infrastructural provision and urban sprawl.
- To promote and facilitate movement to, from, and within the County of Fingal, by integrating land use with a high quality, sustainable transport system that prioritises walking, cycling and public transport.
- To provide an appropriate level of safe road infrastructure and traffic management, in particular to support commercial and industrial activity and new development.
- To work with all relevant stakeholders to seek a reduction in greenhouse gas emissions from transport.

2.3.19 The Development Plan sets out the national and region population targets set by NSS for the Fingal County. This results in an annual growth rate of 1.7% between 2011 and 2022.

Draft Regional Spatial and Economic Strategies (RSES)

2.3.20 The Regional Spatial and Economic Strategy (RSES) Draft is currently on display. The RSES include a spatial strategy for the future location of employment, housing and retail development along with supporting infrastructure and services.

2.3.21 The vision of the draft RSES is "To create a sustainable and competitive region that supports the health and wellbeing of our people and places, from urban to rural, with access to quality housing, travel and employment opportunities for all".

2.3.22 The RSES provides an Investment Framework to prioritise the delivery of key enabling infrastructure and services by government and state agencies.

2.3.23 North –West Corridor (Maynooth/Dunboyne line and DART expansion scheme) is identified as a strategic residential and employment development corridor to create sustainable compact communities with improved housing choice, access to social and economic opportunities, enhanced services and amenities.

Royal Canal Urban Greenway

2.3.24 Fingal County council, in conjunction with the National Transport Authority and Waterways Ireland, is preparing a pedestrian and cycle route along the Royal Canal tow path between Castleknock, Blanchardstown, Coolmine, Clonsilla, Hansfield and the Fingal County Boundary.

2.3.25 The proposed Urban Greenway, illustrated in Figure 2.4, overleaf, will encourage recreation while offering an attractive alternative transport choice for school children and commuters, bringing significant environmental, economic and health benefits to the wider community.

2.3.26 An Emerging Preferred Route for the scheme is now available and under public consultation. Further information on the proposed scheme can be found at: https://consult.fingal.ie/en/consultation/royal-canal-urban-greenway-public-engagement

Figure 2.4 Royal Canal Urban Greenway

2.4 Local Plans & Strategies

Ashtown-Pelletstown LAP (January 2014)

2.4.1 Dublin City Council, in accordance with the provisions of Section 19 and 20 of the Planning and Development Act, 2000 (as amended), resolved to extend the Ashtown-Pelletstown Local Area Plan, 2014, until December 2023[1].

2.4.2 Ashtown-Pelletstown LAP is bounded by the River Tolka to the North and the Maynooth rail line to the South, the plan area is broadly rectilinear, extending from the Ashtown Road on the western side to just east of the Ratoath Road at the eastern end.

2.4.3 The vision for Ashtown-Pelletstown LAP area is "The creation of a sustainable living and working environment with a strong urban identity, anchored by mixed-use supporting hubs and benefitting from both good permeability and quality public transport options. The area shall be characterised by a vibrant social mix, reflected in a variety of housing options and community facilities/amenities, well integrated with the wider city via improved infrastructure and green infrastructure".

2.4.4 The LAP Transport Objectives related to this study can be summarised as follows:

- To facilitate the delivery of a second train station close to Ratoath Road, incorporating a pedestrian and cycle bridge over the canal and rail line. A contract for construction of Pelletstown Station is currently being progressed.

[1] http://www.dublincity.ie/main-menu-services-planning-urban-development-plans-local-area-plans/ashtown-pelletstown-local-area

- To encourage and facilitate, in cooperation with Fingal County Council and Iarnród Éireann, the replacement of the existing manually operated rail level crossing at Ashtown Road, with suitably designed alternative. The eventual design shall have regard to both existing and proposed developments in the immediate vicinity of the plan area and provide for high quality pedestrian and cycle facilities linking with existing and proposed pedestrian cycle networks both within and surrounding the LAP area.

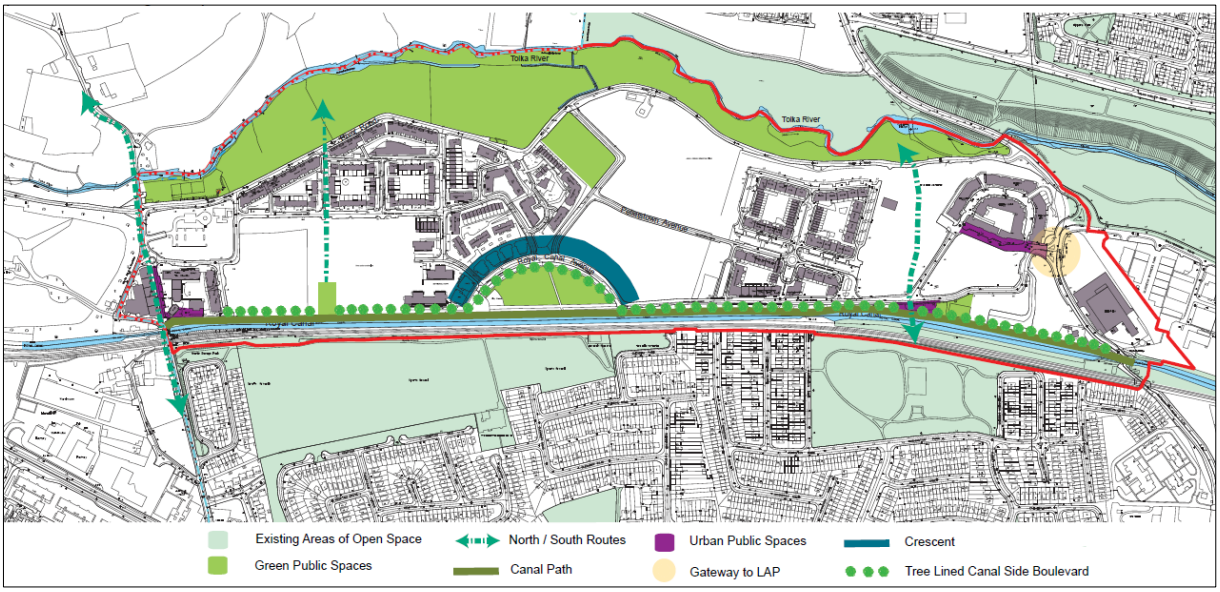


Figure 2.5 Ashtown-Pelletstown LAP, Structuring Principles

Hansfield SDZ, April 2006

2.4.5 Fingal County Council published the Hansfield Strategic Development Zone Report in 2006[2]. The Hansfield SDZ comprises approximately 80.74 hectares of land in south West Blanchardstown close to the county boundary with County Meath.

2.4.6 The SDZ was approved by An Bord Pleanála in April 2006 and a number of residential units are occupied. The site is currently active with residential units under construction in the SDZ (Zones 1, 2, 4 & 6).

2.4.7 The Transport Strategy for the SDZ included the opening of the old Navan Line. The first phase of the proposed railway linking Navan to Dublin opened in September 2010. Over 25 trains each way per day now run between the new M3 Parkway Station, Dunboyne and Dublin city centre. Part of the strategic infrastructure within the SDZ was to provide a new train station within the SDZ lands, and Hansfield train station was opened in 2013.

2.4.8 In addition, pedestrian/cyclist connection to Clonsilla Train Station will be provided as part of the SDZ strategy. Figure 2.6, overleaf, illustrates the extent of the SDZ lands.

[2] http://www.fingal.ie/planning-and-buildings/development-plans-and-consultations/studies-and-reports/hansfield-strategic-development-zone/

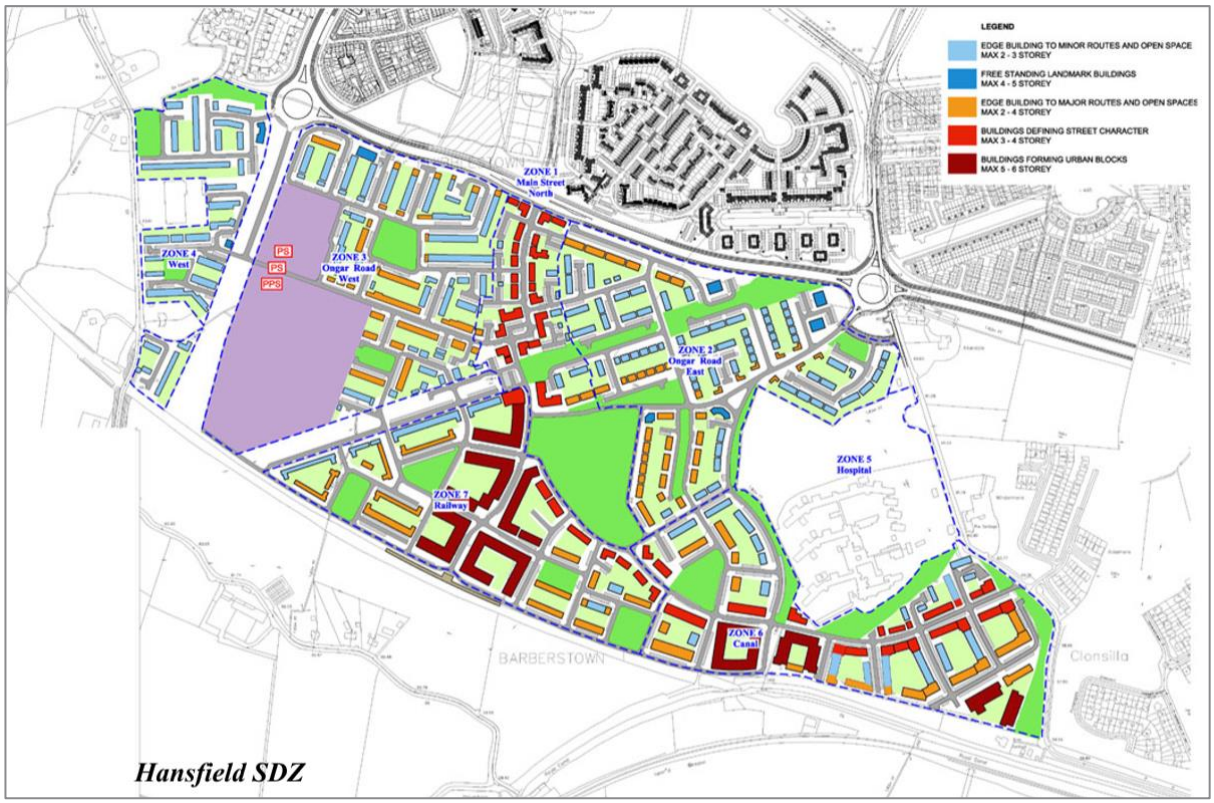


Figure 2.6 Hansfield Strategic Development Zone Lands

Barnhill LAP

2.4.9 Fingal County Council published Barnhill LAP in October 2018[3]. The Plan comprises 45.64 hectares of greenfield, illustrated in Figure 2.7, overleaf. The designated area is located approximately 3km from Blanchardstown Town Centre, situated directly south of the Dunboyne to Clonsilla rail Line, west of the Royal Canal and the Dublin-Maynooth Railway Line, and east of the R149.

2.4.10 The Vision for Barnhill is to create a place to live that is appealing, distinctive and sustainable, maximising the opportunities provided by the surrounding natural environment for biodiversity and improved amenities. It is envisaged that Barnhill will develop as a sustainable community comprised of new homes, community, leisure and educational facilities based around an identifiable and accessible new local centre which will form the heart of the area.

2.4.11 Key aims of the LAP Movement and Transport Strategy are:

- Improve accessibility and maximise public transport use, taking account of the land's location adjoining Hansfield train station.
- Encourage use of sustainable transport options. Walking and cycling shall be encouraged, particularly for shorter trips.
- Prioritise planned infrastructure that supports public transport, and ensures the land use strategy is informed by, and integrated with transportation objectives.

[3] https://consult.fingal.ie/en/consultation/barnhill-local-area-plan

- Seek the interconnection of walking and cycling routes with key public transport and amenity destinations (both existing and planned).

- Encourage sustainable densities of population, such that public transport is supported and sustained, and walking and cycle routes are kept active.

2.4.12 In order to provide for a coherent sustainable movement and transport strategy, and to maximise development capacity within the LAP lands, it is required to deliver the necessary extension of the Ongar-Barnhill road with provision of a new bridge over the Dunboyne (Pace) – Clonsilla rail line and provision of a new junction with the existing road network. This will connect the Ongar road to the existing Clonee-Lucan road (R149).

Figure 2.7 Barnhill LAP

2.5 Previous Studies

Maynooth Line Urban Level Crossings, December 2011

2.5.1 Roughan & O'Donovan on behalf of the Iarnród Éireann, prepared the Maynooth Line Urban Level Crossing Study, to assess the replacement and removal of the 6 no. of level crossings along the Maynooth Line.

2.5.2 The study undertook a feasibility appraisal of a number of alternative proposals for each level crossing closure. At each of the six locations, shortlisted options were

selected and preliminary designs, cost estimates and procurement timelines are presented.

2.5.3 The shortlisted replacement options are summarised in Table 2.2 below. As part of this study, these options were reviewed in a workshop with the NTA, and Irish Rail, based on recent developments in terms of land ownership, engineering constraints etc. One option at each crossing was selected for the transport modelling purposes of this study, and further details are provided in Chapter 5 later in this report.

Table 2.2 Maynooth Line Urban Level Crossing, Route Options - ROD Study

CROSSING	ROD Option	Route Option Descriptions	Included in Modelling Assessment
Ashtown	Option 2	This involves re-routing Ashtown Road along its old alignment on Mill Lane and passing under the railway and the Royal Canal.	✓
	Option 7	The route of this option runs from a new roundabout immediately south of the existing level crossing along the southern side of the railway station and north of Martin Savage Park. The route then climbs on an embankment along the edge of the sports pitches abutting the southern side of the railway reservation before passing over the railway and canal. The route then descends to a new roundabout tying into the existing road network north of the railway.	✗
Coolmine	Option 3	This option involves the construction of a new link road connecting St. Mochta's Grove at the northern end through to a new roundabout on Luttrell Park Road at the southern end. A bridge approximately 43 metres in length would span over the railway and canal with raised embankments at either end.	✓
	Option 4	Horizontally this option follows a similar route to Options 3 commencing at St. Mochta's Grove at the northern end through to a new roundabout on Luttrellpark Road at the southern end. This option entails passing under the railway and over the canal. Given the limited height clearance available, the bridge over the canal would require an opening or lifting span.	✗
Porterstown	Option 1a	This option involves closing the old Porterstown Road where traffic will divert via the new Porterstown / Diswellstown link road to the east. A new pedestrian footbridge would be constructed online of the Old Porterstown Road while the level crossing would be closed.[4]	✓
Clonsilla	Option 2	This option involves the construction of an overbridge approximately 200m to the east of the existing level crossing. This overbridge will span the railway and the canal perpendicularly and will tie in to the Clonsilla Link Road at the northern end of scheme and at a proposed roundabout at the southern end of the scheme along Luttrellstown Road (R121).	✗

[4] Within the Maynooth Line Transport Study, it is assumed that the existing Porterstown Level Crossing will be closed to vehicular traffic due to the availability of the new Porterstown / Diswellstown link road to the east. The requirement for new pedestrian and cyclist infrastructure is assessed in Chapter 7 of this report.

CROSSING	ROD Option	Route Option Descriptions	Included in Modelling Assessment
	Option 4	This option involves the construction of an overbridge approximately 210 metres west of the existing level crossing. The existing Clonsilla Road runs parallel to the railway at this location. It is proposed to raise the road to the east and west of the proposed bridge, and to bridge both the railway and canal. This will tie into the Clonsilla Road south of the existing level crossing. A structure will be required to span the railway and the canal.	✓
Barberstown	Option 3	This route option is located approximately 195 metres to the east of the existing level crossing. This option is approximately 1150 metres in length and links the R121 to the south and the Ongar Distributor Road to the north. To the north the route ties into an existing roundabout on the Ongar Distributor Road while to the south a new off-line roundabout would need to be constructed with a realignment of the R121. Three new overbridges would be required, one to span the Maynooth Line, another over the Royal Canal and further bridge to span the Clonsilla Navan Line in the vicinity of Hansfield Station.	✗
	Option 4	This option takes the form an overbridge spanning the railway and canal along with a roundabout at either end of route option to facilitate a tie-in with the existing road network approximately 250 metres to the west of the existing level crossing.	✓
Blakestown		This option involves closing the local road and the provision of a pedestrian footbridge over the railway and canal to accommodate local pedestrian activity along the existing route. Car and other vehicular traffic would be accommodated on the nearby higher quality Celbridge Link Road.[5]	✗

Ashtown Level Crossing Closure – Traffic Impacts, December 2011

2.5.4 Clifton Scannell Emerson, on behalf of Fingal County Council, carried out an assessment of the likely traffic impacts that closing the level crossing at Ashtown Station would have on the surrounding road network.

2.5.5 The Conclusions of the study were as follows:

- Closing the level crossing at Ashtown Station would have the effect of removing through traffic on Ashtown Road thus reducing traffic volumes at Ashtown Village. The closure could potentially remove approximately 29 vehicles from AM peak hour traffic on River Road east of Ashtown Road. However, there would be an increase in traffic flows of approximately 74 vehicles on River Road west of Ashtown Road.

- The resulting increases in journey times and travel distances for people living and working in the Ashtown Village/Scribblestown Road or Ashtown Road/Mill Lane areas could be significant. Given the local severance that will be caused,

[5] The closure of Blakestown Level Crossing is re-assessed within the Maynooth Line Transport Study, and the results are presented in Chapters 6 and 7 of this report.

the provision of a pedestrian bridge over the rail line should be examined if the level crossing is to be closed.

- The current traffic flow through the level crossing is relatively low at 6,125 AADT. The surrounding road network should be able to absorb this level of redistributed traffic, given that a new bridge will be provided at the Ratoath Road crossing.

- The value of providing a new bridge crossing at Ashtown for this level of traffic should be further examined. The cost of providing this new bridge crossing would be significant when compared to the potential benefit for the relatively low volumes of traffic that could otherwise redistribute to the new Ratoath bridge crossing.

Maynooth Rail Line Upgrade – Traffic Implications Report, March 2012

2.5.6 Clifton Scannell Emerson Associates were appointed by Fingal County Council to carry out an assessment of the traffic implications of the proposed closure of the level crossings on the Maynooth Rail line at Ashtown, Coolmine, Porterstown, Clonsilla and Barberstown.

2.5.7 The Conclusions of the study were as follows:

- In the horizon year (2033) two replacement routes will be required to cater for traffic across the Maynooth Rail line west of the M50 if the Coolmine, Porterstown, Clonsilla and Barberstown level crossings were closed. These replacement crossings are required at Coolmine and Barberstown.

- In the short term, a single new bridge crossing at either Barberstown or in the interim at Clonsilla will be required. Given that the future scenario requires the Barberstown and Coolmine options, the short-term provision of the Barberstown route including the Ongar-Barnhill Scheme is recommended. The option at Barberstown including the Ongar-Barnhill link has the advantage that it provides a better quality link to the Ongar Road and an alternative to the substandard R149 route. This is particularly important when future demand flows are considered under the 2033 model. This route keeps traffic congestion away from Clonsilla and Coolmine and can be provided on a green field route reserved in the Hansfield SDZ and Barnhill zoned lands.

- Consideration needs to be given to local pedestrian, cyclist and vehicular access issues at each closed level crossing.

Proposed Closure of Porterstown Road Railway Level Crossing, March 2013

2.5.8 Clifton Scannell Emerson on behalf of Fingal County Council, prepared the Proposed Closure of Porterstown Road Railway Level Crossing study.

2.5.9 Fingal County Council with part funding from the NTA have recently completed the Porterstown Link road which, combined with Dr. Troy bridge, provides an alternative route for traffic, facilitating the closure of the Porterstown Level Crossing.

2.5.10 The alternative for pedestrian and cyclists is the provision of a footbridge. The options considered are as follows:

- Option 1: footbridge to the west of the existing level crossing
- Option 2: pedestrian/cyclist footbridge with full universal access ramps

2.5.11 The Conclusions of the study were as follows:

- The provision of a Pedestrian Footbridge Option 1 is recommended. This provides pedestrian access across the closed level crossing in the most efficient manner.
- An alternative with full universal access is in place for people via Dr. Troy Bridge.
- Cyclists can also avail of the alternative route which has dedicated cycle facilities in place.

2.6 Summary

2.6.1 This chapter provided an overview of the relevant national, regional and local policies, along with previous studies, strategies and plans that relate to Maynooth Line Transport Study. In Summary, the following documents were reviewed:

- National Policies and Strategies:
  - National Planning Framework – Ireland, Our Plan 2040
  - National Development Plan, 2018-2027
  - Smarter Travel: a Sustainable Transport Future; 2009-2020

- Regional Plans and Strategies:
  - Transport Strategy for the Greater Dublin Area (2016-2035)
  - Fingal County Development Plan (2017 – 2023)
  - Regional Spatial and Economic Strategies (RSES)
  - Royal Canal Urban Greenway.

- Local Plans and Strategies:
  - Ashtown-Pelletstown LAP
  - Hansfield SDZ
  - Barnhill LAP

- Previous Studies:
  - Maynooth Line – Urban Level Crossings. December 2011
  - Ashtown Level Crossing Closure – Traffic impacts. December 2011
  - Proposed Closure of Porterstown Road Railway Level Crossing
  - Maynooth Rail Line Upgrade - Traffic Implications Report. March 2012

- Key points contained in the above documents include:
  - There are a number of key transport infrastructure measures which form a part of the Government's Project Ireland 2040 - National Planning Framework (NPF) and National Development Plan (NDP) 2018-2027, and the NTA Greater Dublin Area (GDA) Transport Strategy;
  - These key infrastructure measures include DART Expansion, Metro Link, Luas, and Bus Connects. These schemes, which will support the delivery of an environmentally sustainable low-carbon public transport system, will ensure that public transport will be able to meet the significant growth in passenger demand for public transport services in the Eastern and Midlands Region by 2040;
  - The DART Expansion Programme consists of a number of investment projects that will significantly expand the heavy rail capacity, frequency, and connectivity in Dublin city centre and throughout the GDA. These projects include the Electrification of the Sligo Line to Maynooth, together with the removal of level crossings and re-signalling on this line;
  - A number of Local Area Plans and planning applications have been prepared along the railway line boundary lands. The transport implications of these applications are outlined in this chapter.
  - Previous studies have been undertaken by Clifton Scannell Emerson and Roughan & O'Donovan in 2011, 2012 and 2013, to assess the replacement and removal of the six level crossings along the Maynooth Line. The options assessed, and conclusions of each study, are summarised in this chapter.

3. BASELINE TRANSPORT ASSESSMENT

3.1 Introduction

3.1.1 The following chapter provides an overview of existing traffic and transport conditions within the study area, with a particular focus on the following:

- **Traffic Survey Results**: A review of traffic counts undertaken within the study area to gain a greater understanding of traffic demand at key locations, journey times across the network and pedestrian and cyclists volumes using the existing level crossings;

- **Public Transport Review:** Provides an overview of the nature and characteristics of existing Maynooth Line Rail services and the resultant level crossing closure patterns. Also included is information on existing bus services that may be impacted by the proposed level crossing closures; and

- **Level Crossing Existing Conditions Review:** A review of the existing level crossings with particular focus on facilities, and accessibility, for pedestrians, cyclists and vehicular traffic.

3.2 Traffic Surveys Results

3.2.1 Traffic survey data was collected to gain an understanding of existing traffic conditions within the study area, and to assist in calibration and validation of the base year local area models. TRACSIS were commissioned to undertake the following surveys:

- Automatic Traffic Counts (ATC) at 35 location;
- Pedestrian and Cyclist counts at 2 locations; and
- Junction Turning Counts (JTC) at 48 locations;

3.2.2 This data was supplemented with counts undertaken in the study area by Fingal County Council (FCC), and journey time information on key routes extracted from a database of Satellite Navigation data housed within the NTA. The following sections of this chapter provide information on each of the surveys outlined above including site locations and observed results.

Automatic Traffic Counts (ATC)

3.2.3 Automatic Traffic Counts (ATC's) were undertaken at 35 locations across the network, as illustrated in Figure 3.1 overleaf, over a 3-week period from Monday 28th January to Sunday 14th February. The ATC data provides information on:

- The daily and weekly profile of traffic within the study area;
- Busiest time periods and locations of highest traffic demand on the network;
- Any issues on the network during the survey period e.g. accidents, road closures etc.; and
- Typical speed of traffic on the network.

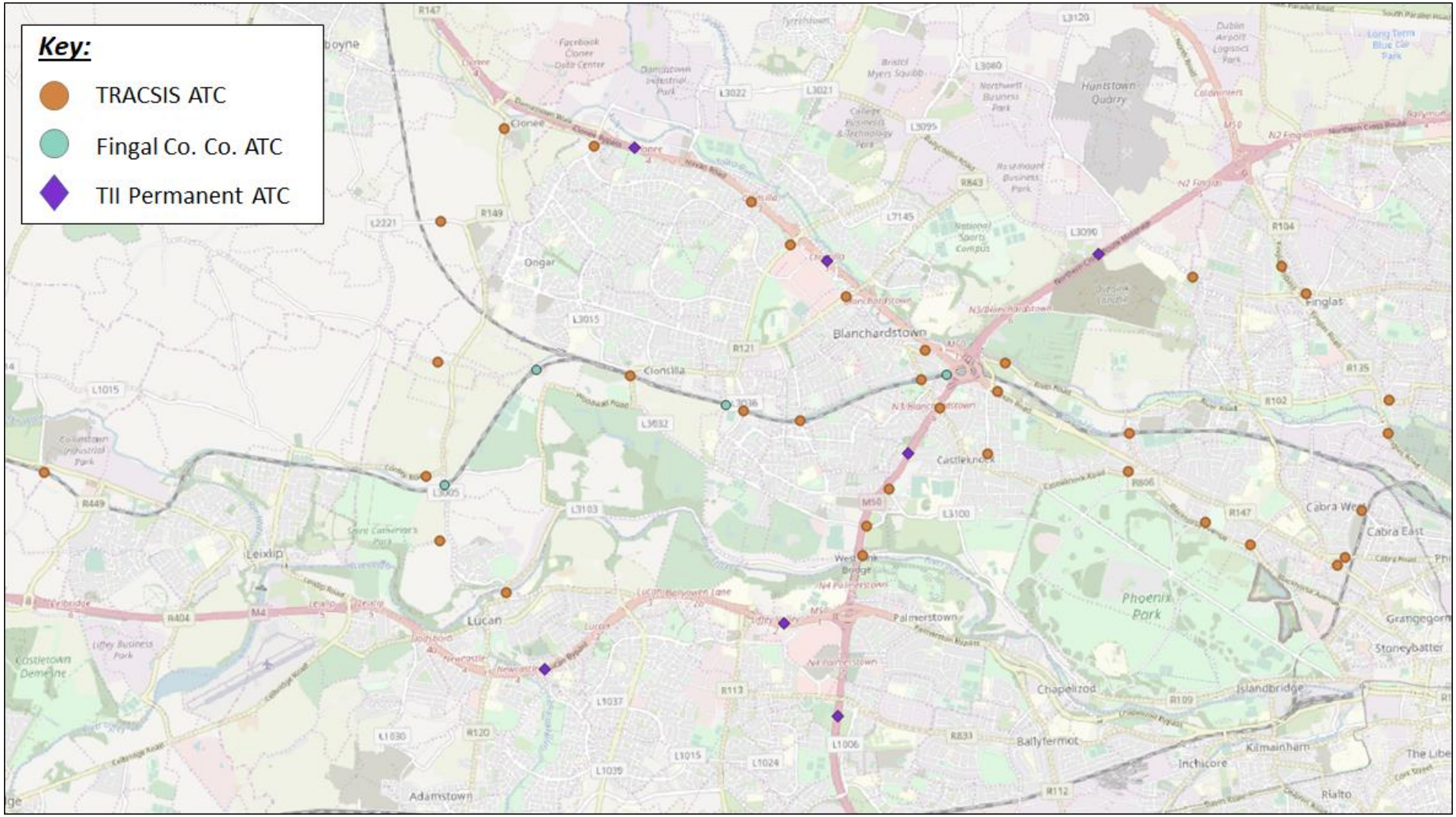


Figure 3.1 ATC Locations

3.2.4 The ATC results were utilised to identify the typical profile of traffic demand within the study area throughout an average weekday, and the results are illustrated for all sites combined in Figure 3.2. The results follow a typical trend with peaks in traffic volumes in the morning and evening. The ATC data suggests that the hours experiencing the highest levels of traffic are from 08:00-09:00 in the AM, and 17:00-18:00 in the PM.

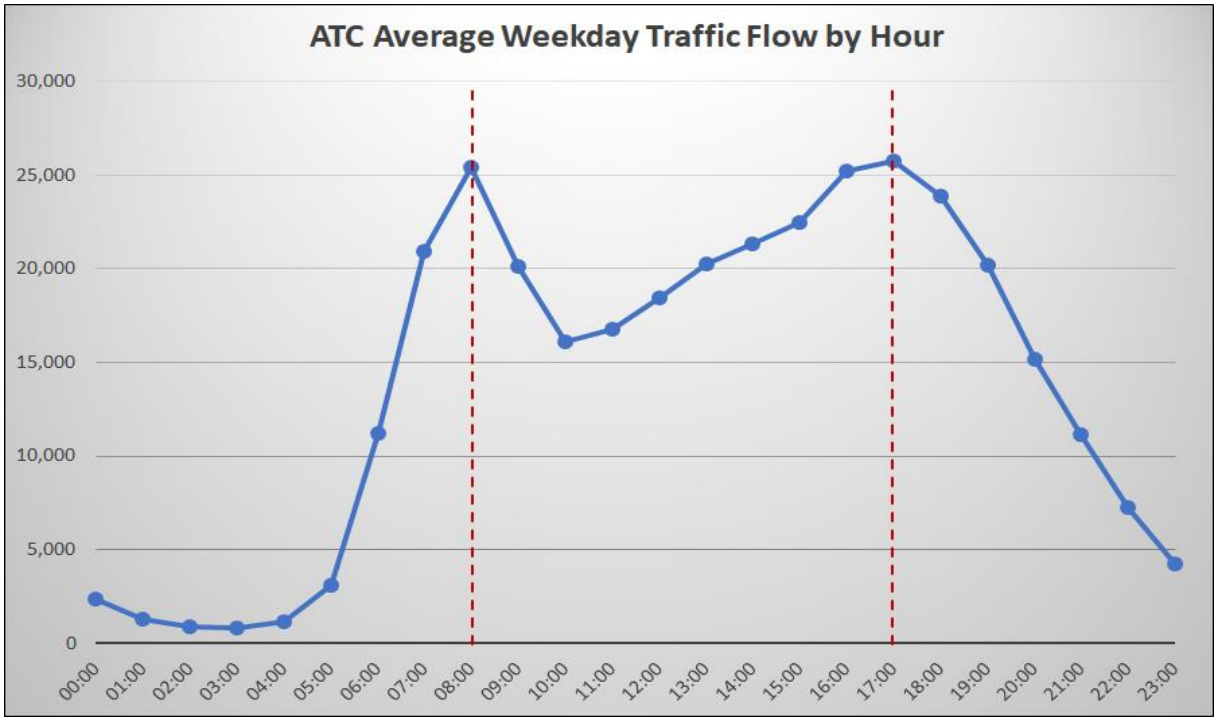


Figure 3.2 ATC Daily Traffic Profile

3.2.5 As illustrated in Figure 3.1, ATC data was collected at all locations crossing the Maynooth Rail line within the study area. This data was interrogated to identify the volume of northbound and southbound traffic at each location in the AM and PM peak hours, and the results are provided in Figure 3.3, overleaf.

3.2.6 The results indicate that the overbridge at Diswellstown Road is the most heavily utilised crossing point in the AM peak (08:00-09:00) with approx. 1,573 vehicles in both directions. Of the level crossings, Coolmine experiences the largest traffic volumes with 518 vehicles in the AM peak hour, followed by Ashtown with 454 vehicles. Blakestown experiences relatively low traffic volumes with only 12 vehicles recorded in the AM peak hour.

3.2.7 Similarly, in the PM peak the Diswellstown Road experiences the highest traffic volumes with 1,647 vehicles recorded between 17:00 and 18:00. The other bridge crossings at the R149 and Castleknock Road also carry significant volumes with 840 and 1,265 vehicles respectively. Again, Coolmine is the most heavily utilised level crossing with 447 vehicles recorded in the PM peak hour. Porterstown, Barberstown and Blakestown all experience relatively low volumes of traffic with two-way flows of 59, 71 and 13 respectively.

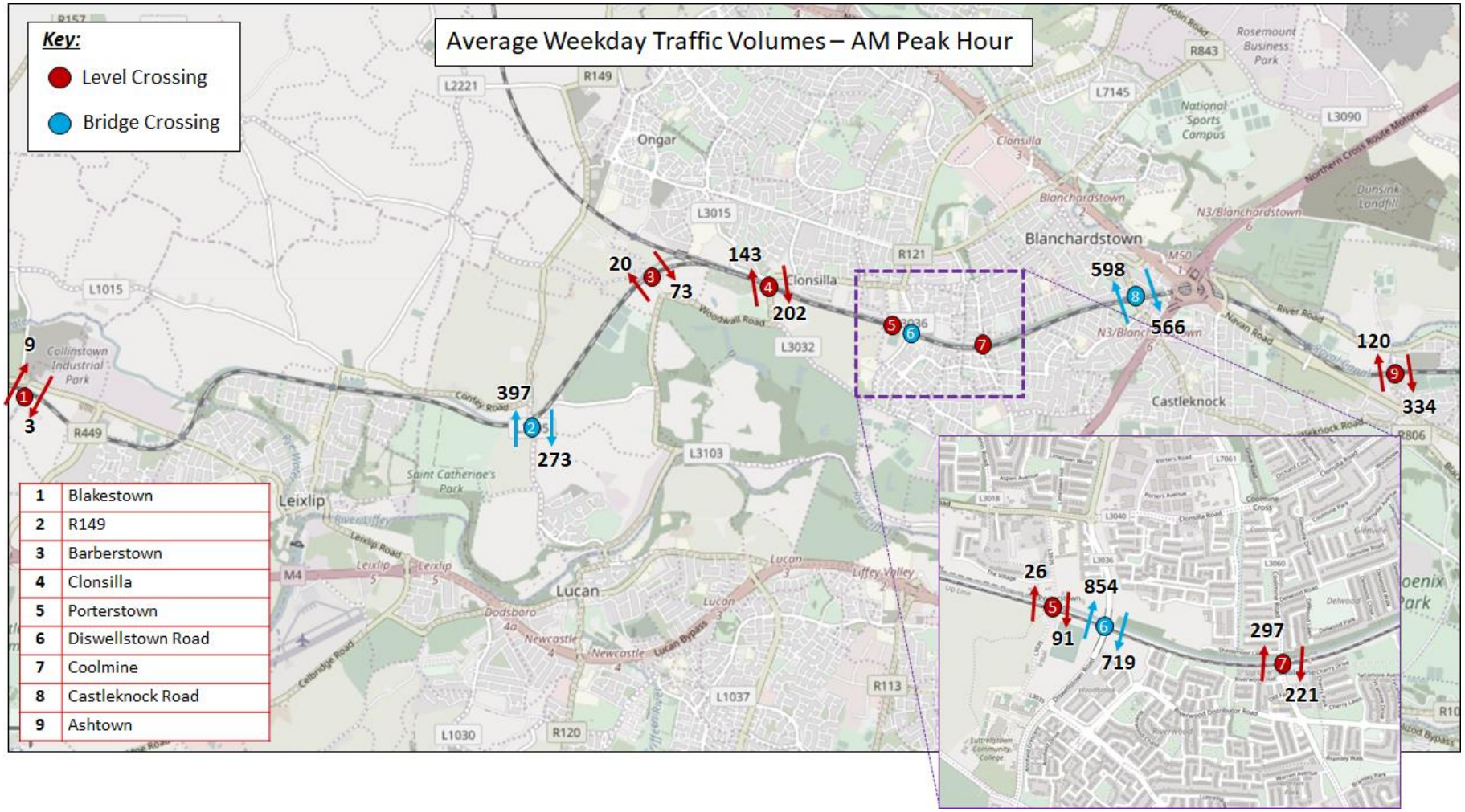


Figure 3.3 ATC AM Peak Hour Traffic Volumes

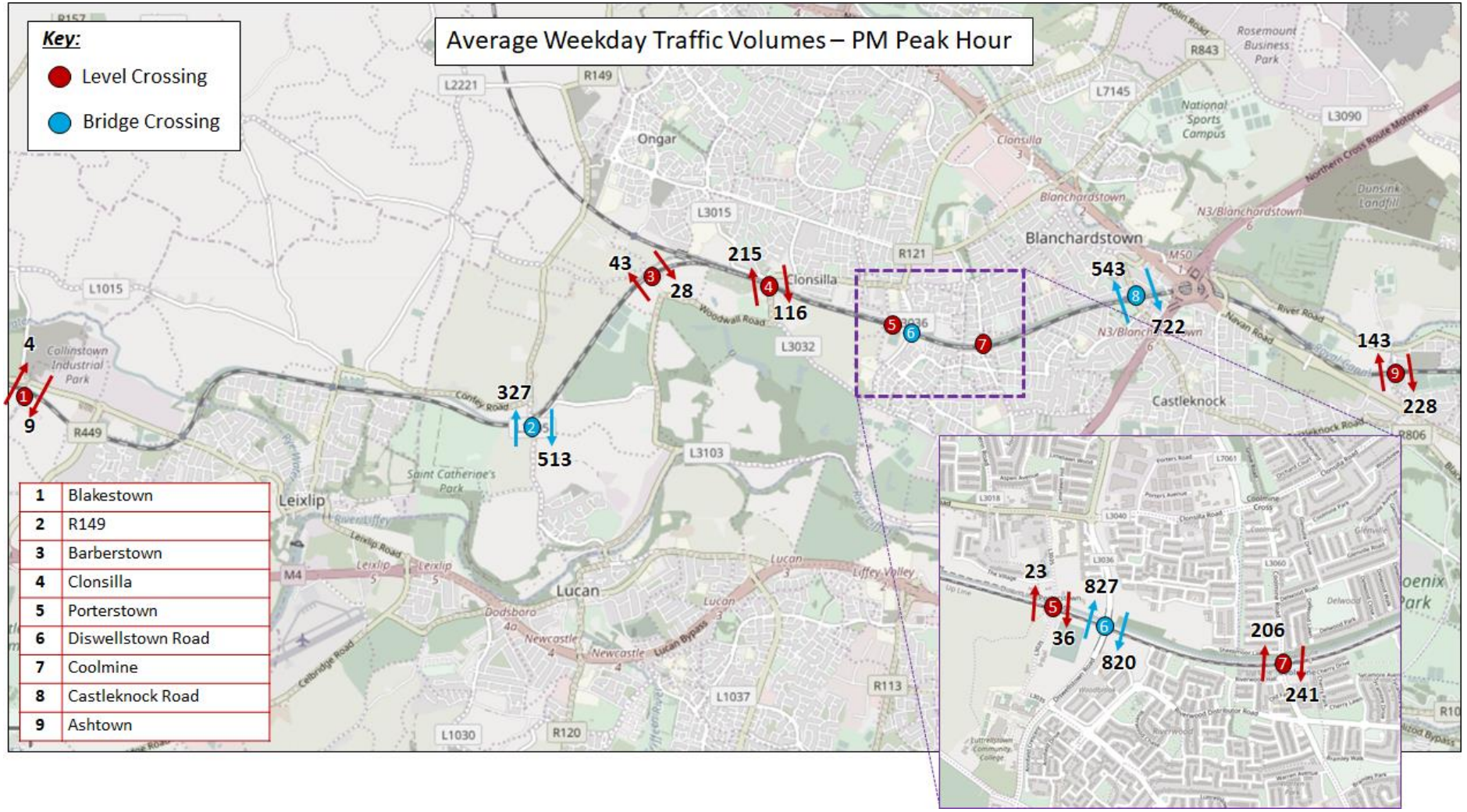


Figure 3.4 ATC PM Peak Hour Traffic Volumes

Pedestrian and Cyclist Counts

3.2.8 Pedestrian and cyclist counts were undertaken at Ashtown and Blakestown level crossings on Tuesday 5th February 2019 between 07:00 to 10:00 in the AM, and 16:00 to 19:00 in the PM. This data was supplemented with recent counts undertaken by Fingal County Council at Coolmine, Porterstown, Clonsilla and Barberstown, meaning information on pedestrian and cyclist movements is available at all six level crossings on the Maynooth line.

Ashtown

3.2.9 The results of the pedestrian and cycle count at Ashtown are illustrated in Figure 3.5 below. It indicates that Ashtown level crossing is quite heavily utilised in the peak periods with 822 pedestrians counted in the AM and 791 in the PM.

3.2.10 Due to the location where the count was undertaken, it is not possible to determine the number of people using the level crossing that aren't accessing the train station. However, given the surrounding land-use (i.e. no schools or high density employment in close proximity), and the tidal nature of the flows, it is reasonable to assume that the majority of people surveyed are travelling to/from the train station.

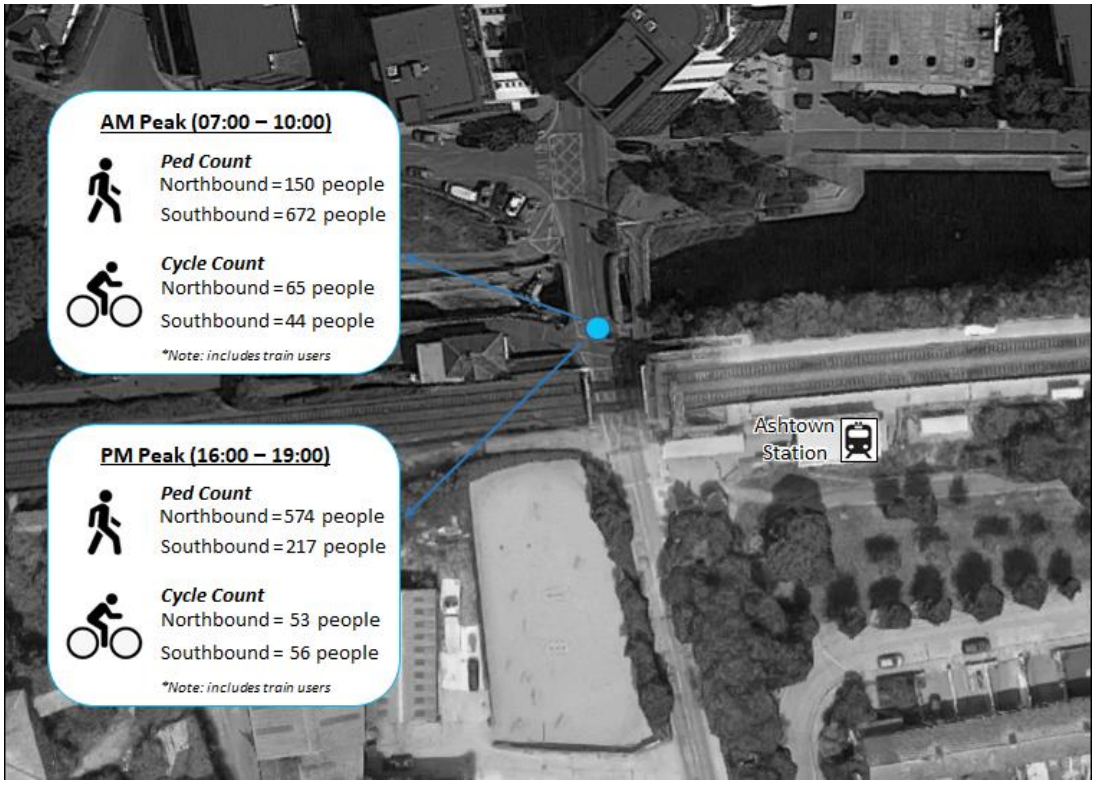


Figure 3.5 Ashtown Pedestrian and Cycle Counts

Coolmine

3.2.11 Figure 3.6, overleaf, outlines the pedestrians and cyclists surveyed as using the Coolmine level crossing in the AM and PM peak periods. The results indicate that the crossing is well used, with 498 pedestrians counted in the AM and 336 in the PM.

3.2.12 In the AM peak, it is likely that the majority of the 395 pedestrians travelling northbound are accessing the train towards Dublin city centre at Coolmine station. In the PM peak, the northbound flows are likely to represent people coming home from work on the train and travelling to residential lands to the north of the crossing.

3.2.13 Due to the location and nature of the counts undertaken, it is not possible to definitively determine which users are accessing the train station, or are using the crossing to travel to nearby destinations on foot/via bicycle. However, given the location of the level crossing in the middle of high density residential development, it is highly likely that it is frequently used for travel outside of accessing the train, particularly during non-peak periods e.g. visiting friends, recreational walks, accessing local shops etc.

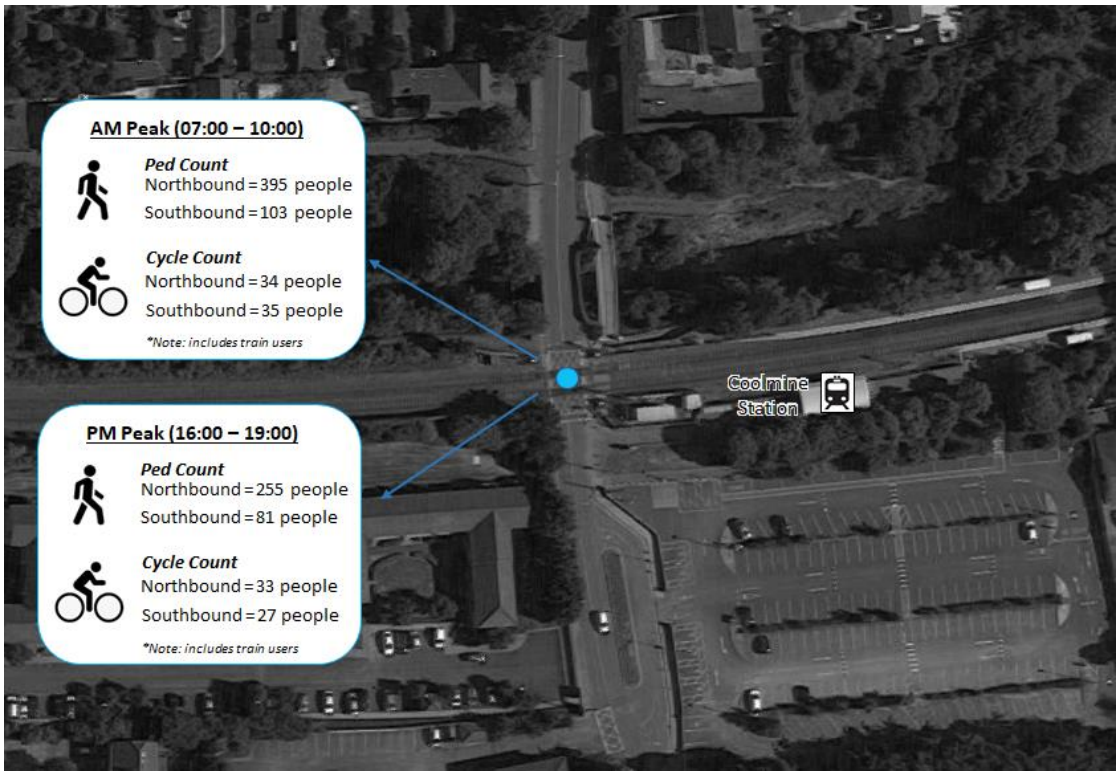


Figure 3.6 Coolmine Pedestrian and Cycle Counts

Porterstown

3.2.14 The results of pedestrian and cycle counts undertaken at Porterstown Level Crossing are illustrated in Figure 3.7, overleaf. The results indicate a significant number of pedestrians (approx. 123 people) travel via the crossing in a southbound direction in the AM. This is likely to represent children and parents accessing Scoil Choilm Community National School, and Luttrellstown Community College, from residential areas to the north.

3.2.15 In the PM peak, the survey period was extended to 15:45 to capture students leaving school. Of the 149 people surveyed travelling northbound, 126 were counted at 15:45 and 16:00 representing pupils returning home after school.

3.2.16 St. Mochtas Football Club is located immediately south of the Porterstown level crossing with a large number of playing pitches. This is likely to be a generator of trips

in the evenings and weekends, with the main access via the Porterstown level crossing for residents in the north.

Figure 3.7 Porterstown Pedestrian and Cycle Counts

Clonsilla

3.2.17 Figure 3.8, overleaf, outlines the results of pedestrian and cycle counts undertaken at the Clonsilla level crossing during the AM and PM peak periods. The results indicate low usage of the crossing during the AM period. This is primarily due to its location, and the low density of development to the immediate south. People accessing the train station from residential areas to the north, and travelling to the city centre, do not need to use the level crossing.

3.2.18 In the PM peak, there are significantly more people surveyed travelling northbound. This represents people travelling home on the train to residential areas to the North. The counts would suggest that the Clonsilla level crossing is predominantly used to access the train station in the peak periods. However, there are a number of recreational facilities located to the south of the level crossing including playing pitches, a playground and golf course. It is likely that these would generate pedestrian and cycle trips at the level crossing outside the peak periods, and at weekends, which are not captured in our surveys.

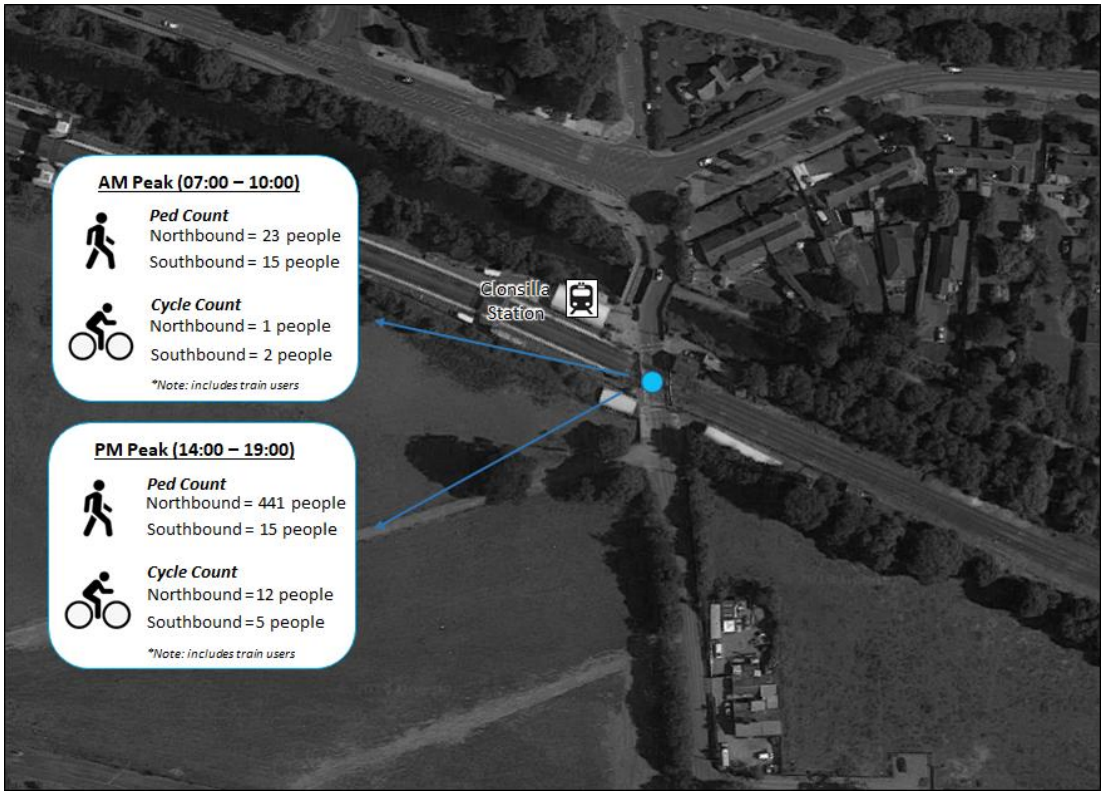


Figure 3.8 Clonsilla Pedestrian and Cycle Counts

Barberstown and Blakestown

3.2.19 The results of pedestrian and cycle counts undertaken at Barberstown and Blakestown level crossings during the AM (07:00-10:00) and PM (16:00-19:00) periods are outlined in Table 3.1. The results indicate a very low level of activity at both these locations with no pedestrians surveyed at Barberstown, and just two pedestrians counted at Blakestown in the PM. This is not that surprising given the rural nature of both these sites and the low density of development in their vicinity.

Table 3.1 Barberstown and Blakestown Pedestrian and Cycle Counts

Crossing	Time Period	Pedestrians		Cyclists	
		Northbound	Southbound	Northbound	Southbound
Barberstown	AM	0	0	2	1
	PM	0	0	3	0
Blakestown	AM	0	0	1	0
	PM	0	2	0	2

Journey Time Data

3.2.20 SYSTRA/CSEA received journey time information from the NTA's satellite navigation database. This data was extracted for identified routes within the study area for an average weekday in 2018 i.e. excluding bank holidays, weekends etc. Figure 3.9 and 3.10 below illustrate the routes selected, and the recorded journey times for the AM (08:00-09:00) and PM (17:00-18:00) peak hours.

3.2.21 It should be noted that the results in Figure 3.9 and 3.10 represent an average across a significant number of vehicles recorded throughout the year. As such, the delay experienced at the level crossings takes into account that some users arrive as the gates are closing and experience significant delays, whilst others arrive while the gates are open and experience no impact in journey time.

3.2.22 The journey time data is used to calibrate and validate the local area models to ensure that they are providing a robust representation of current levels of delay on the network at the correct locations.

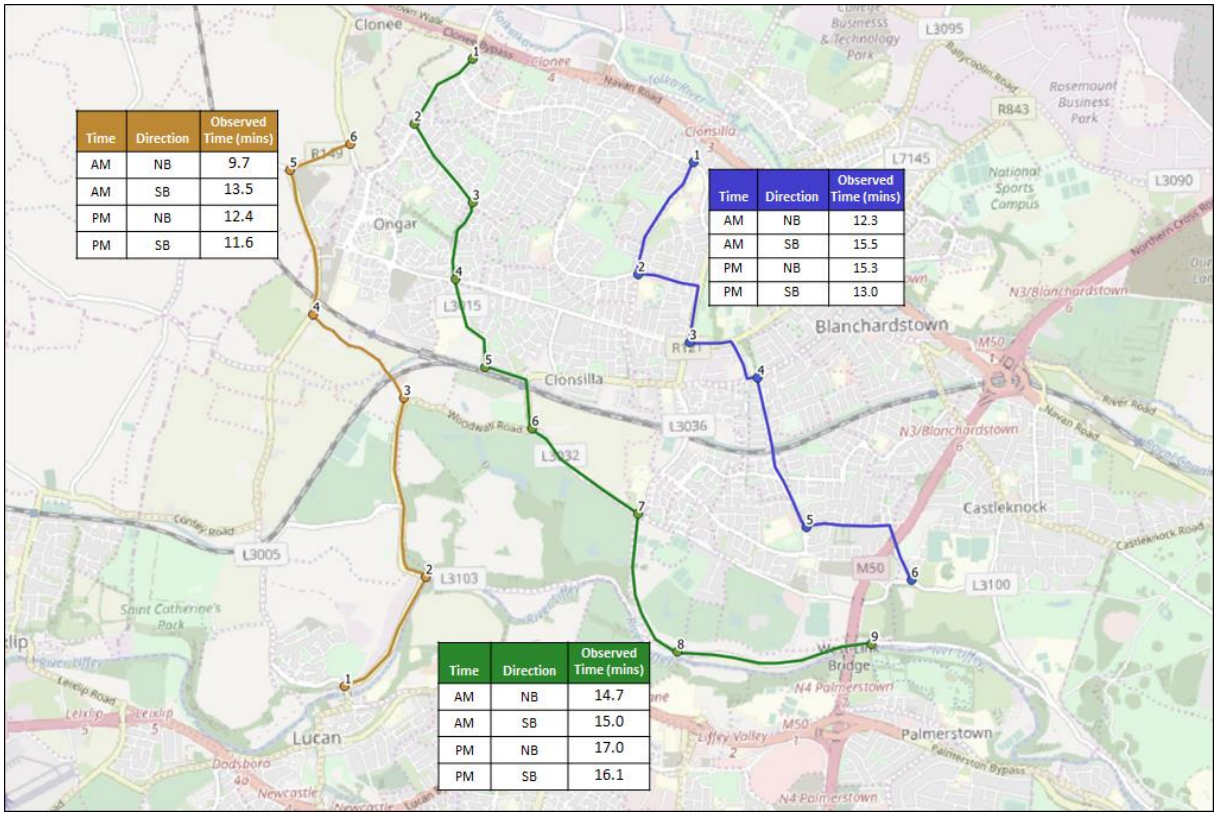


Figure 3.9 N3/N4/M50 Boundary Area Journey Times

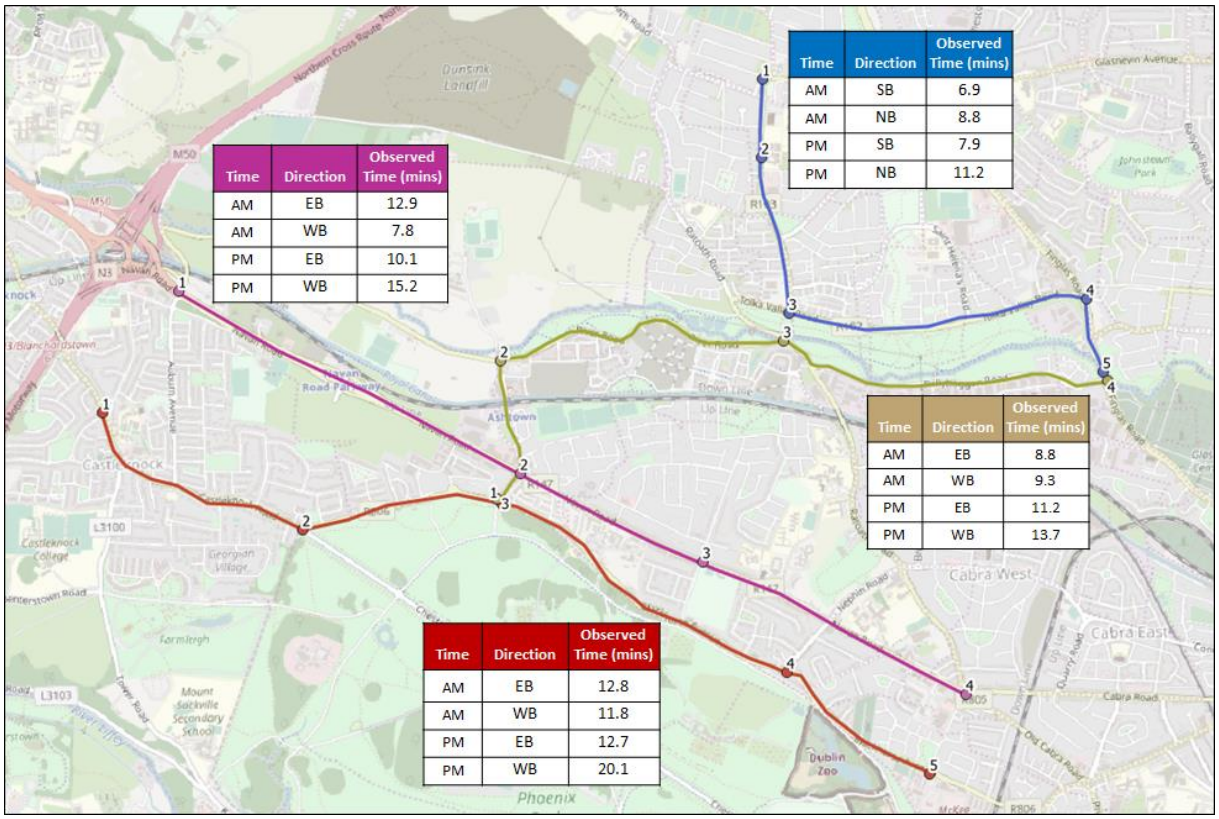


Figure 3.10 Ashtown Area Journey Times

Junction Turning Counts

3.2.23 Junction Turning Counts (JTC's) were undertaken at 48 locations across the network, illustrated in Figure 3.11 overleaf, during the AM and PM peak periods (07:00 – 10:00 and 16:00 – 19:00) on Tuesday 5th February 2019. This data was supplemented by existing counts carried out in the area for previous studies by Fingal Co. Co. and the NTA.

3.2.24 As indicated in Figure 3.11, all the main junctions within the study area have been included and provide information on the volume, and types of vehicles, making turning movements at each location. This data is utilised within the Local Area Model calibration to ensure that the flow of vehicles through the main junctions on the network is being represented accurately.

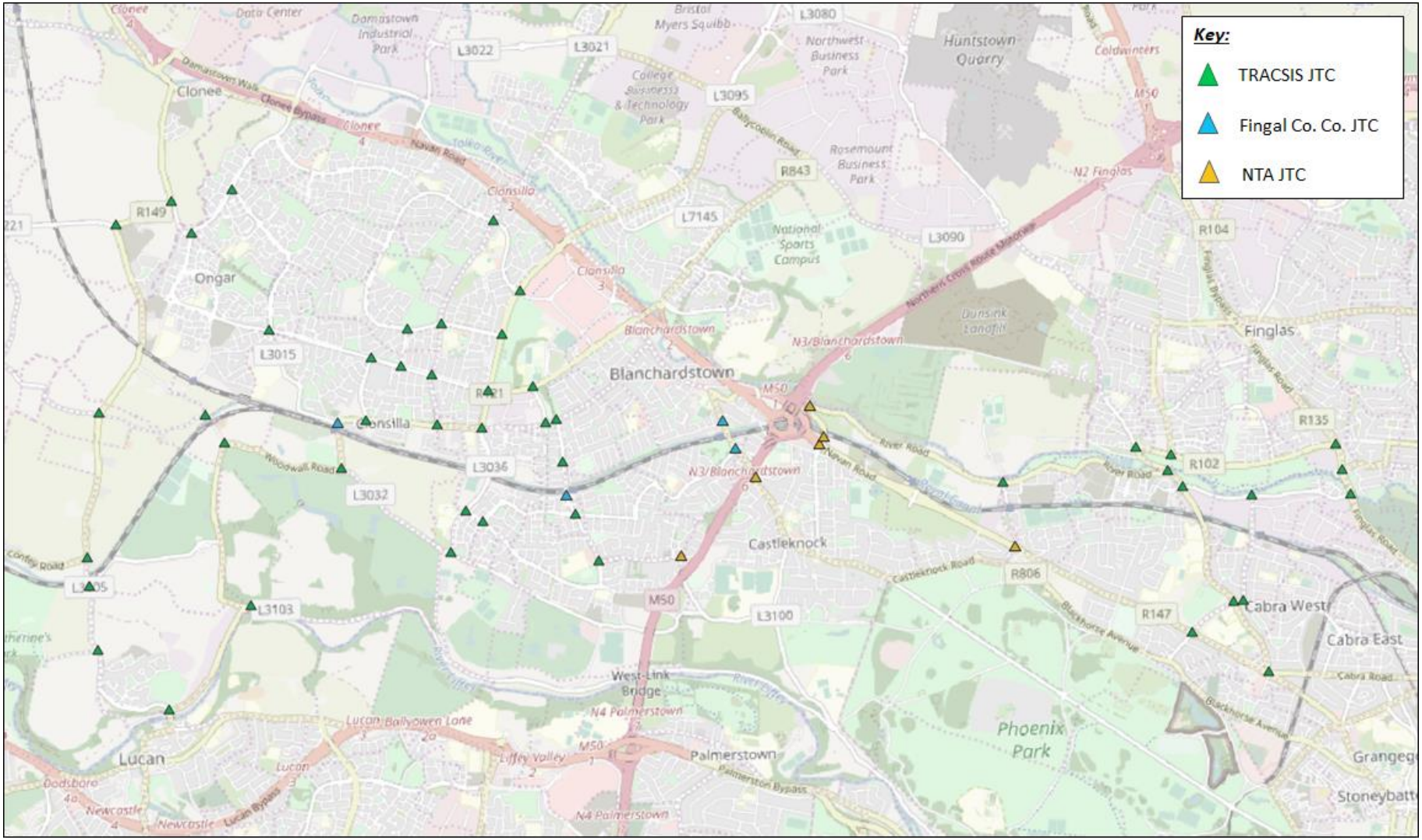


Figure 3.11 JTC Locations

3.3 Public Transport Review

Irish Rail

3.3.1 The Sligo/Maynooth rail line provides diesel commuter services from Maynooth to Dublin city centre, with a lower frequency service extending to Longford, and Intercity services provided to Sligo. Through a recently constructed branch line, commuter services are now also provided to Hansfield, Dunboyne and the M3 Parkway.

3.3.2 Irish Rail provided timetable information, and CCTV analysis, to facilitate a greater understanding of existing train movements at each of the level crossings during the AM (08:00-09:00) and PM (17:00-18:00) peak hours. The full set of data received is provided in Appendix A of this report, and Table 3.2 and 3.3 provide a summary for each crossing including information on the number of trains passing in the hour, number of closures in the hour and average closure time.

Table 3.2 Level Crossing Closure Information – AM Peak Hour 08:00-09:00

Level Crossing	No. Trains Passing	No. Closures	Total Closure Time	Average Time per Closure
Ashtown	13	6	00:36:42	00:06:07
Coolmine	12	9	00:41:35	00:04:37
Porterstown	12	7	00:32:46	00:04:41
Clonsilla	12	7	00:30:58	00:04:25
Barberstown	9	6	00:26:03	00:04:21
Blakestown	7	5	00:23:48	00:04:46

Table 3.3 Level Crossing Closure Information – PM Peak Hour 17:00-18:00

Level Crossing	No. Trains Passing	No. Closures	Total Closure Time	Average Time per Closure
Ashtown	11	6	00:36:32	00:06:05
Coolmine	11	7	00:34:14	00:04:53
Porterstown	10	6	00:19:57	00:03:20
Clonsilla	10	4	00:26:30	00:06:38
Barberstown	7	6	00:20:37	00:03:26
Blakestown	7	6	00:21:54	00:03:39

3.3.3 The results in the above tables indicate that Coolmine level crossing is closed for the longest duration during the AM peak hour. In total, Coolmine is closed for approx. 41 minutes during the hour from 08:00 to 09:00 with 9 separate closure events. On average, the time the barriers are down per closure range from approx. four and a half minutes to six minutes across all the level crossings.

3.3.4 In the PM peak, Ashtown level crossing has the longest overall closure time of 36 and a half minutes. Barberstown and Blakestown experience the lowest closure times in both the AM and PM peaks. This is to be expected due to the increased train frequency from Clonsilla to Connolly with the inclusion of M3 Parkway services.

3.3.5 The above information is extremely useful in gaining an understanding of the current closure conditions at the six level crossings, and can provide an indication as to the benefits that can be achieved by providing an alternative free-flow crossing for vehicular traffic, as well as pedestrians and cyclists.

Bus

3.3.6 A review was undertaken of existing bus services within the study area to identify if any routes would be disrupted due to the closure of the six level crossings along the Maynooth rail line.

3.3.7 Currently, only route 239 operated by Go Ahead Ireland travels via the existing level crossings. The route, illustrated in Figure 3.12 below, operates from Blanchardstown Shopping Centre to Liffey Valley Shopping Centre via the Clonsilla level crossing. The service operates approximately once per hour throughout the day in each direction, with one service in each of the AM and PM peaks.[6]

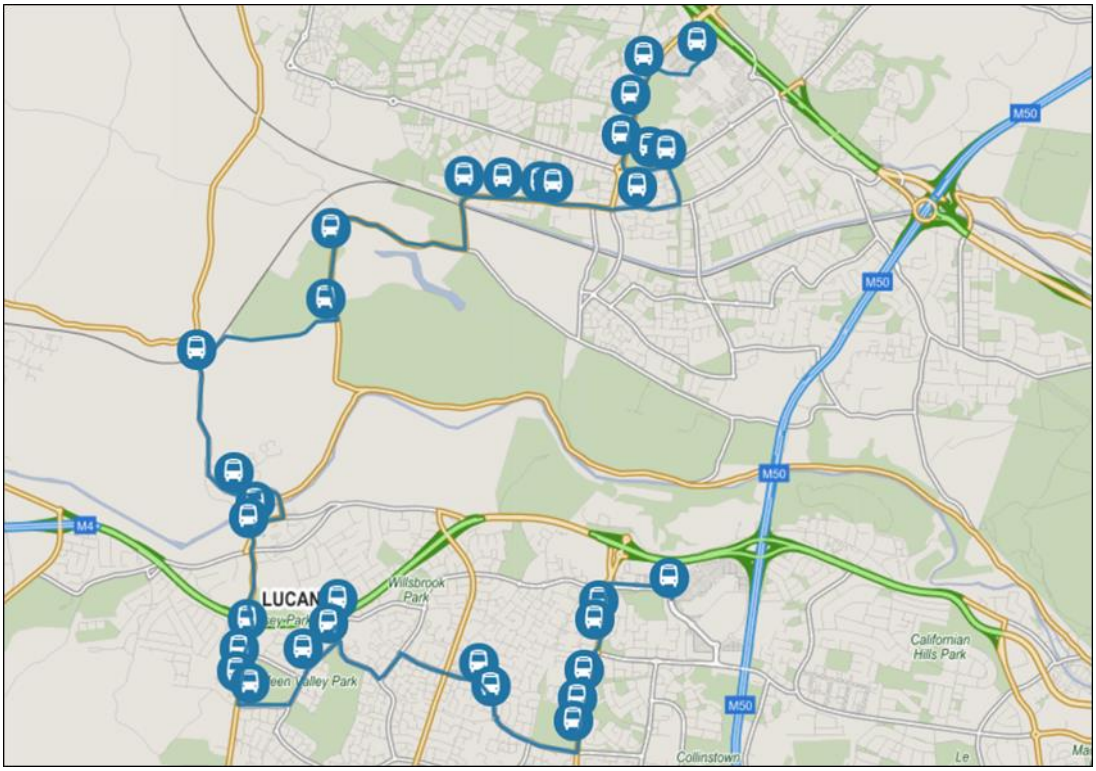


Figure 3.12 Go Ahead Ireland Route 239 (Transport for Ireland Journey Planner Map)

3.3.8 As noted in Section 2.3 previously, Bus Connects is an ongoing programme of works that is aimed at overhauling the current bus system in the Dublin. As part of Bus Connects, it is proposed that the Route 239 will be replaced by a new Route 252 (see

[6] Full timetable information for Route 239 available at: https://www.goaheadireland.ie/services/239?date=2019-05-10&direction=outbound

Figure 2.2). The 252 will follow a very similar route to the 239, and it is envisaged that it will operate via Clonsilla level crossing. As such, the proposed routing for service 252, and the potential impact on its operation of closing the Clonsilla level crossing will need to be considered.

3.4 Level Crossing Existing Conditions Review

3.4.1 A site visit, and desktop review, were undertaken to gain an understanding of the operation of the existing level crossings along the Maynooth line, along with any transportation issues in the area. The conditions review focused on the following key elements:

- **Existing pedestrian and cyclist facilities**: review of existing conditions and main issues faced by pedestrian, cyclists and railway users including aspects such as footpaths, lighting, pedestrian crossings etc.; and
- **Existing road network:** review of the road network at each of the level crossings including aspects such as number of lanes, width of carriageway, visibility etc.

3.4.2 The following tables provide a brief summary of some of the key issues identified at each of the level crossings. Full details of the conditions review is provided in Appendix B of this report.

Ashtown Level Crossing

Sumary of issues identified for pedestrian / cylists:

- To cross the level crossings, pedestrian and cyclist have to share the road space with the general traffic. The path provided for pedestrians is narrow (approx. 1.5m) and delineated by road markings. Also, it must accommodate all users, i.e. pedestrian, cyclist, wheelchair users, pushchairs, etc.;
- The existing footbridge within the land ownership of Irish Rail doesn't provide ramps/lifts, therefore it is not adequate for universal access (wheelchair, cyclists, pushchairs, elderly users, mobility impaired users, etc.);
- Narrow footpath approaching from the south, only on the eastern side. No crossings provided from the Navan Road roundabout junction to the level crossing;
- There are no dedicated cycle facilities. Cyclist must dismount to share the pedestrian paths or must share traffic lanes.

Sumary of issues for general traffic:

- The level crossing is manually operated, creating long queues and increasing the waiting time for vehicles;
- The bridge over the Royal Canal is narrow;
- Inappropriate vertical visibility across the overbridge due to the high crest;
- No car parking / drop off area for accessing the Train Station.

Issue – Narrow path for pedestrians

Issue – Ashtown Road (south), narrow footpath; no footpaths on the western side; no crossings; bad lighting

Issue – pedestrian, cyclists and cars waiting for the barriers to be lifted

Issue - Footbridge without univeral access

Coolmine Level Crossing

Sumary of issues identified for pedestrian / cylists:

- To cross the level crossings, pedestrian and cyclist have to share the road space with the general traffic. The path provided for pedestrians is narrow (less than 1m) and delineated by road markings. Also, it must accommodate all users, i.e. pedestrian, cyclist, wheelchair users, pushchairs, etc.
- The existing footbridge within the land ownership of Irish Rail is off the desire line and it doesn't provide ramps/lifts, therefore it is not adequate for universal access (wheelchair, cyclists, pushchairs, elderly users etc.)
- Narrow footpath in Carperstown Road (south approach) on the western side, no pedestrian crossing provided from the western footpath to the eastern footpath and to access the train station;
- No pedestrian crossing provided on Coolmine Road (north approach);

- There are no dedicated cycle facilities. Cyclist must dismount to share the pedestrian paths or must share traffic lanes.

Sumary of issues for general traffic:

- Queues and waiting time to cross the level crossing;
- The bridge over the Royal Canal is a narrow protected structure.

Issue – Footbridge without universal access

Issue – Narrow path for pedestrians

Issue – Narrow footpath on the western side of Coolmine Road (northern approach), no crossing provided

Issue – Narrow footpath on the western side of Carperstown Road (southern approach), no crossing provided

Porterstown Level Crossing

Sumary of issues identified for pedestrian / cylists:

- To cross the level crossings, pedestrian and cyclist have to share the road space with the general traffic. There is no dedicated pedestrian path on the level crossing;
- The Royal Canal overbridge is very narrow, there are no pedestrian or cyclist facilities provided;
- Narrow and discontinuous footpaths approaching from the north and the south, no pedestrian crossings provided;

- There are no dedicated cycle facilities.

Sumary of issues for general traffic:

- The bridge over the Royal Canal is very narrow, allowing only one car. No road signs provided warning drivers of the narrow bridge ahead and regulating the give way.

Issue – Narrow Royal Canal Bridge

Issue – Sub-standard pedestrian facilities on the level crossing

Issue – Narrow footpath on the northern approach

Issue – Narrow footpath on the southern approach

Clonsilla Level Crossing

Sumary of issues identified for pedestrian / cylists:

- To cross the level crossings, pedestrian and cyclist have to share the road space with the general traffic. There is no dedicated pedestrian path on the crossing. Also, it must accommodate all users, i.e. pedestrian, cyclist, wheelchair users, pushchairs, etc.;
- The existing footbridge beside the train station doesn't provide ramps/lifts, therefore it is not adequate for universal access (wheelchair, cyclists, pushchairs, elderly users, mobility impairs, etc.);

- There is another footbridge with universal access located approximately 185m off the desire line.
- Narrow footpath only on the eastern side approaching from the south. This footpath presents obstructions, e.g. lamp posts, road signs, etc.
- There are no dedicated cycle facilities. Cyclist must dismount to share the pedestrian paths or must share traffic lanes.

Sumary of issues for general traffic:

- The bridge over the Royal Canal is narrow;
- Due to the high crest of the overbridge high, the required forward visibility for cars is not provided;
- No car parking / drop off area for accessing the Train Station.

Issue – No road markings to demarcate pedestrian paths along the crossing

Issue – Narrow bridge over the Royal Canal, not providing the required forward visibility

Issue – Narrow footpath with obstacles approaching from the southe

Issue - Footbridge without univeral access

Barberstown Level Crossing

Sumary of issues identified for pedestrian / cylists:

- To cross the level crossings, pedestrian and cyclist have to share the road space with the general traffic. There is no dedicated pedestrian path on the level crossing;
- The Royal Canal overbridge is very narrow, the existing pedestrian facilities are sub-standard, i.e. narrow, no dropped kerbs, etc;
- No pedestrian facilities along Milestown Road, neither approaching from the north or the south;
- There are no dedicated cycle facilities.

Sumary of issues for general traffic:

- Inappropriate vertical visibility across the overbridge due to the high crest;

Issue – sub-standard facilities on the Royal Canal Bridge

Issue – Sub-standard pedestrian facilities on the level crossing

Issue – No pedestrian facilities/hardshoulder approaching from the south

Issue - No pedestrian facilities along Milestown Road approaching from the south

Blakestown Level Crossing

Sumary of issues identified for pedestrian / cylists:

- To cross the level crossings, pedestrian and cyclist have to share the road space with the general traffic. There is no dedicated pedestrian path on the level crossing;
- The Royal Canal overbridge is very narrow, the existing pedestrian facilities are sub-standard, i.e. narrow, no dropped kerbs, etc;
- No pedestrian facilities along the L81206 road, neither approaching from the north or the south;
- There are no dedicated cycle facilities.

Sumary of issues for general traffic:

- Existing road surface in bad conditions;
- Road approaching from the south is very narrow.

Issue – Sub-standard facilities on the Royal Canal Bridge

Issue – Sub-standard pedestrian facilities on the level crossing

Issue – No pedestrian facilities/hardshoulder approaching from the south. Road surface in bad condition

Issue - No pedestrian facilities approaching from the north

3.5 Summary

3.5.1 The previous sections of this chapter provide an overview of the existing traffic and transport conditions at the six level crossings along the Maynooth rail line. In summary:

Traffic Survey Results

- The ATC data suggests that the hours experiencing the highest levels of traffic are from 08:00-09:00 in the AM, and 17:00-18:00 in the PM;
- The overbridge at Diswellstown Road is the most heavily utilised crossing point in both the AM peak and PM peaks with two-way flows of 1,573 and 1,647 vehicles respectively;
- Of the level crossings, Coolmine experiences the largest traffic volumes with 518 vehicles on average in the AM peak, and 447 in the PM;
- Blakestown experiences relatively low levels of traffic volumes in both the AM and PM peaks with two-way flows of 12 and 13 vehicles respectively;
- Pedestrian and cyclist counts indicate that Ashtown is the most heavily utilised level crossing with 822 pedestrians counted in the AM, and 791 in the PM. However, it is envisaged that the majority of those surveyed were accessing the train station;
- Coolmine is the second most heavily utilised level crossing. Given its location in the middle of high density residential development, it is highly likely that it is frequently used for travel outside of accessing the train, particularly during non-peak periods e.g. visiting friends, recreational walks, accessing local shops etc;
- The pedestrian and cyclist counts indicate a relatively high level of usage of the Porterstown level crossing for accessing schools to the south from residential areas to the north;
- Barberstown and Blakestown have a very low level of activity with no pedestrians surveyed at Barberstown, and just two pedestrians counted at Blakestown in the PM;
- SYSTRA/CSEA received journey time information from the NTA's satellite navigation database. This data is used to calibrate and validate the local area models to ensure that they are providing a robust representation of current levels of delay on the network at the correct locations; and
- JTC data was collected for numerous junctions throughout the study area. This data is utilised within the Local Area Model calibration to ensure that the flow of vehicles through the main junctions on the network is being represented accurately.

Public Transport Review

- Coolmine level crossing is closed for the longest duration during the AM peak hour. In total, Coolmine is closed for approx. 41 minutes during the hour from 08:00 to 09:00 with 9 separate closure events;
- On average, the time the barriers are down per closure range from approx. four and a half minutes to six minutes across all the level crossings;
- In the PM peak, Ashtown level crossing has the longest overall closure time of 36 and a half minutes;
- Barberstown and Blakestown experience the lowest total closure times in both the AM and PM peaks ranging from approx. 20 to 26 minutes;
- Currently, only bus route 239 operated by Go Ahead Ireland travels via the existing level crossings. This service operates approximately once per hour throughout the day in each direction, with one service in each of the AM and PM peaks;
- As part of the Bus Connects network redesign, it is proposed that the 239 will be replaced by Route 252. It is envisaged that the 252 will follow a similar route to the 239 via Clonsilla level crossing.

Level Crossing Existing Conditions Review

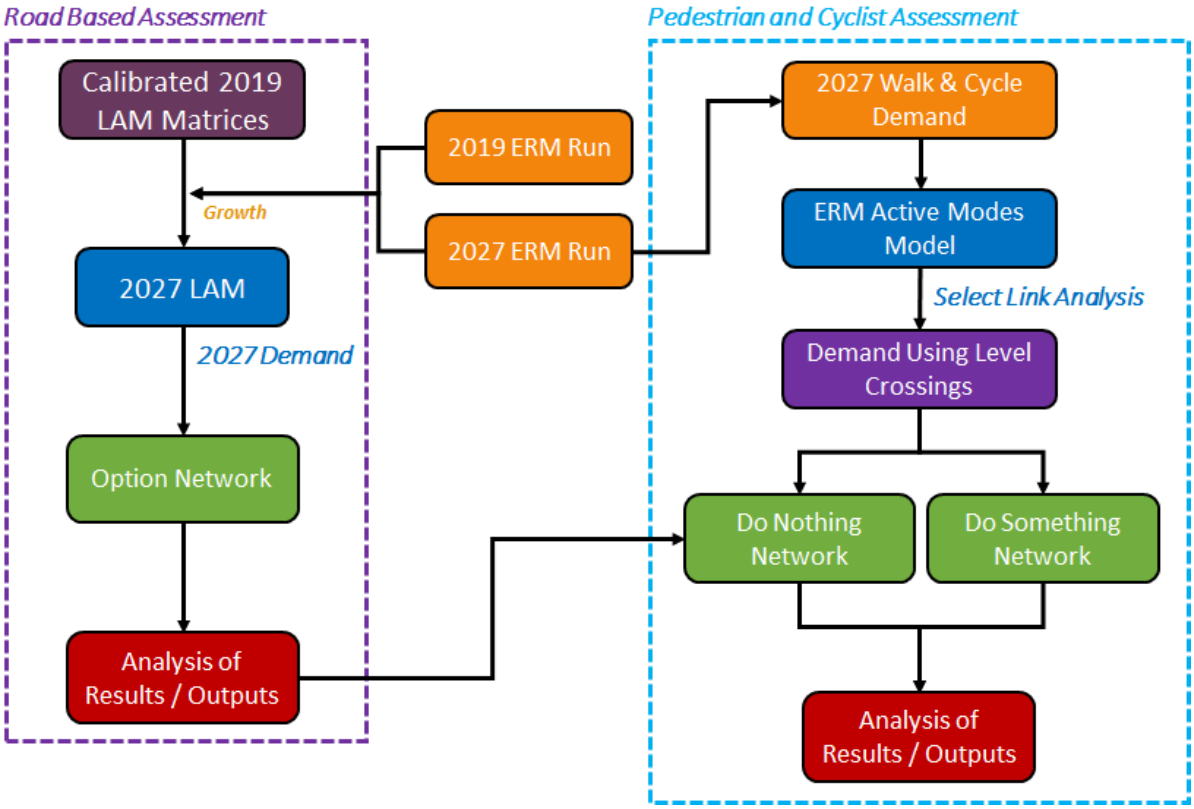
- Issues identified for pedestrians and cyclists:
  - To cross the level crossings, pedestrian and cyclist have to share the road space with the general traffic. There is no dedicated pedestrian path on the crossing or the dedicated path by markings is narrow. Also, it must accommodate all users, i.e. pedestrian, cyclist, wheelchair users, pushchairs, etc.;
  - The existing footbridges beside the train stations don't provide ramps/lifts, therefore they are not adequate for universal access (wheelchair, cyclists, pushchairs, elderly users, mobility impairs, etc.);
  - Narrow footpath on the roads approaching from the north and the south. Generally, these footpaths present obstructions, e.g. lamp posts, road signs, etc.
  - There are no dedicated cycle facilities. Cyclist must dismount to share the pedestrian paths or must share traffic lanes.
- Issues identified for general traffic:
  - Long queues to cross the level crossing on the busiest roads;
  - The bridges over the Royal Canal are generally very narrow with high crests leading to low levels of forward visibility;
  - Clonsilla and Ashtown Train stations have no car parking / drop off areas.

4. ASSESSMENT METHODOLOGY

4.1 Introduction

4.1.1 This chapter provides an overview of the methodology used to assess the impact of closing the level crossings along the Maynooth rail line to vehicular traffic, along with pedestrians and cyclists. A two-phased assessment was undertaken, illustrated in Figure 4.1, and included the following main elements:

- **Road Based Assessment:** analysis of a number of options for closing, and replacing, the level crossings along the Maynooth line for vehicular traffic to assess the impact on the wider road network. Further details on the options assessed is provided in Chapter 5.
- **Pedestrian & Cyclist Assessment:** analysis of the impact of closing the level crossings to pedestrian and cyclists with particular focus on changes in journey times and distances, along with accessibility to key services and amenities.

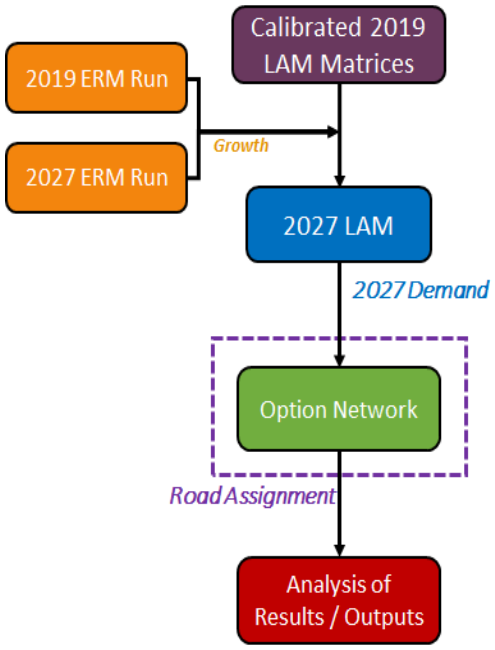


4.1.2 The following sections of this chapter provide further information on each of the elements outlined in Figure 4.1.

4.2 Road Based Assessment

4.2.1 The methodology for the road based assessment comprises of the following key elements:

- **2027 NTA Planning Data:** Demographic and land-use estimates, including population and levels of employment and education were developed in consultation with the NTA. This data is the driver for trip generation in 2027;



- **East Regional Model (ERM) Run:** The NTA's ERM was run to generate forecast 2027 travel demand. Growth in vehicular traffic from the ERM was used to generate forecast year matrices for testing on the road network;
- **Road Assignment:** The forecast travel demand was assigned to LAM road networks in SATURN for a number of test scenarios (further details on these scenarios is provided in Chapter 5 of this report);
- **Analysis of Results/Outputs:** Key outputs from the road assignment were assessed to identify the impact on the wider network under the various test scenarios.

2027 NTA Planning Data

4.2.2 The forecast year 2027 was chosen as it corresponds with delivery of improved train frequencies on the Maynooth rail line as part of the DART expansion programme. The NTA's National Demand Forecasting Model (NDFM) was used to generate 2027 demand which could be fed into the ERM. The NDFM takes input land-use attributes such as population, no. of employees, no. of school places etc., and estimates the total quantity of daily travel demand produced by, and attracted to, each of the 18,488 Census Small Areas.

4.2.3 The NTA's planning department have forecast estimates of population, employment and education data for the entire country to align with their 2035 Greater Dublin Area Strategy. This was reviewed against 2016 Census data, and straight line interpolation was utilised to generate 2027 forecasts.

4.2.4 The generated 2027 values for population, employment and education places were then reviewed within the study area, taking cognisance of known development proposals and Local Area Plans (LAP). Figure 4.2, overleaf, illustrates the key development zones and LAPs that are of specific relevance to our study area. Further details on these LAPs are provided in Chapter 2 of this report.

4.2.5 In consultation with the NTA's planning department, the interpolated 2027 land-use data was adjusted in these specific locations to reflect known LAP and planning proposals. In terms of the key areas highlighted in Figure 4.2, it was assumed that they would be fully delivered by 2035. Therefore, the level of development in 2027 was estimated based on interpolation between the 2016 Census and the proposed full build out in 2035.

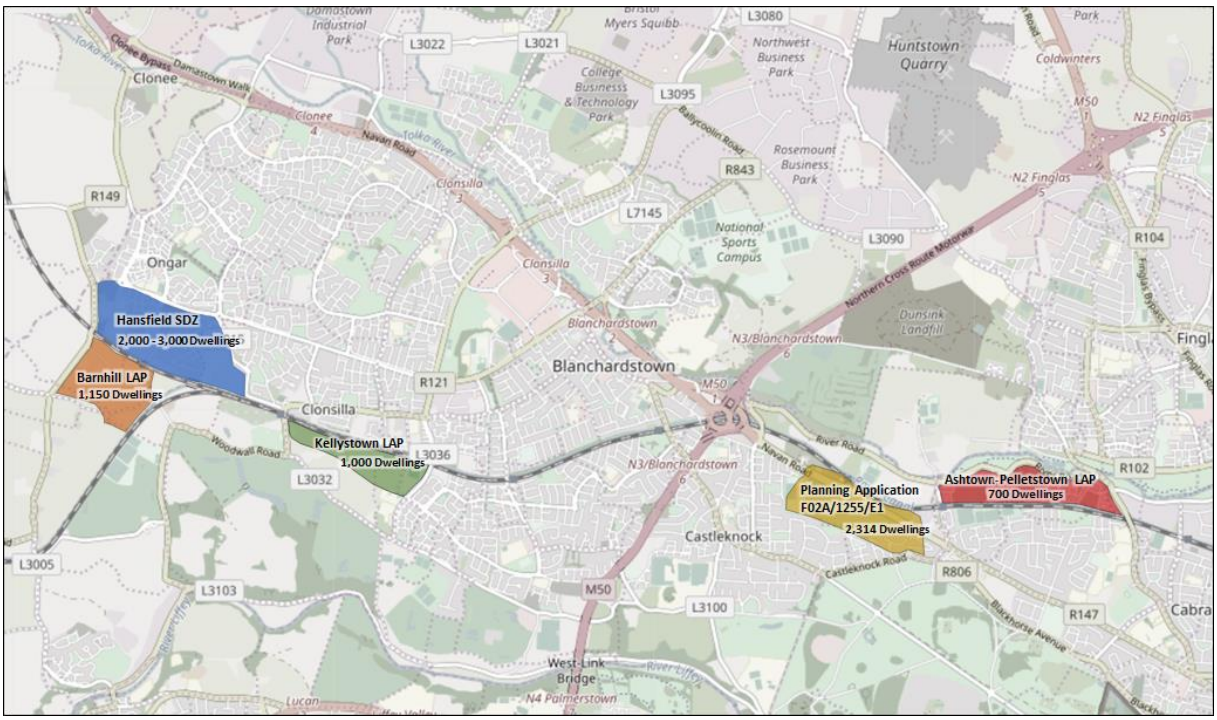
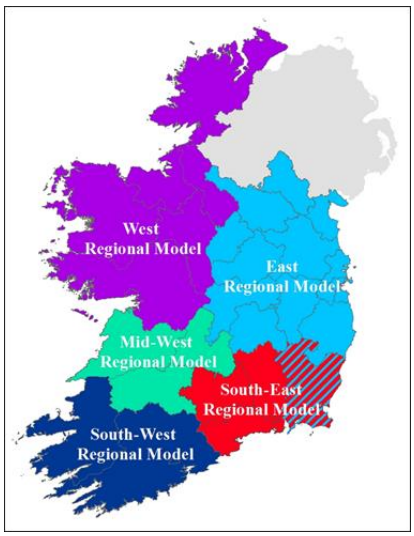


Figure 4.2 Proposed developments and LAPs within the study area

East Regional Model (ERM)

4.2.6 The ERM is a strategic multi-modal transport model representing travel by all the primary surface modes – including, walking and cycling (active modes), and travel by car, bus, rail, tram, light goods and heavy goods vehicles.



4.2.7 It covers the area to the east of Ireland including the counties of Dublin, Wicklow, Kildare, Meath, Louth, Wexford, Carlow, Laois, Offaly, Westmeath, Longford, Cavan and Monaghan.

4.2.8 The ERM sits within the overall NTA Regional Modelling System which comprises of the following three main components, namely:

- The National Demand Forecasting Model (NDFM);
- 5 Regional Models (including the ERM); and
- A suite of Appraisal Modules.

4.2.9 It is comprised of the following key elements:

- **Trip End Integration:** The Trip End Integration module converts the 24 hour trip ends output by the NDFM into the appropriate zone system and time period disaggregation for use in the Full Demand Model (FDM);
- **The Full Demand Model (FDM):** The FDM processes travel demand, carries out mode and destination choice, and outputs origin-destination travel matrices to the assignment models. The FDM and assignment models run iteratively until an equilibrium between travel demand and the cost of travel is achieved; and
- **Assignment Models:** The Road, Public Transport, and Active Modes assignment models receive the trip matrices produced by the FDM and assign them in their respective transport networks to determine route choice and the generalised cost for each origin and destination pair.

4.2.10 Destination and mode choice within the ERM have been calibrated using two main sources: Census 2011 Place of Work, School or College - Census of Anonymised Records (2011 POWSCAR), and the Irish National Household Travel Survey (2012 NHTS). Therefore, the ERM is an ideal tool to estimate the forecast travel demand for the Maynooth Line Transport Study.

Local Area Model (LAM) Development

4.2.11 As outlined in the methodology description in Chapter 1 previously, two calibrated and validated LAMs have been developed to assess the road network impacts of the various level crossing replacement options. The boundaries of the LAMs are illustrated in Figure 4.3, and have been defined based on the area of influence of the level crossing closures. In summary:

- **Blanchardstown LAM**: Covers the area bounded by the N3, N4 and M50 and includes Barberstown, Clonsilla, Porterstown and Coolmine level crossings; and
- **Ashtown LAM:** Covers the road network and key junctions surrounding the Ashtown level crossing.

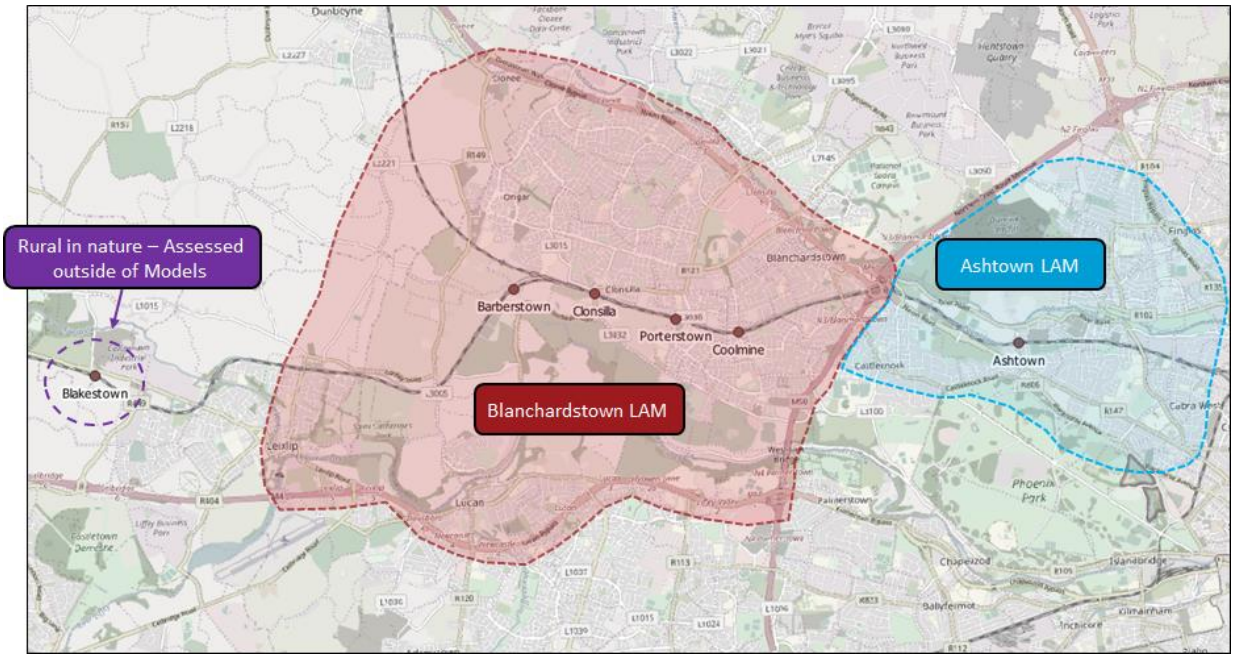


Figure 4.3 Local Area Model Boundaries

4.2.12 The ERM was utilised as a base for developing the LAMs, with additional network and zonal detail included to provide an enhanced representation of the road network, and route choice, in the study area. The road network was reviewed, in particular in the vicinity of the proposed level crossing closures, to ensure that it provides a robust and accurate representation of existing conditions. Figure 4.4 and 4.5, overleaf, provide an illustration of the detailed road networks for both the Blanchardstown and Ashtown LAMs.

4.2.13 Traffic survey data, collected in February 2019 (see Chapter 2), was then used to calibrate and validate the 2019 base LAMs to ensure that they provide an accurate representation of traffic flow within the study area.

4.2.14 The Blanchardstown and Ashtown LAMs were calibrated and validated in accordance with Transport Infrastructure Ireland's (TII) *Project Appraisal Guidelines (PAG) for National Roads Unit 5.1 – Construction of Transport Models (October 2016)* and have been shown to meet all specified criteria for both the AM (08:00-09:00) and PM (17:00-18:00) peak hours. This is a widely accepted standard in Ireland that provides robust calibration and validation criteria to which certain types of highway models should adhere.

4.2.15 The Blanchardstown and Ashtown LAMs are fit for purpose, and represent AM and PM peak hour traffic conditions well, as demonstrated statistically through calibration and validation. They provide a robust basis for assessing the impacts on the road network of any future closure/replacement of the level crossings within the model area.

4.2.16 For further information on the development, calibration and validation of the LAMs, the reader is referred to the model development reports included in Appendix B and C.

LAM Road Assignment

4.2.17 The road assignment within the Blanchardstown and Ashtown LAM is undertaken using the SATURN suite of modelling software. It allocates road users to routes between their desired origin and destination taking cognisance of aspects such as capacity constraints and traffic congestion.

4.2.18 New future year road networks were created to reflect the various options for closure, and replacement, of the level crossings on the Maynooth rail line (further details on the options for testing is provided in Chapter 5). These were then run in the LAMs with the following key performance indicators (KPI) extracted to assess the performance of each test option:

- Number of **vehicles displaced** from closed crossings onto alternative routes;
- Volume over Capacity (V/C) at key junctions;
- Overall **junction delay** within the study area; and
- **Journey times** for existing users of the level crossings.

4.2.19 Further information on the above KPIs, along with a detailed review of the road based assessment results are provided in Chapter 6 of this report. Conclusions and recommendations for replacement infrastructure on foot of the road based assessment were taken into consideration as part of the pedestrian and cyclist assessment.

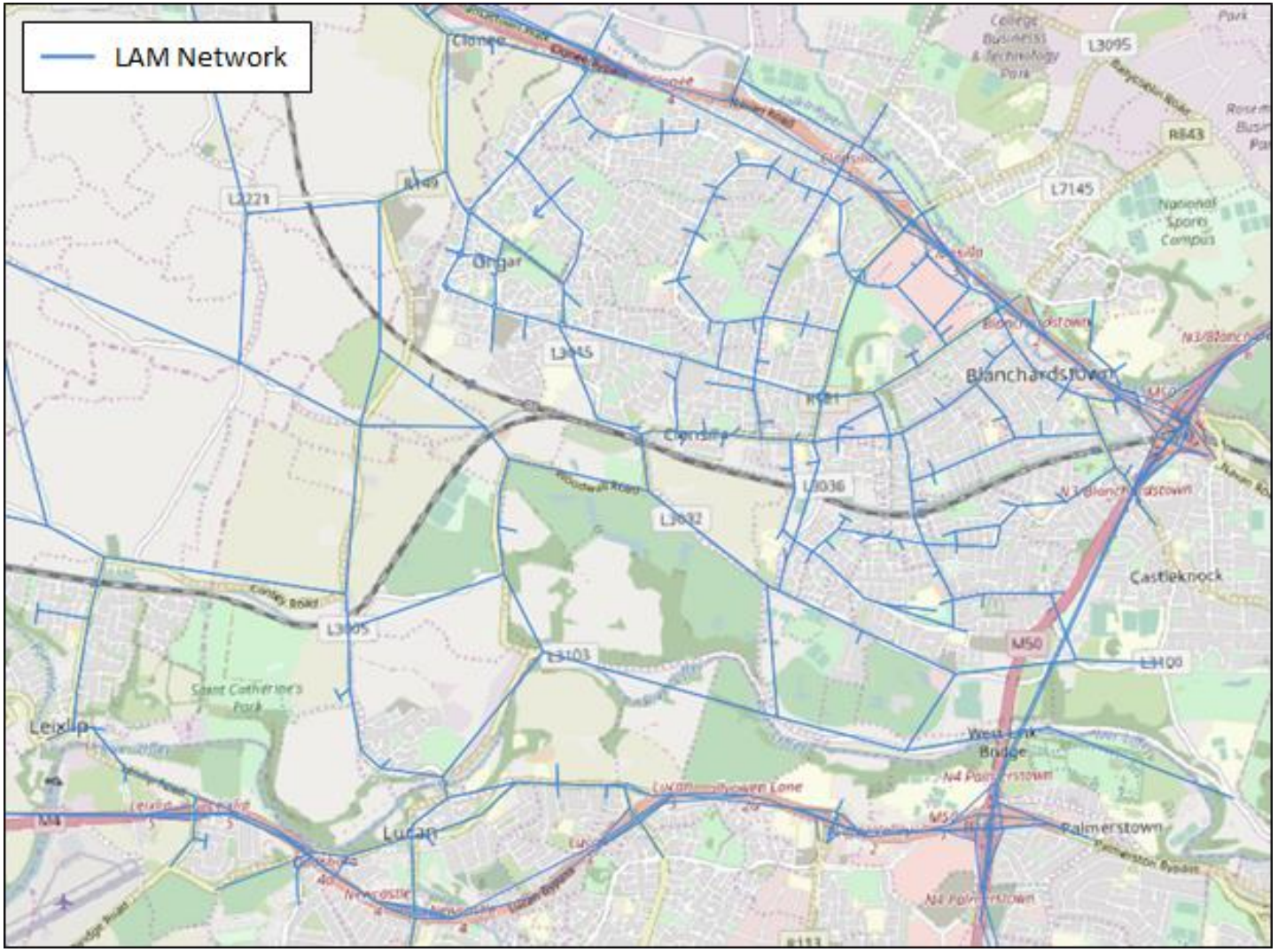


Figure 4.4 Blanchardstown LAM Road Network

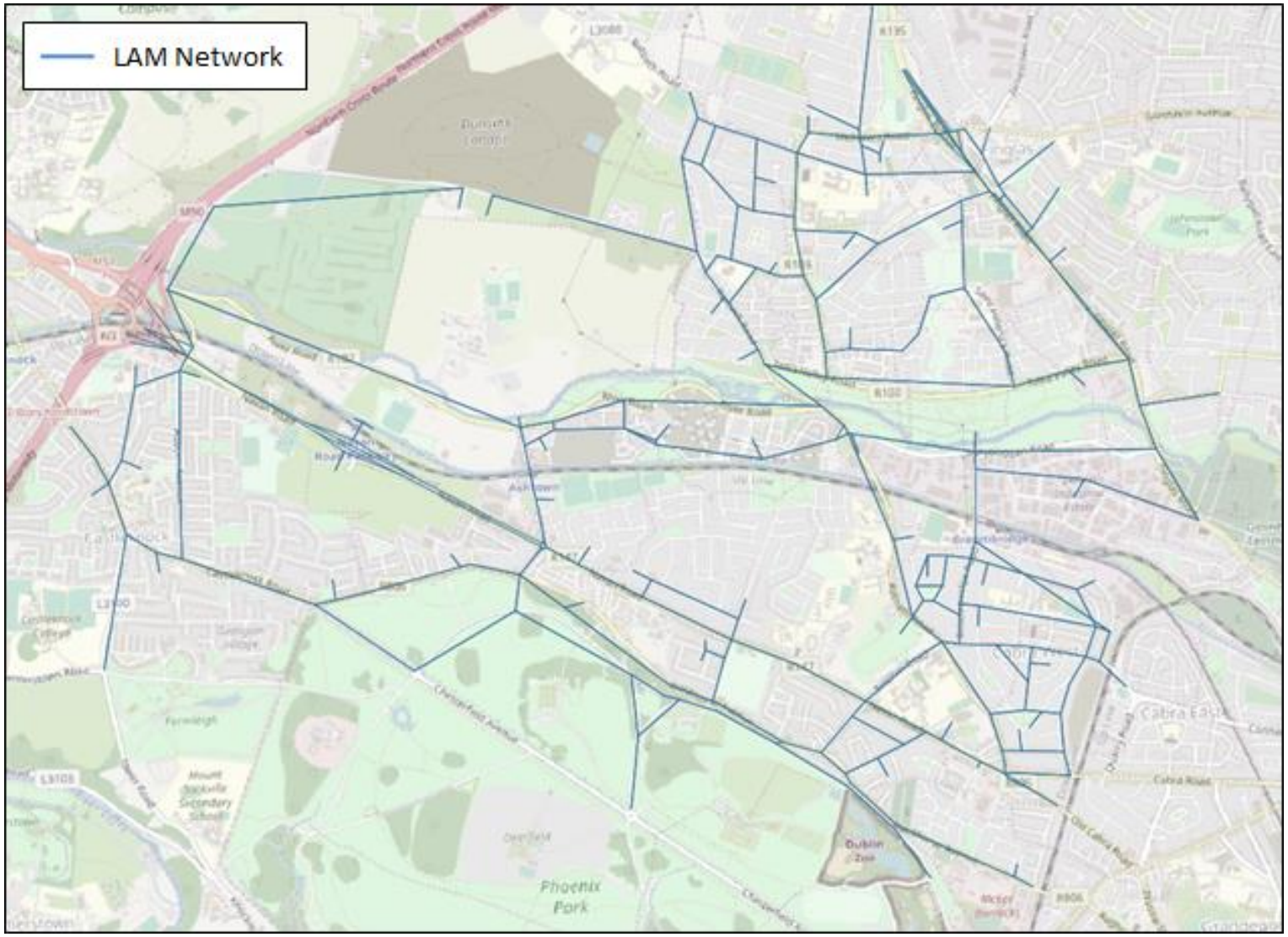


Figure 4.5 Ashtown LAM Road Network

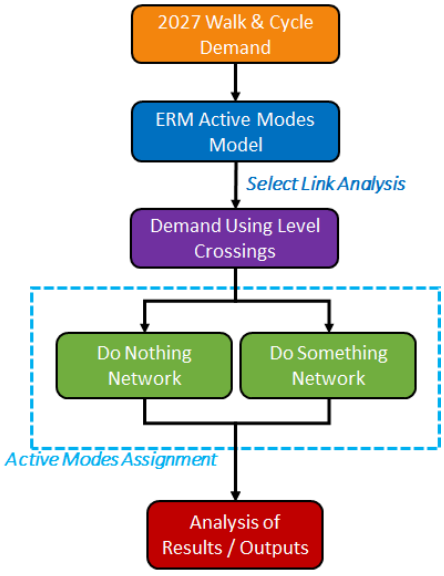
Blakestown Level Crossing

4.2.20 Due to the rural nature of the Blakestown level crossing, it was not deemed necessary to undertake a detailed modelling assessment of its closure. Instead, a review was undertaken of Automatic Traffic Counts (ATC) to gain an understanding of the volume of daily traffic using the level crossing and, depending on its level of use, recommend whether it would require replacement road infrastructure or not.

4.3 Pedestrian and Cyclist Assessment

4.3.1 The methodology for the pedestrian and cyclist (active modes) assessment comprises of the following key elements:

- **2027 Walk & Cycle Demand:** The NTA's ERM was run to generate forecast 2027 travel demand for testing on the pedestrian and cycle network;
- **Select Link Analysis:** The Active Modes assignment within the ERM was interrogated to determine the volume of pedestrians and cyclists using each of the level crossings, along with their origin and destination of travel;
- **Active Assignment:** The forecast travel demand using each level crossing was assigned to a network with, and without, the crossing available to pedestrians and cyclists; and



- **Analysis of Results/Outputs:** Key outputs from the active assignment were assessed to identify the impact on travel time, and distance, for pedestrian and cyclists if the level crossings are closed.

ERM Active Modes Assignment

4.3.2 The active modes (walking and cycling) assignment within in the ERM is undertaken using the CUBE Voyager modelling software. It allocates pedestrians and cyclists to routes between their origin and destination zones based on a shortest path approach, with no capacity or 'speed-flow' effects – i.e. the speed on the links will not be affected by the number of pedestrians or cyclists using that link.

4.3.3 The active modes assignment uses a detailed representation of the road network (as illustrated in Figure 4.3), along with additional specific walk and cycle infrastructure. A detailed review was undertaken, in particular in the vicinity of the proposed level crossing closures, to ensure all available walk and cycle access routes were included in the model e.g. pedestrian only links, access routes through housing estates etc.

4.3.4 Within the CUBE Voyager active modes assignment, the 'Select Link' function identifies the volume of pedestrians and cyclists using a specific link on the network. This functionality was used to identify the number of people using each level crossing on the Maynooth rail line, along with their origin and destination of travel.

4.3.5 For each level crossing, the 'Select Link' demand was assigned to a network with, and without, the crossing available to pedestrians and cyclists, and the following KPIs were extracted:

- Change in **journey times** for pedestrians and cyclists due to the level crossing closure; and
- Change in **travel distance** for pedestrians and cyclists due to the level crossing closure.

4.3.6 The results and recommendations from the road based assessment, described above, have also been taken into consideration when assessing the impact on pedestrians and cyclists. Where replacement road infrastructure is recommended, this has been tested in the active modes assignment to investigate whether it is sufficient to cater for pedestrian and cyclist movements, or whether additional infrastructure is also required at the existing level crossing location.

Non-Modelling Assessment

4.3.7 There are some amenities (e.g. playing pitches, parks, GAA clubs etc.) that cannot be captured accurately in peak hour modelling as they are most heavily utilised outside of the peaks, or at weekends, and access to these should also be considered when making a decision on the requirement for pedestrian and cyclist replacement infrastructure.

4.3.8 As such, a mapping analysis was undertaken of key destinations to identify areas that could have reduced accessibility due to crossing closures, but may not be captured fully in the modelling assessment.

4.3.9 Further information on the results of the pedestrian and cyclist assessment are provided in Chapter 7 of this report.

4.4 Summary

4.4.1 The previous sections of this chapter provide an overview of the methodology used to assess the impact of closing the level crossings along the Maynooth rail line for both road users, as well as pedestrians and cyclists. In summary:

- Demographic and land-use estimates for 2027, including population, and levels of employment and education, were developed in consultation with the NTA.

- The NTA's ERM was used to generate 2027 travel demand for road users, along with pedestrians and cyclists.

- Two calibrated and validated Local Area Models were developed to provide a robust basis for assessing the impacts on the road network of any future closure/replacement of the level crossings within the model areas.

- The LAMs were used to test various options for closure, and replacement, of the level crossings on the Maynooth rail line, with the following KPIs extracted to assess the performance of each test option:

  - Number of **vehicles displaced** from closed crossings onto alternative routes;
  - **Volume over Capacity (V/C)** at key junctions;
  - Overall **junction delay** within the study area; and
  - **Journey times** for existing users of the level crossings.

- Due to the rural nature of the Blakestown level crossing, it was not assessed using the LAMs. Instead, a review was undertaken of usage levels from ATC data to determine whether a road based replacement would be required at this location.

- The ERM's active modes model was used to test the closure of each level crossing to pedestrians and cyclists, and identify the impact on journey times and travel distances.

- Where replacement road infrastructure is recommended, this has been tested in the active modes assignment to investigate whether it is sufficient to cater for pedestrian and cyclist movements, or whether additional infrastructure is also required at the existing level crossing location.

- A mapping analysis was undertaken of key destinations to identify areas that could have reduced pedestrian and cyclist accessibility due to crossing closures, but may not be captured fully in the modelling assessment.

5. OPTIONS FOR ASSESSMENT

5.1 Introduction

5.1.1 The following chapter provides an overview of the road based options tested as part of the Maynooth rail line level crossing closure study. The options include different variations in the provision of replacement infrastructure for vehicular traffic at each crossing point, and are summarised in Table 5.1 below.

5.1.2 As noted in Section 4.2 previously, two LAMs were developed to assess the impact of the various level crossing closure and replacement options on the road network. Options 1-6 are focused on the crossings within the N3/N4/M50 boundary, and as such, have been tested within the Blanchardstown LAM. Ashtown is more remote from other level crossing points, and therefore, its closure and potential replacement was tested in isolation within the Ashtown LAM.

Table 5.1 Road Based Options for Assessment[7]

Option	Level Crossing	Replacement Infrastructure				
		Barberstown	Clonsilla	Porterstown	Coolmine	Ashtown
Do Minimum	All Closed	✗	✗	✗	✗	✗
Option 1	All Closed	✓	✗	✗	✗	N/A*
Option 2	All Closed	✗	✓	✗	✗	N/A
Option 3	All Closed	✗	✗	✗	✓	N/A
Option 4	All Closed	✓	✓	✗	✗	N/A
Option 5	All Closed	✓	✗	✗	✓	N/A
Option 6	All Closed	✗	✓	✗	✓	N/A
Ashtown Replacement	All Closed	N/A	N/A	N/A	N/A	✓

Blanchardstown LAM

Ashtown LAM

** N/A = Level Crossing is not included in the Local Area Model boundary*

5.1.3 The options have been developed to identify what scale of replacement road infrastructure, if any, is required to allow the level crossings on the Maynooth line to be closed without having significant impacts on network performance. In summary:

- The **Do Minimum** scenario looks at the impact of closing all the level crossings to vehicular traffic, without providing any replacement infrastructure;
- **Options 1-3** investigate if providing a replacement at one of the level crossings within the N3/N4/M50 boundary area would be sufficient to accommodate the re-routing of traffic from other closed crossings. The results of these options

[7] It is assumed that Porterstown level crossing will not require replacement infrastructure for vehicular traffic due to the availability of a high quality alternative bridge over the canal and rail line to the immediate east (L3036 Diswellstown Road).
Due to the rural nature of the Blakestown level crossing, it was not deemed necessary to undertake a detailed modelling assessment of its closure

also provide an indication as to the most critical crossings that would require replacement road infrastructure;

- **Options 4-6** include providing replacement infrastructure at a combination of level crossings, to identify if there is any particular location where a road based alternative may not be required; and

- **Option 7** focuses on the impact of closing the Ashtown level crossing to vehicular traffic without provision of direct relief infrastructure to identify the impact this would have on the surrounding road network.

5.1.4 For the purpose of this assessment, the proposed replacement infrastructure has been adopted from the '*Maynooth Line Urban Level Crossings NTA Briefing Document*' prepared by Roughan & O'Donovan (ROD) Consulting Engineers in 2011. This report included a preliminary assessment of a number of potential road replacement infrastructure alternatives at each level crossing to determine the preferred option/options. The design of the individual relief bridges may vary from that shown in this report, subject to design evolution and optimisation.

5.1.5 For some of the level crossings, the ROD report recommended a number of potential alternatives. In these instances, one option was selected to be tested for modelling purposes within this study in agreement with the NTA and Irish Rail.

5.1.6 The following sections provide a summary of each of the options outlined in Table 5.1 above.

5.2 Do Minimum

5.2.1 In the 2027 Do Minimum scenario, it is assumed that all the level crossings along the Maynooth rail line are closed to vehicular traffic, with no replacement road infrastructure provided at any location.

Level Crossing Closures

5.2.2 Details of a sample rail service pattern under DART Expansion were received from Irish Rail, and are illustrated in Figure 5.1, overleaf. Information was also received on the current level crossing closure times at each location in the AM (08:00-09:00) and PM (17:00-18:00) peak hours taken from a review of CCTV footage. Analysis of this data indicates the following:

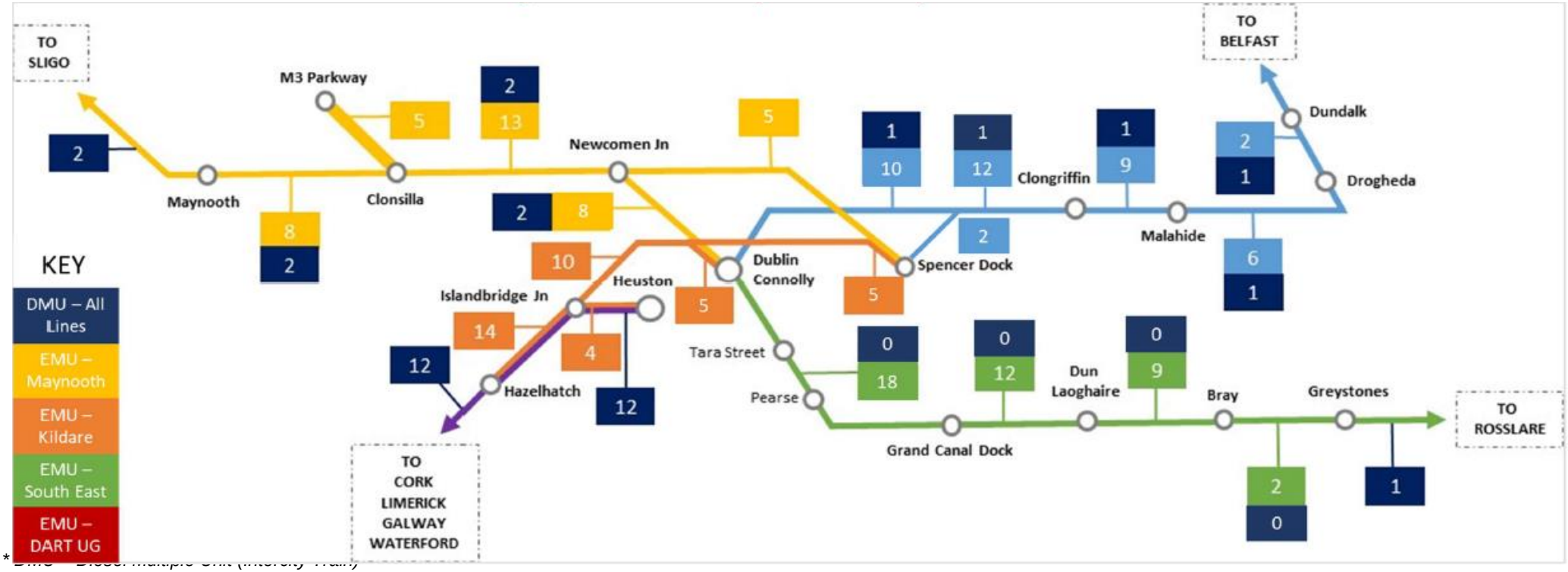
- **Barberstown Level Crossing**: Under the DART Expansion programme, it is envisaged that 10 trains per direction will pass via Barberstown in the peak hours (i.e. 20 trains passing the level crossing point). The trains in each direction will not be in-sync, and as such, will not pass the level crossing at the same time. Therefore, road curtailment at the Barberstown crossing will be required 20 times in the hour. Analysis of current level crossing times indicate that at Barberstown, on average, the barrier is down for approx. four minutes and 20 seconds per closure. Therefore, based on the proposed increase in train frequencies, it is estimated that there would be insufficient crossing time available in the hour to accommodate vehicular traffic.

- **Crossings East of Clonsilla**: As outlined in Figure 5.1, it is envisaged that the rail line east of Clonsilla will have 15 trains per direction in the peak hours under DART Expansion (i.e. 30 trains passing the level crossing point). The current average closure time at Ashtown, Coolmine, Porterstown and Clonsilla is approx. five minutes (per closure). Therefore, even if the trains on this line are perfectly in-sync, and pass the level crossings at the same time, this means that the barriers would need to be closed for the entire hour.

5.2.3 Therefore, as part of the Do Minimum scenario, the level crossings are closed completely in the future year, and no further testing was undertaken with reduced opening times for the following reasons:

- Analysis of existing crossing closures, and proposed DART Expansion train frequencies, suggest that the barriers would be closed for the entire peak hours; and

- The retention of the crossings, if open for only a very short period of time, could lead to frustration for drivers and an increase in the likelihood of accidents along the train line.



* DMU = Diesel Multiple Unit (Intercity Train)
* EMU = Electric Multiple Unit (DART Train)

Figure 5.1 Sample DART Expansion Service Pattern – Number of Trains per direction per hour

Road Network Updates (Local Authority Works, not associated with DART Expansion)

5.2.4 The following road infrastructure upgrades, illustrated in Figure 5.3, overleaf, are assumed to be constructed prior to the 2027 test year, and as such, have been included in all options for testing, including the Do Minimum.

Ongar to Barnhill Distributor Road

5.2.5 The proposed Ongar to Barnhill Distributor Road is to be constructed south of Ongar and will provide improved access to the Barnhill LAP lands. It was granted planning permission on the 2nd April 2007, and is due to go out on site in late 2019 / early 2020. The proposed road includes the construction of a new bridge over the Clonsilla-M3 Parkway rail spur, and a new road connecting to the R149 and L7005 Barberstown Lane South (See Figure 5.2). As part of the modelling assessment, it was assumed that Barberstown Lane North would remain open to vehicular traffic in the future, however, with no connection to the Ongar to Barnhill Distributor Road.

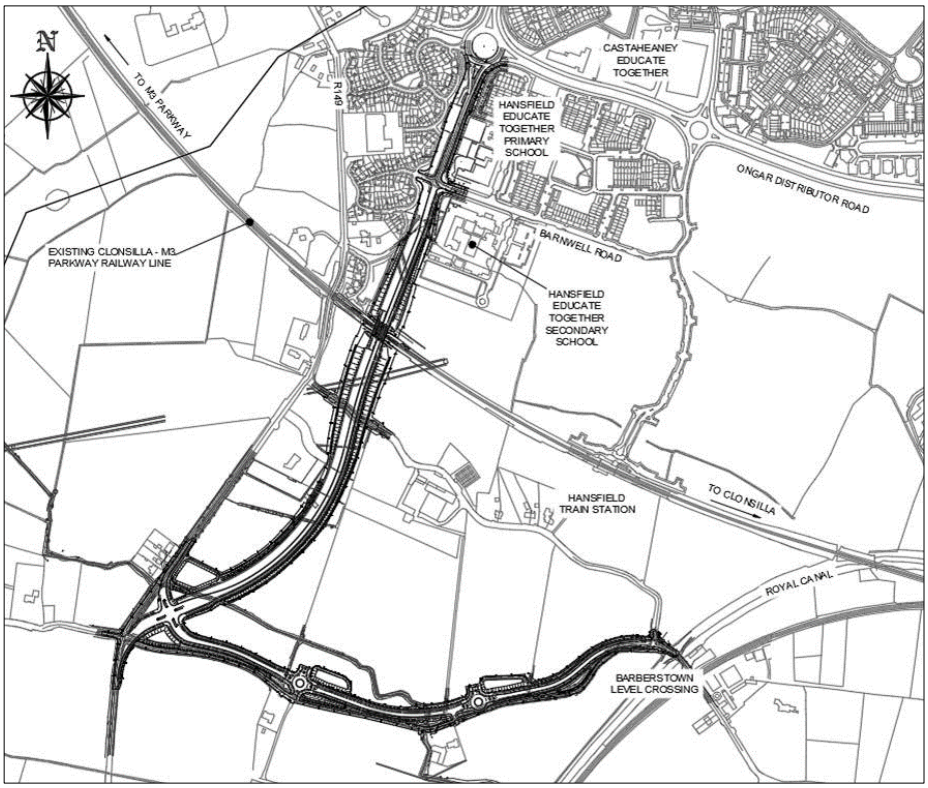


Figure 5.2 Ongar to Barnhill Distributor Road

Kellystown Link Road

5.2.6 As noted in Section 4.2 previously, the draft Kellystown Local Area Plan proposes the development of approximately 1,000 dwellings on the lands between Clonsilla and Porterstown level crossings. It is assumed that a portion of this development will be delivered by the forecast year 2027, and as such, road infrastructure will be required to link these lands with the surrounding road network. The location of this proposed Kellystown Link road is illustrated in orange in Figure 5.3, overleaf, and connects the L3032 Luttrellstown Road with the L3036 Diswellstown Road.

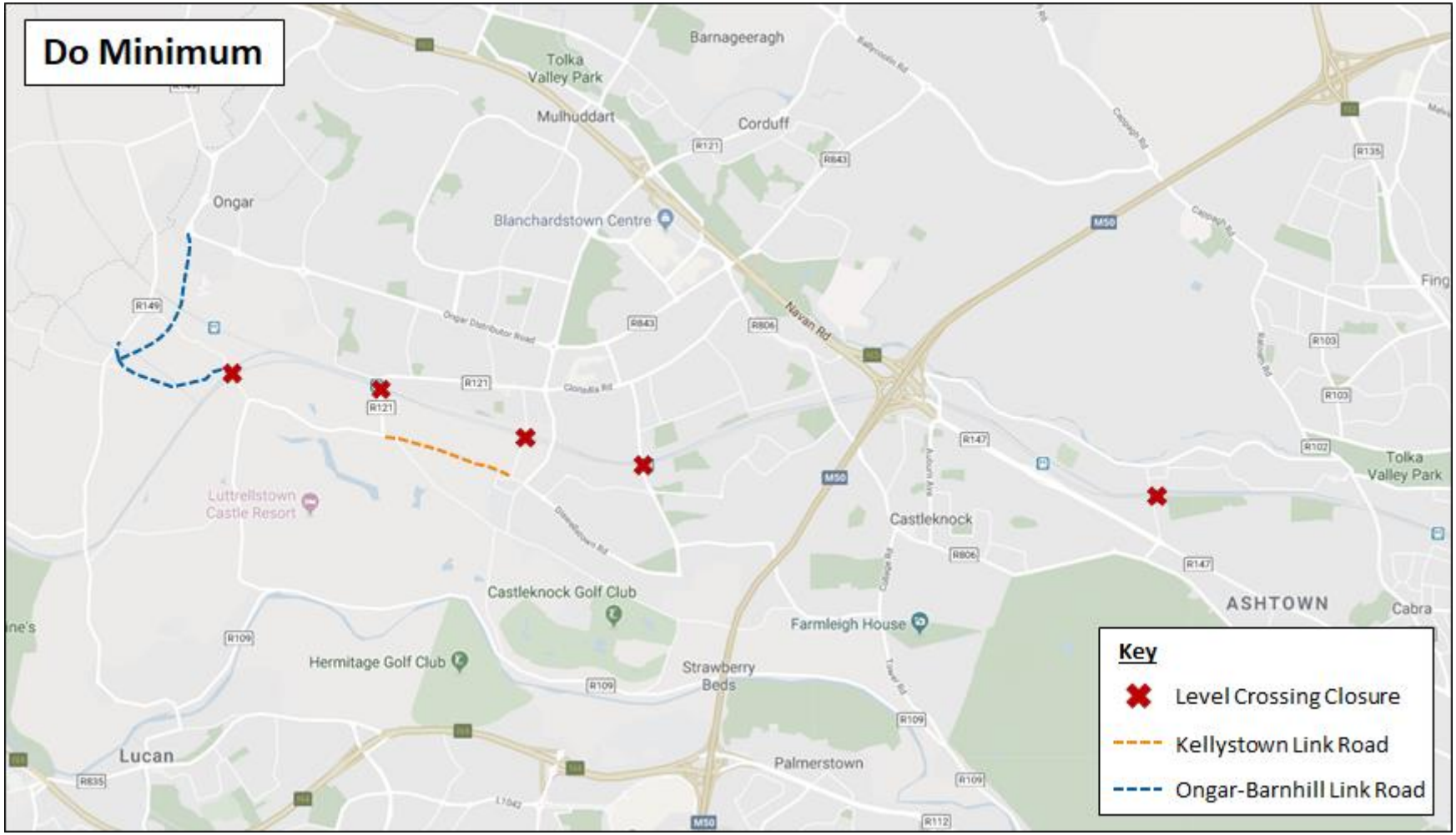


Figure 5.3 Do Minimum Network

5.3 Option 1

5.3.1 In Option 1, it is assumed that all level crossings along the Maynooth rail line will be closed with replacement road infrastructure provided at Barberstown. This assumes the construction of a new bridge to the southwest of the existing crossing, spanning the rail line and canal, linking the L7005 Barberstown Lane South to the R121 (illustrated in Figure 5.4).

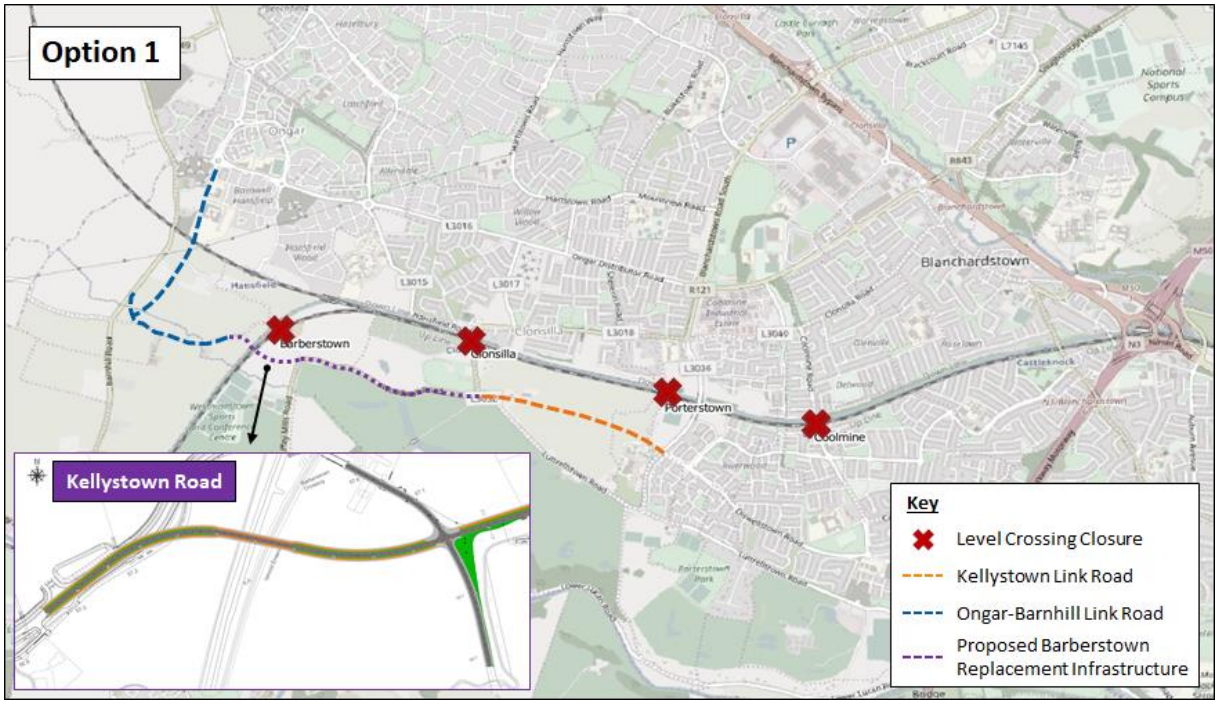


Figure 5.4 Option 1 Network[8]

5.4 Option 2

5.4.1 Option 2 includes the closure of all level crossings on the Maynooth line with replacement road based infrastructure provided at Clonsilla. This option assumes the construction of an overbridge, approximately 210 metres west of the existing level crossing, connecting the R121 to the L3015 Hansfield Road as illustrated in Figure 5.5, overleaf.

[8] More detailed drawings of the proposed Barberstown replacement infrastructure are provided in Appendix C.

Figure 5.5 Option 2 Network[9]

5.5 Option 3

5.5.1 In Option 3, it is assumed that all level crossings along the Maynooth rail line will be closed with replacement road infrastructure provided at Coolmine. This assumes the construction of a new link road connecting St. Mochta's Grove at the northern end, through to a new roundabout on Luttrell Park Road at the southern end, as illustrated in Figure 5.6. A bridge approximately 43 metres in length is modelled to span over the railway and canal with raised embankments at either end. The existing corridor for the road is predominantly green space but contains local access roads that would be realigned.

Figure 5.6 Option 3 Network[10]

[9] ROD preliminary drawings for the proposed Clonsilla replacement infrastructure are provided in Appendix C
[10] ROD preliminary drawings for the proposed Coolmine replacement infrastructure are provided in Appendix C

5.6 Option 4

5.6.1 Option 4 includes the closure of all level crossings on the Maynooth line with replacement road based infrastructure provided at Barberstown (Option 1) and Clonsilla (Option2) as illustrated in Figure 5.7 below.

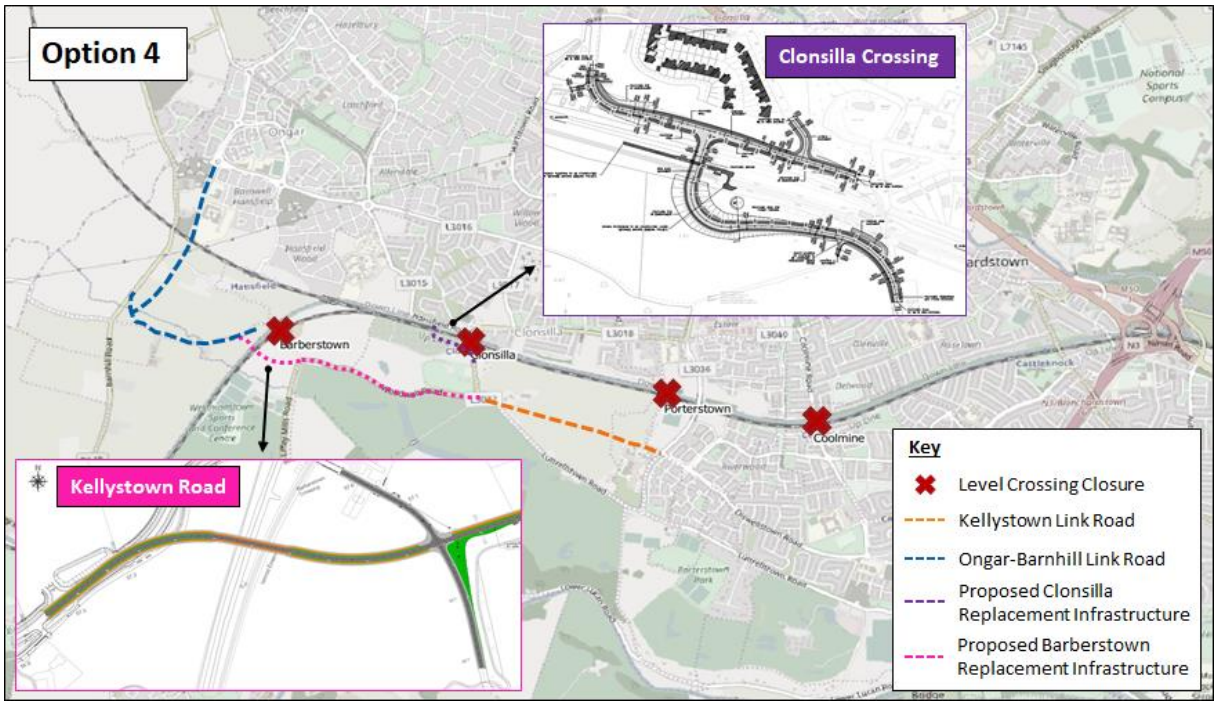


Figure 5.7 Option 4 Network

5.7 Option 5

5.7.1 Option 5 includes the closure of all level crossings on the Maynooth line with replacement road based infrastructure provided at Barberstown (Option 1) and Coolmine (Option 3) as illustrated in Figure 5.8 below.

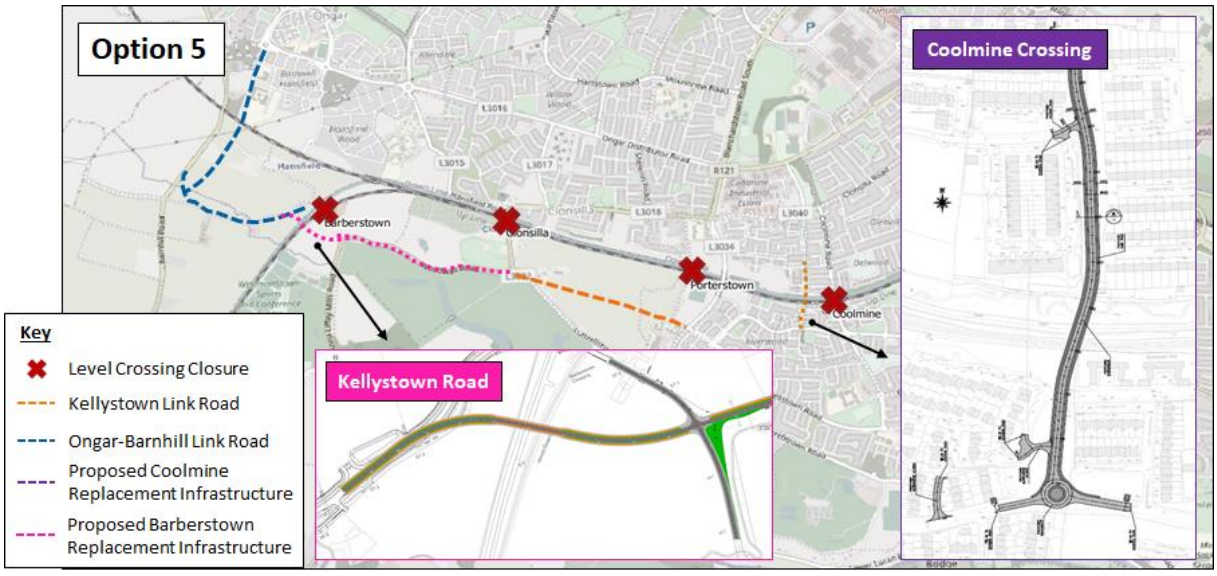


Figure 5.8 Option 5 Network

5.8 Option 6

5.8.1 Option 6 includes the closure of all level crossings on the Maynooth line with replacement road based infrastructure provided at Clonsilla (Option 2) and Coolmine (Option 3) as illustrated in Figure 5.9 below.

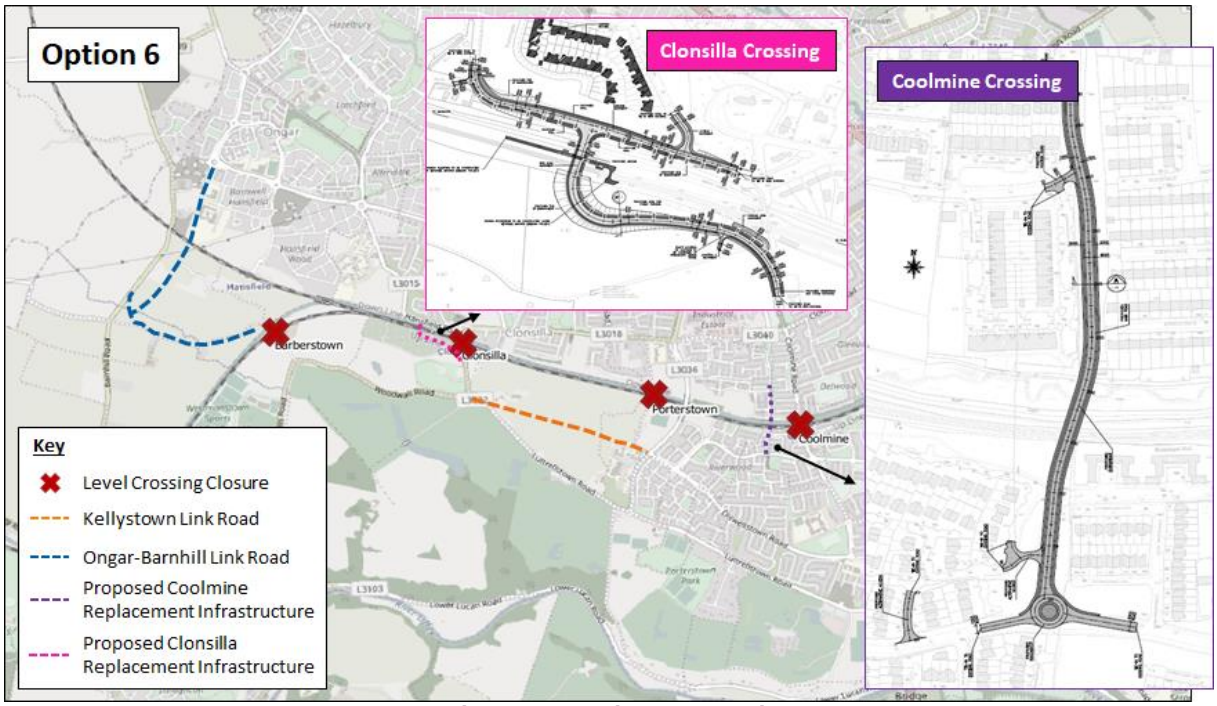


Figure 5.9 Option 6 Network

5.9 Option 7

5.9.1 Options 1-6 focus on the four level crossings within the N3/N4/M50 boundary area, as the closure of one has implications for the others. Ashtown, however, is more remote from other level crossing points and, as such, the impact of its closure is tested in isolation in Option 7.

5.9.2 The proposed road based replacement infrastructure at Ashtown is adopted from '*Option 2*' in the ROD '*Maynooth Line Urban Level Crossings NTA Briefing Document'*. It includes the re-routing of Ashtown Road along its old alignment on Mill Lane, and passing under the railway and the Royal Canal as illustrated in Figure 5.10, overleaf. As part of this replacement option, it is envisaged that there would be height restrictions on the underpass, and as such, it will not be accessible for heavy goods vehicles.

5.9.3 Within Option 7, the closure of the Ashtown level crossing (Do Minimum) is compared to the provision of replacement infrastructure as illustrated in Figure 5.10. This is to isolate the impact on the surrounding road network of not providing a road based replacement at Ashtown.

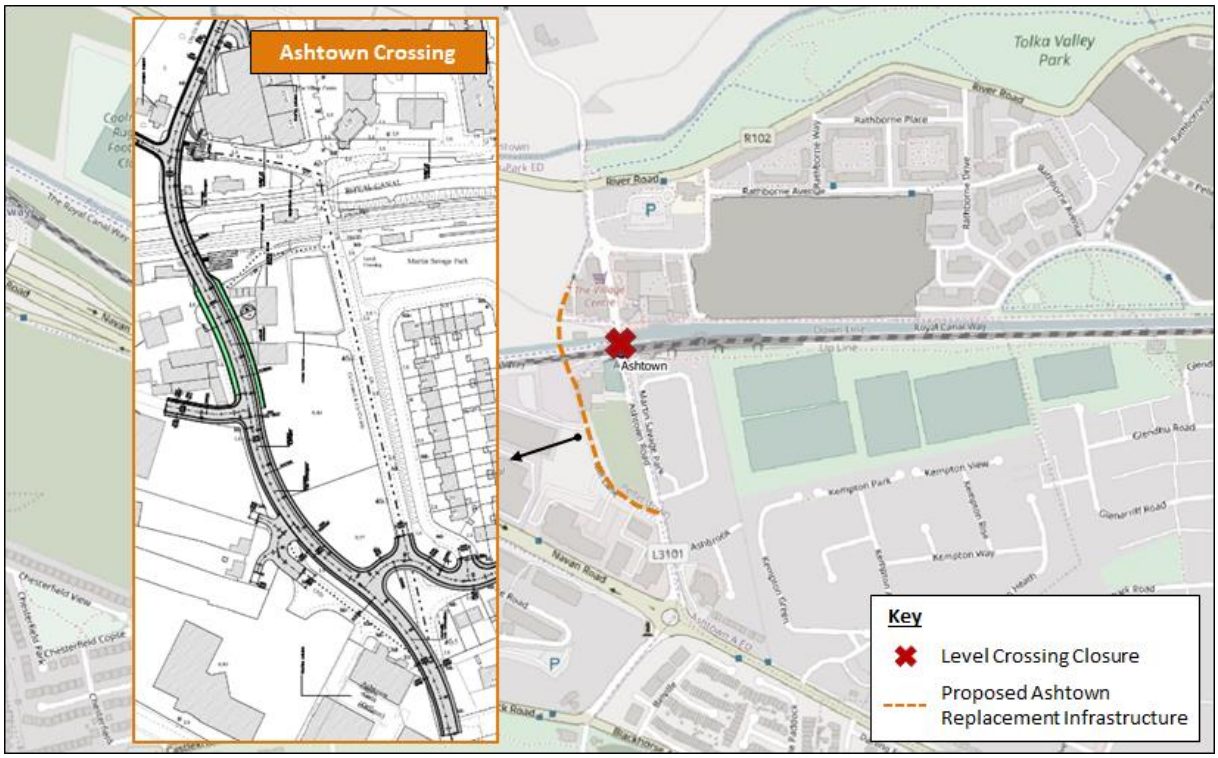


Figure 5.10 Proposed Ashtown Replacement Infrastructure Tested in Options 1-6[11]

[11] ROD preliminary drawings for the proposed Ashtown replacement infrastructure are provided in Appendix C

5.10 Summary

5.10.1 The previous sections of this chapter provide an overview of the road based options tested as part of the Maynooth Line Transport Study. In summary:

- The options have been developed to identify what scale of replacement road infrastructure, if any, is required to allow the level crossings on the Maynooth line to be closed without having significant impacts on network performance.
- Based on a review of proposed DART expansion train frequencies, and existing closure times, it is envisaged that all level crossings on the Maynooth rail line will need to be closed completely in the future year.
- It is envisaged that both the Ongar to Barnhill Distributor Road, and Kellystown Link Road, will be constructed prior to the 2027 test year, and as such, have been included in all options for testing, including the Do Minimum.
- It is assumed that Porterstown level crossing will not require replacement infrastructure for vehicular traffic due to the availability of a high quality alternative bridge to the immediate east (L3036 Diswellstown Road).
- Due to the rural nature of the Blakestown level crossing, it was not deemed necessary to undertake a detailed modelling assessment of its closure.
- In Summary:
  - The **Do Minimum** scenario looks at the impact of closing all the level crossings to vehicular traffic, without providing any replacement infrastructure;
  - **Options 1-3** investigate if providing a replacement at one of the level crossings within the N3/N4/M50 boundary area would be sufficient to accommodate the re-routing of traffic from other closed crossings;
  - **Options 4-6** include providing replacement infrastructure at a combination of level crossings, to identify if there is any particular location where a road based alternative may not be required; and
  - **Option 7** focuses on closing the Ashtown level crossing to vehicular traffic to identify the impact this would have on the surrounding road network.

6. ROAD BASED ASSESSMENT RESULTS

6.1 Introduction

6.1.1 This chapter outlines the results of the road based assessment of the Level Crossing Closure Options detailed previously in Chapter 5. All of the test scenarios have been assessed using the Blanchardstown and Ashtown Local Area Models focusing on the following key performance indicators (KPIs):

- **KPI-1 Vehicles Displaced:** This represents the number of vehicles that would want to use each of the level crossings if available, however, can no longer do so due to their closure. Flow difference plots have been extracted to identify the volume of traffic displaced onto alternative routes due to the closure of the level crossings. This KPI is important as the displacement of vehicles, and the resultant re-routing, can lead to increased vehicular flows at other locations on the network causing increased levels of congestions and delay;

- **KPI-2 Volume over Capacity (V/C):** For key junctions within the study area, illustrated in Figure 6.1 overleaf, the V/C has been plotted to illustrate areas of the network experiencing capacity issues due to the level crossing closures. Volume over capacity is a commonly used index to assess the performance of junctions, and in general a V/C of greater than 100% means that demand through the junction exceeds capacity leading to significant congestion and delay. Typically, junctions with V/C in excess of 85% are regarded as suffering from traffic congestion;

- **KPI-3 Junction Delay:** Overall change in delay at key junctions (illustrated in Figure 6.1) have been extracted to identify the impact of the various level crossing closure options; and

- **KPI-4 Journey Times:** For current users of the level crossings, their change in journey time has been extracted and analysed to identify the impact of the various level crossing closure options.

6.1.2 Each of the road based options has been analysed in comparison to an unconstrained benchmark scenario, whereby all level crossings are closed and replacement road infrastructure is provided at all locations (except Porterstown[12] and Blakestown) as illustrated in Figure 6.2, overleaf.

6.1.3 The forecast changes in journey times have also been analysed in comparison to a 2027 'Do Nothing' scenario. In this option, it is assumed that no further upgrades are undertaken on the Maynooth Rail Line, and the level crossing closures times remain the same as present day.

6.1.4 The following sections of this chapter provide an overview of the results of the various level crossing closure options under each of the KPIs identified above. As noted in the assessment methodology, all scenarios have been tested in the forecast year 2027 in-line with delivery of improved train frequencies on the Maynooth line as part of the DART expansion programme.

[12] Porterstown Level Crossing has an existing replacement for vehicular traffic to the immediate east, and as such, replacement road based infrastructure is not required at this location.

Figure 6.1 Junctions included in the V/C and Delay KPI Assessment

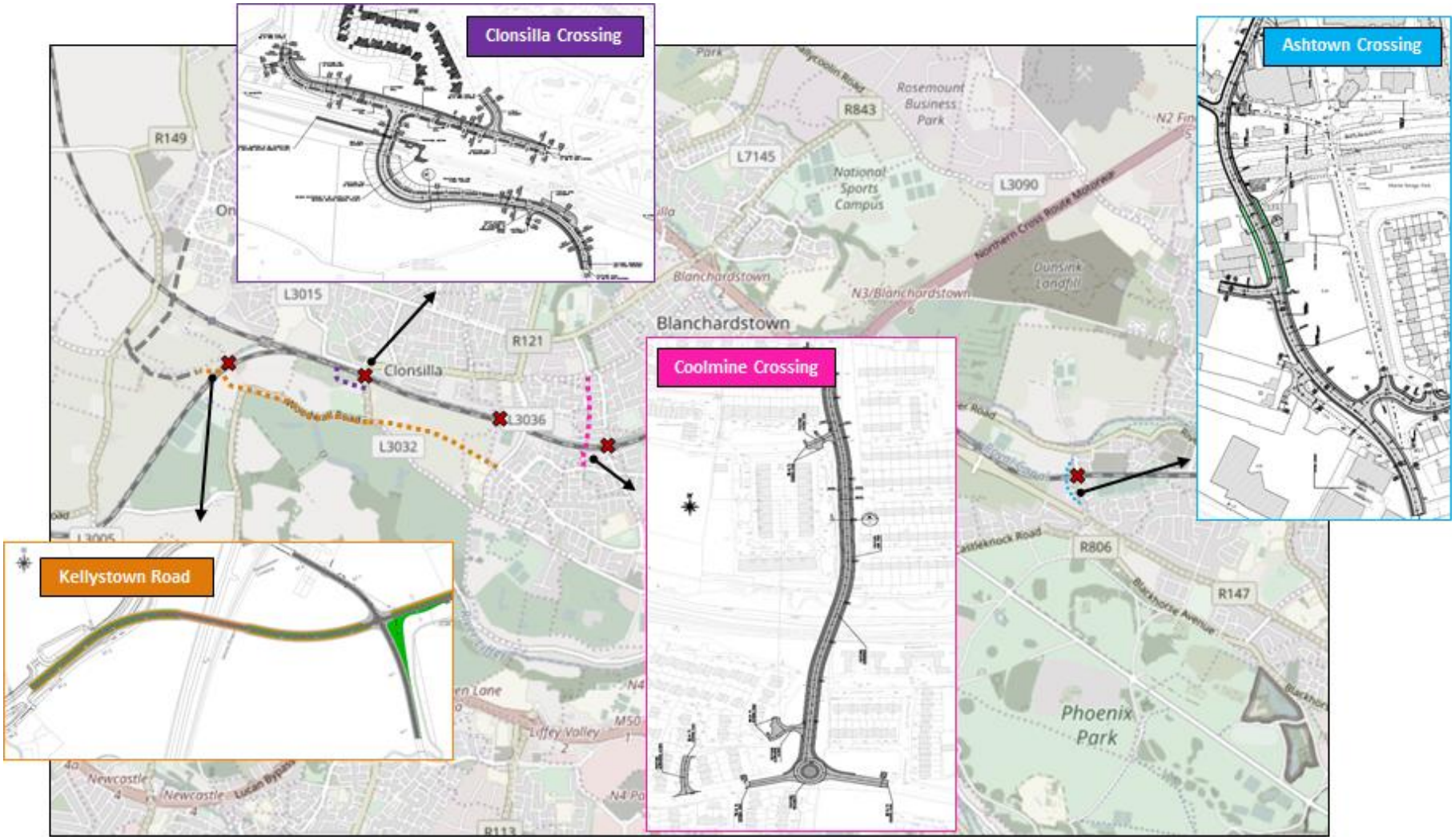


Figure 6.2 Benchmark Level Crossing Replacement option

6.2 Do Minimum

6.2.1 As outlined in Chapter 5 previously, the Do Minimum Option assumes that all level crossings are closed in 2027 with no replacement road infrastructure provided.

6.2.2 The results for the Do Minimum and Options 1-6 have been extracted from the Blanchardstown LAM (Figure 4.3) and are focused on the four level crossings within the N3/N4/M50 boundary area. These crossings are located within close proximity to each other, and as such, the closure of one has a knock-on impact on the others.

KPI-1 Vehicles Displaced

6.2.3 Figure 6.3, overleaf, shows a difference plot illustrating the change in forecast traffic flows for the Do Minimum when compared against the benchmark scenario (illustrated above in Figure 6.2). The green bands represent an increase in flow, whilst the blue bands represent a decrease in flow on each link. The width of the bands provide an indication of the magnitude of the change, with the thicker bands representing larger increases/decreases in traffic volumes.

6.2.4 The results in Figure 6.3 illustrate significant decreases in flows at Clonsilla, Barberstown and Coolmine due to the level crossing closures. In total, approximately 2,240 passenger car units[13] (pcus) are displaced in the AM peak hour (08:00 – 09:00) onto alternative crossing locations.

6.2.5 Traffic previously using the Barberstown and Clonsilla crossings are re-routed onto the R149 and the Diswellstown Road bridge crossing (location 2 in Figure 6.3). The R149, in particular, experiences a significant increase in traffic volumes of approx. 62%.

6.2.6 Traffic previously using the Coolmine crossing are re-routed primarily onto the alternative bridge crossings at Diswellstown Road and Castleknock Road (R806). These areas are already congested in the peak hours and experience increases in traffic volumes of approx. 65% and 38% respectively.

[13] Passenger Car Unit (PCU) is a metric used in transport modelling to assess traffic-flow rate. It represents the impact that a mode of transport has on traffic variables (such as headway, speed, density) compared to a single car. So for example, a car would be represented as 1 pcu, whilst a large truck could have a pcu value of 3.

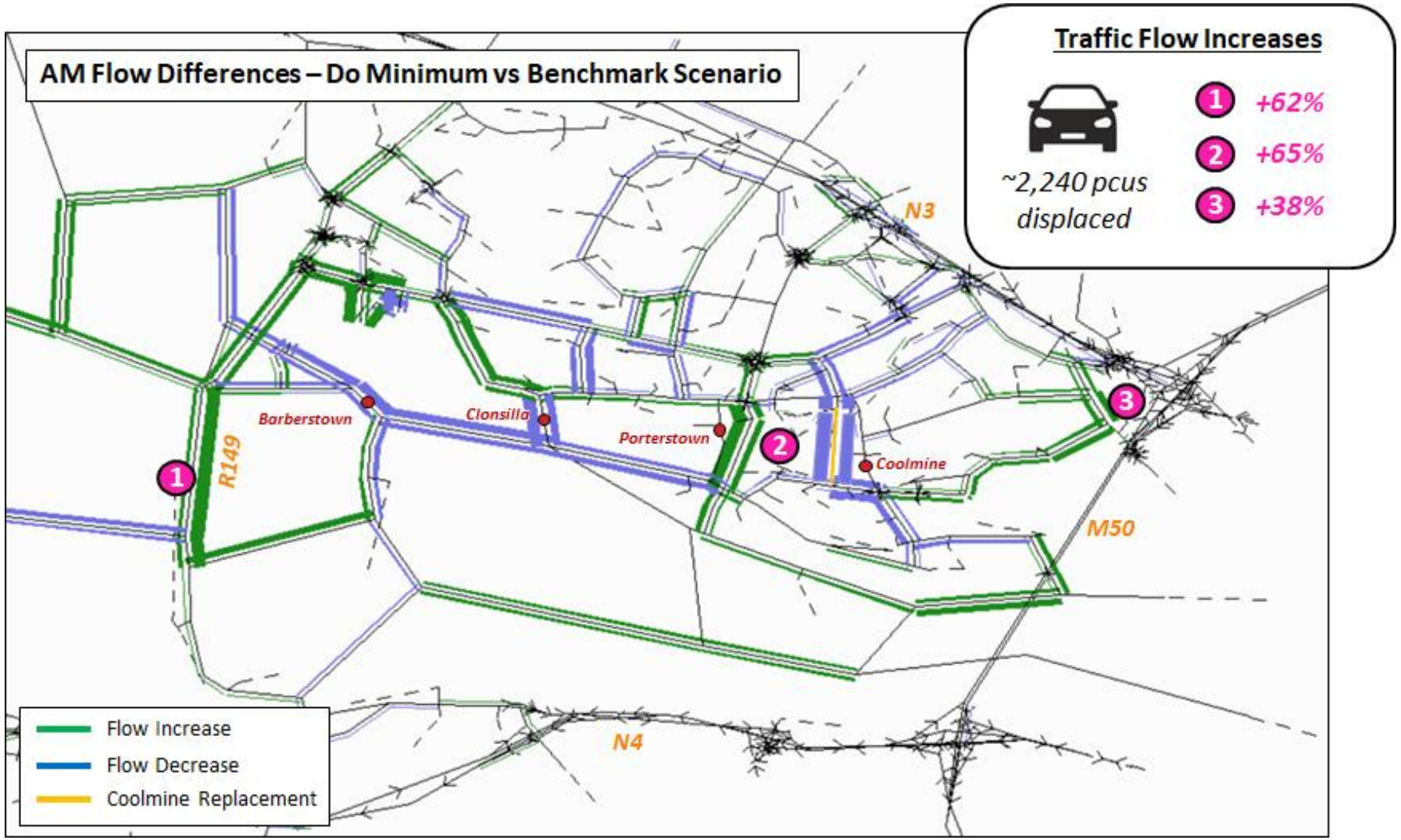


Figure 6.3 AM Flow Difference Plot – Do Minimum vs Benchmark Scenario

KPI-2 Volume over Capacity

6.2.7 Figure 6.4, overleaf, displays the demand weighted average V/C (as a percentage) for a number of identified key junctions within the study area for the Benchmark and Do Minimum scenarios. As mentioned previously, V/C is a commonly used measure to identify areas of the network that may be experiencing capacity issues. In general, a V/C of greater than 100% means that the junction is operating over capacity. Junctions with a V/C of greater than 85% are likely to experience significant levels of congestions and delay.

6.2.8 The results in Figure 6.4 indicate a general increase in V/C for junctions that experience a growth in traffic volumes due to the re-routing of vehicles from the closed level crossings. In particular, junctions around the Diswellstown Road overbridge , and the Castleknock Road, experience quite high levels of average V/C (85%-100%) indicating that these areas are quite heavily congested.

KPI-3 Junction Delay & KPI-4 Journey Times

6.2.9 Figure 6.5 displays the change in total junction delay (in seconds) between the Do Minimum and benchmark scenarios for a number of junctions within the study area. The modelling results indicate that junctions in close proximity to the closed level crossings experience a reduction in delay due to reduced traffic volumes.

6.2.10 Junctions that experience increases in traffic volume (KPI-1), and V/C (KPI-2), due to the re-routing of vehicles from closed crossings, see a significant rise in congestion and delay. In total, junctions in the Do Minimum scenario experience an increase in delay of 38% and 22% in the AM (08:00 – 09:00) and PM (17:00 – 18:00) peak hours respectively when compared to the benchmark scenario.

6.2.11 Select Link Analysis was used to identify the people who would want to use the Maynooth line level crossings if they remained open, including their desired origin and destination of travel. Journey times for these origin-destination movements were extracted and compared for the Do Minimum and Benchmark scenarios. The results indicate that the Do Minimum scenario sees a 19% (AM) and 20% (PM) increase in journey times for vehicles who would want to use the level crossings during the peak hours. This increase in journey time is primarily due to the re-routing required to alternative crossing points, along with the increased levels of congestion and delay at these locations as described above.

Table 6.1 Do Minimum Road Based Assessment Summary Results

Option	**KPI-1** Flows Displaced (pcus)		**KPI-3** Change in Delay (vs Benchmark)		**KPI-4** Change in Journey Times (vs Benchmark)[14]	
	AM	PM	AM	PM	AM	PM
Do Minimum	2,241	2,179	38%	22%	19%	20%

[14] Represents change in journey times for people who previously would have used the crossings that are now closed

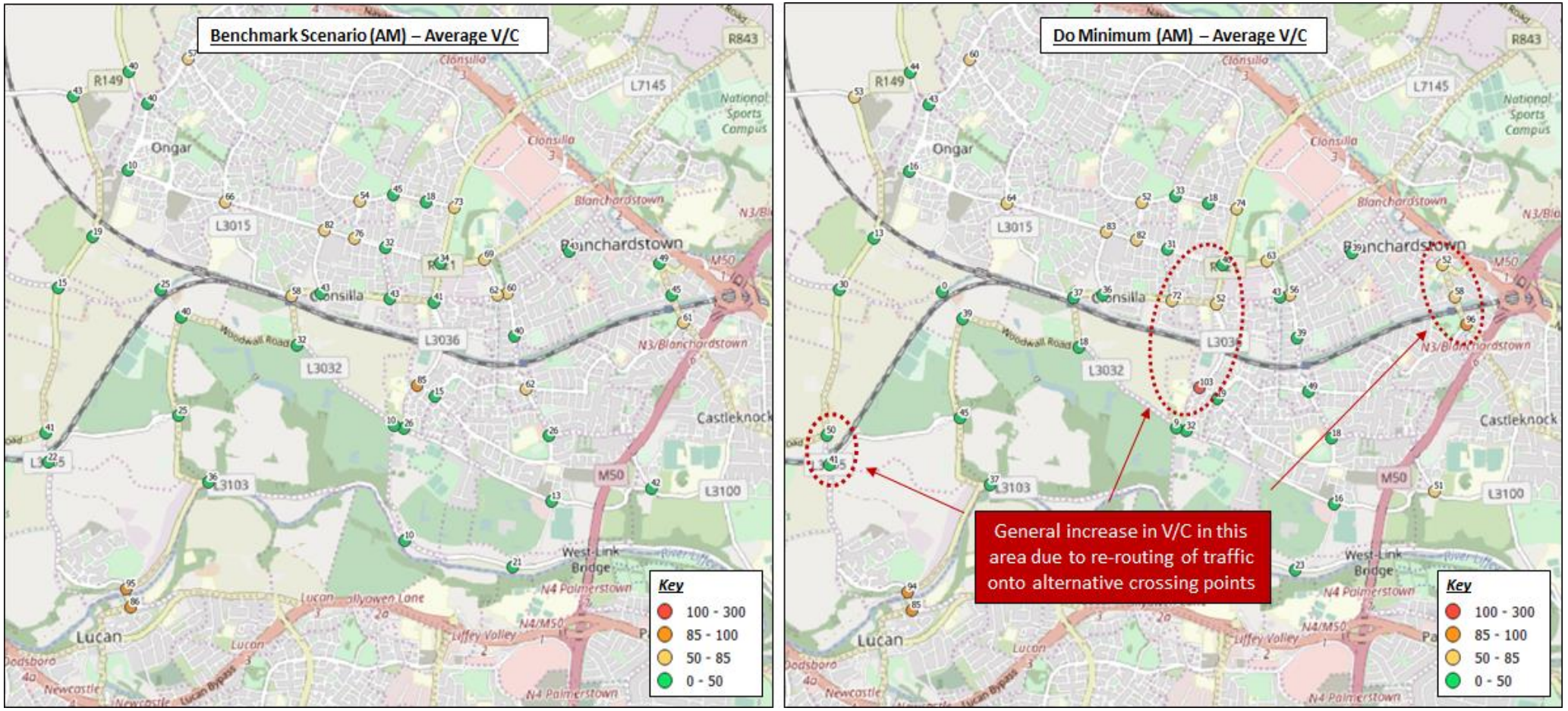


Figure 6.4 AM Average V/C – Do Minimum vs Benchmark Scenario

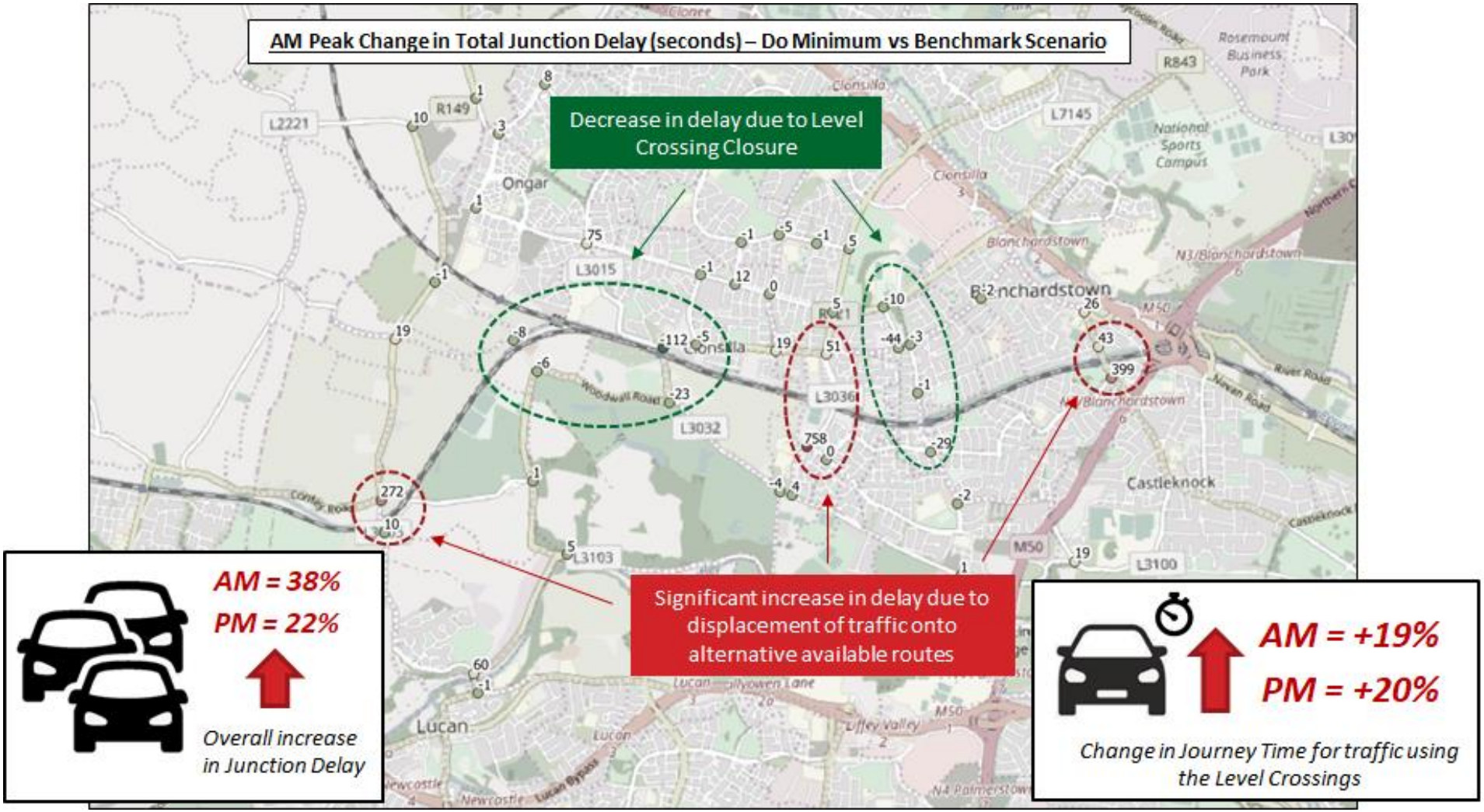


Figure 6.5 AM Change in Junction Delay – Do Minimum vs Benchmark Scenario

6.3 Option 1

6.3.1 Option 1 includes the closure of the level crossings at Barberstown, Clonsilla, Porterstown and Coolmine with a new bridge constructed over the canal and rail line south of Barberstown linking the L7005 and the R121 (see Figure 5.4).

KPI-1 Vehicles Displaced

6.3.2 Figure 6.6 shows a difference plot illustrating the change in forecast traffic flows for Option 1 when compared against the benchmark scenario (i.e. replacement road infrastructure provided at Coolmine, Clonsilla and Barberstown). The green bands represent an increase in flow, whilst the blue bands represent a decrease in traffic flow on each link. The width of the bands provide an indication of the magnitude of the change, with the thicker bands representing larger increases/decreases in traffic volumes.

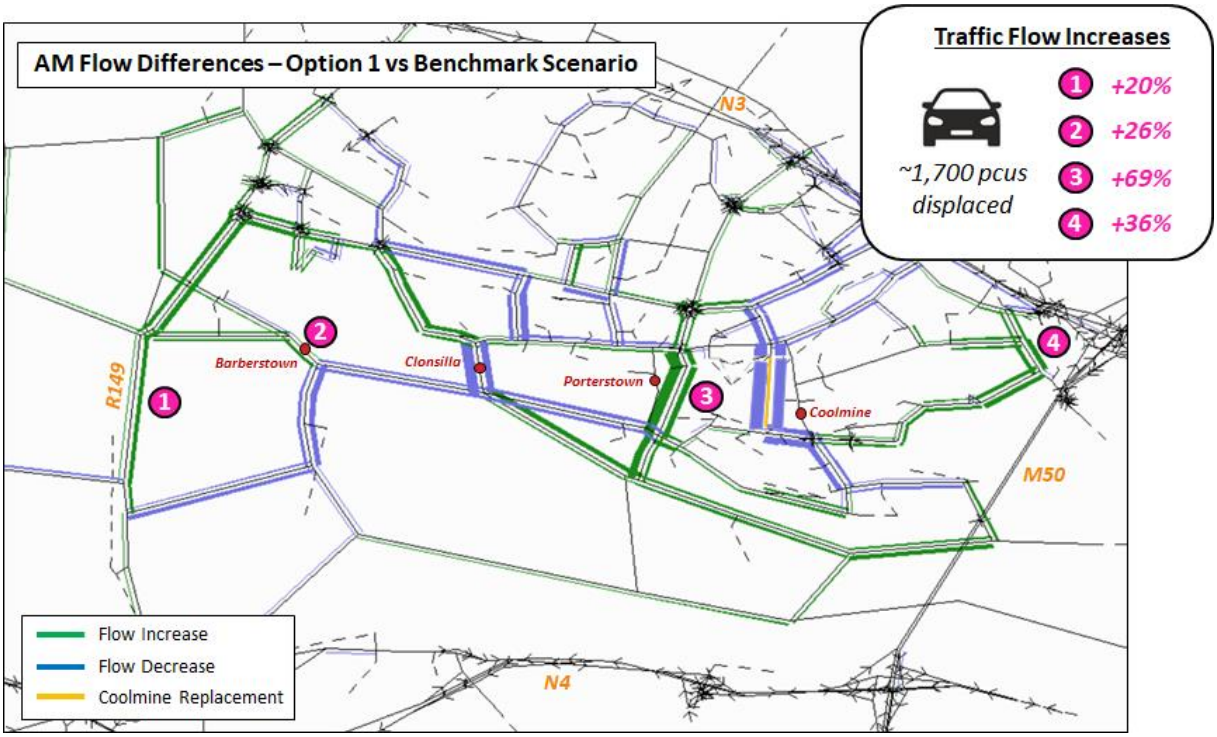


Figure 6.6 AM Flow Difference Plot – Option1 vs Benchmark Scenario

6.3.3 The results in Figure 6.6 illustrate a significant reduction in traffic volumes at Clonsilla and Coolmine due to the level crossing closures with approximately 1,700 pcus displaced onto alternative crossing locations.

6.3.4 The replacement road infrastructure provided at Barberstown alleviates some of the traffic growth experienced on the R149 in the Do Minimum scenario (See Figure 6.3 above). However, both the R149, and the new Barberstown crossing, do experience increases in flows of approx. 20% and 26% respectively due to the closure at Clonsilla.

6.3.5 The alternative bridge crossings at Diswellstown Road and Castleknock Road (R806) experience the largest increase in traffic volumes of 69% and 36% respectively, primarily due to the re-routing of vehicles from the closed crossing at Coolmine.

KPI-2 Volume over Capacity

6.3.6 Figure 6.7, overleaf, displays the demand weighted average V/C (as a percentage) for a number of identified key junctions within the study area for Option 1 and the Benchmark scenario. As mentioned previously, V/C is a commonly used measure to identify areas of the network that may be experiencing capacity issues.

6.3.7 The results in Figure 6.7 indicate a general increase in V/C for junctions located in close proximity to the Diswellstown Road and the R806 Castleknock Road. These areas are already quite heavily congested in the peak hours, and the re-routing of additional traffic to these locations due to the closure of Coolmine crossing is likely to cause further capacity issues, leading to increased congestion and delay.

KPI-3 Junction Delay & KPI-4 Journey Times

6.3.8 Figure 6.8 below, displays the change in total junction delay (in seconds) between Option 1 and the benchmark scenario for a number of junctions within the study area. The modelling results indicate that the junctions in close proximity to the closed level crossings at Clonsilla and Coolmine experience a reduction in delay due to reduced traffic volumes.

6.3.9 Junctions that experience increases in traffic volume (KPI-1), and V/C (KPI-2), due to the re-routing of vehicles from the closed crossings, see a significant rise in congestion and delay. This is particularly prevalent for junctions around the alternative bridge crossings at Diswellstown Road and Castleknock. In total, junctions in Option 1 experience an increase in delay of 22% in the AM (08:00 – 09:00), and 11% in the PM (17:00 – 18:00), peak hours when compared to the benchmark scenario.

6.3.10 Select Link Analysis was used to identify the people who would want to use the Maynooth line level crossings if they remained open, including their desired origin and destination of travel. Journey times for these origin-destination movements were extracted and compared for Option 1 and the Benchmark scenario. The results indicate that Option 1 experiences a 13% (AM) and 15% (PM) increase in journey times for vehicles who would want to use the level crossings during the peak hours. This increase in journey time is primarily due to the re-routing required to alternative crossing points, along with the increased levels of congestion and delay at these locations.

Table 6.2 Option1 Road Based Assessment Summary Results

Option	**KPI-1** Flows Displaced (pcus)		**KPI-3** Change in Delay (vs Benchmark)		**KPI-4** Change in Journey Times (vs Benchmark)[15]	
	AM	PM	AM	PM	AM	PM
Option 1	1,703	1,772	22%	11%	13%	15%

[15] Represents change in journey times for people who previously would have used the crossings that are now closed

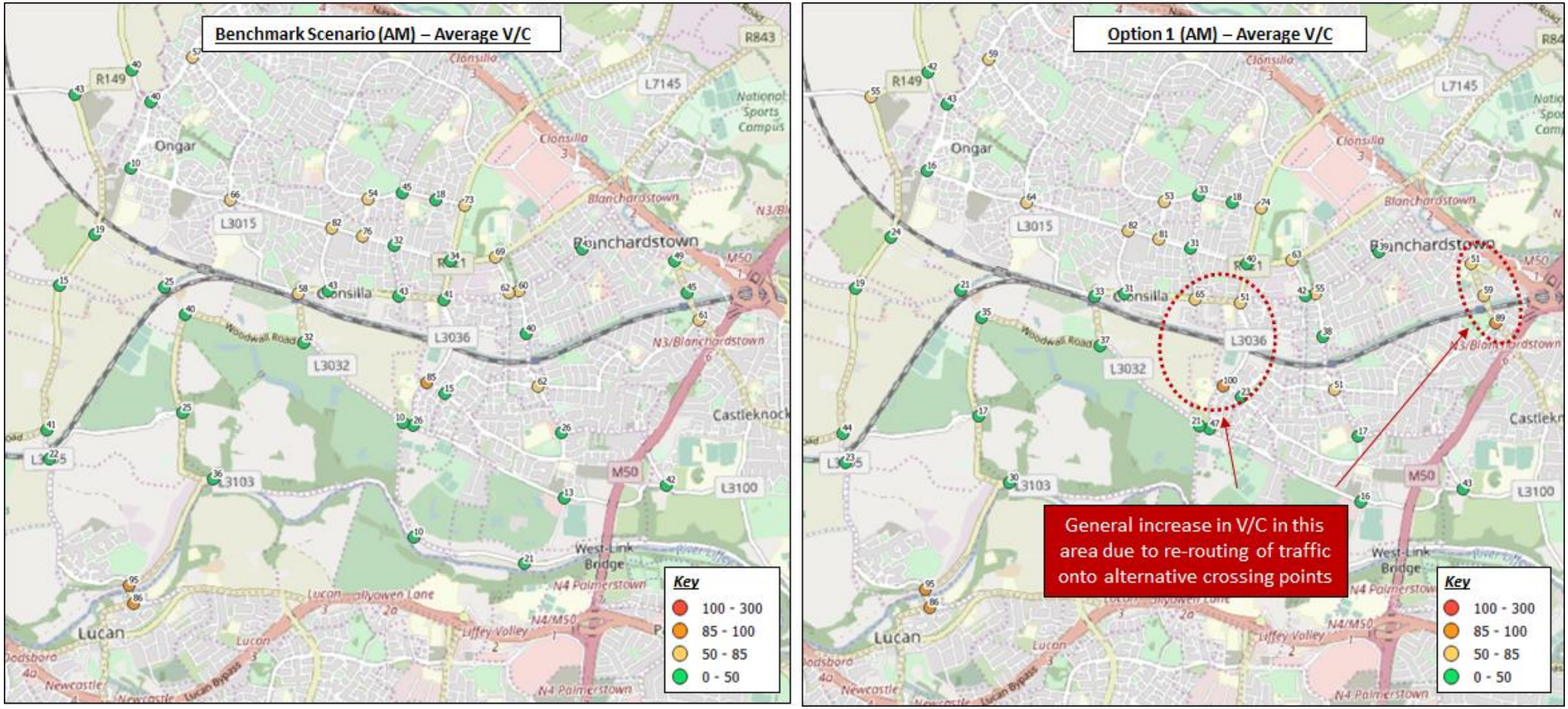


Figure 6.7 AM Average V/C – Option 1 vs Benchmark Scenario

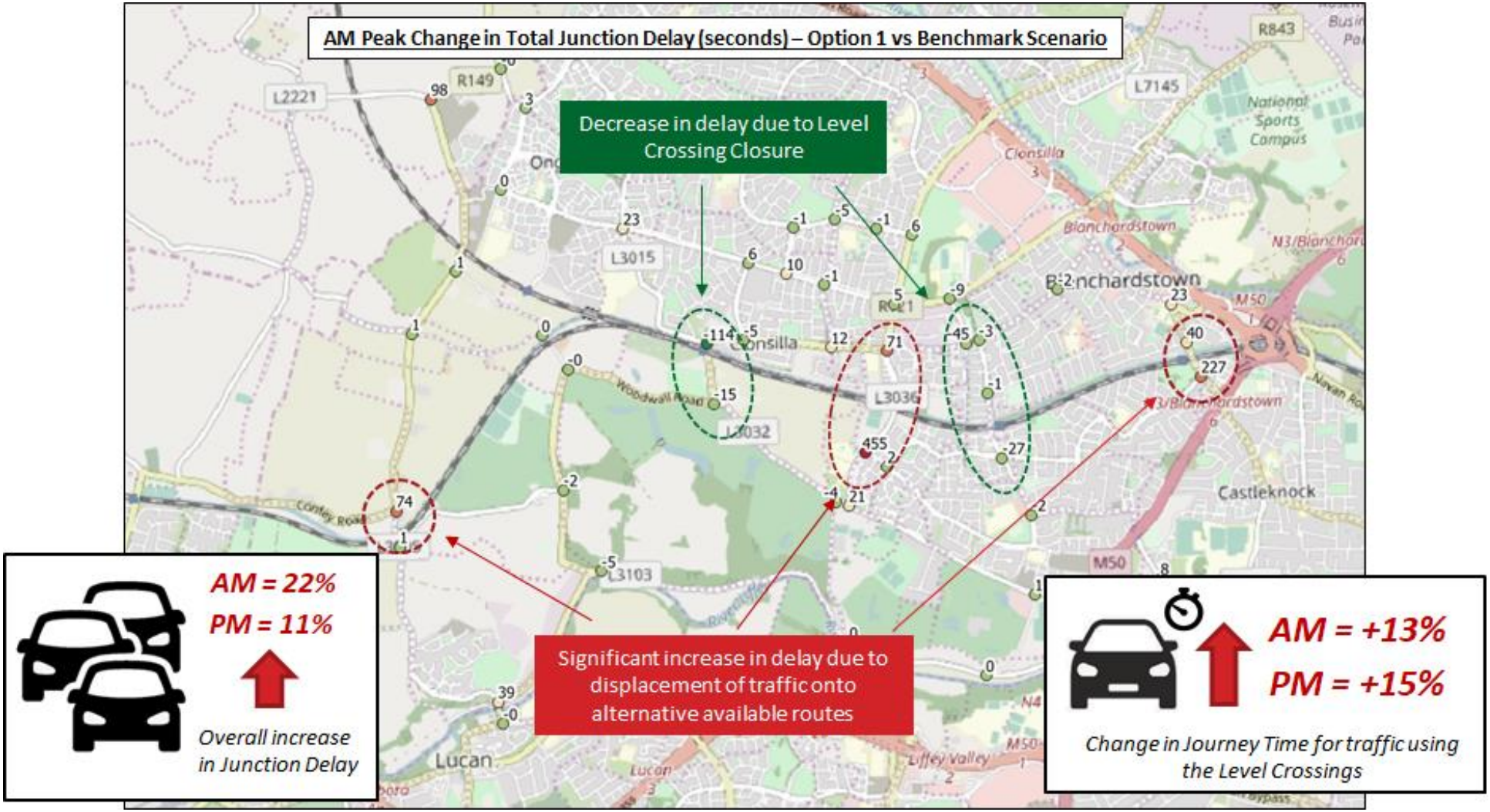


Figure 6.8 AM Change in Junction Delay – Option1 vs Benchmark Scenario

6.4 Option 2

6.4.1 Option 2 includes the closure of the level crossings at Barberstown, Clonsilla, Porterstown and Coolmine with a new road bridge constructed over the canal and rail line at Clonsilla (see Figure 5.5 above).

KPI-1 Vehicles Displaced

6.4.2 Figure 6.9 shows a difference plot illustrating the change in forecast traffic flows for Option 2 when compared against the benchmark scenario (i.e. replacement road infrastructure provided at Coolmine, Clonsilla and Barberstown). The green bands represent an increase in flow, whilst the blue bands represent a decrease in traffic flow on each link. The width of the bands provide an indication of the magnitude of the change, with the thicker bands representing larger increases/decreases in traffic volumes.

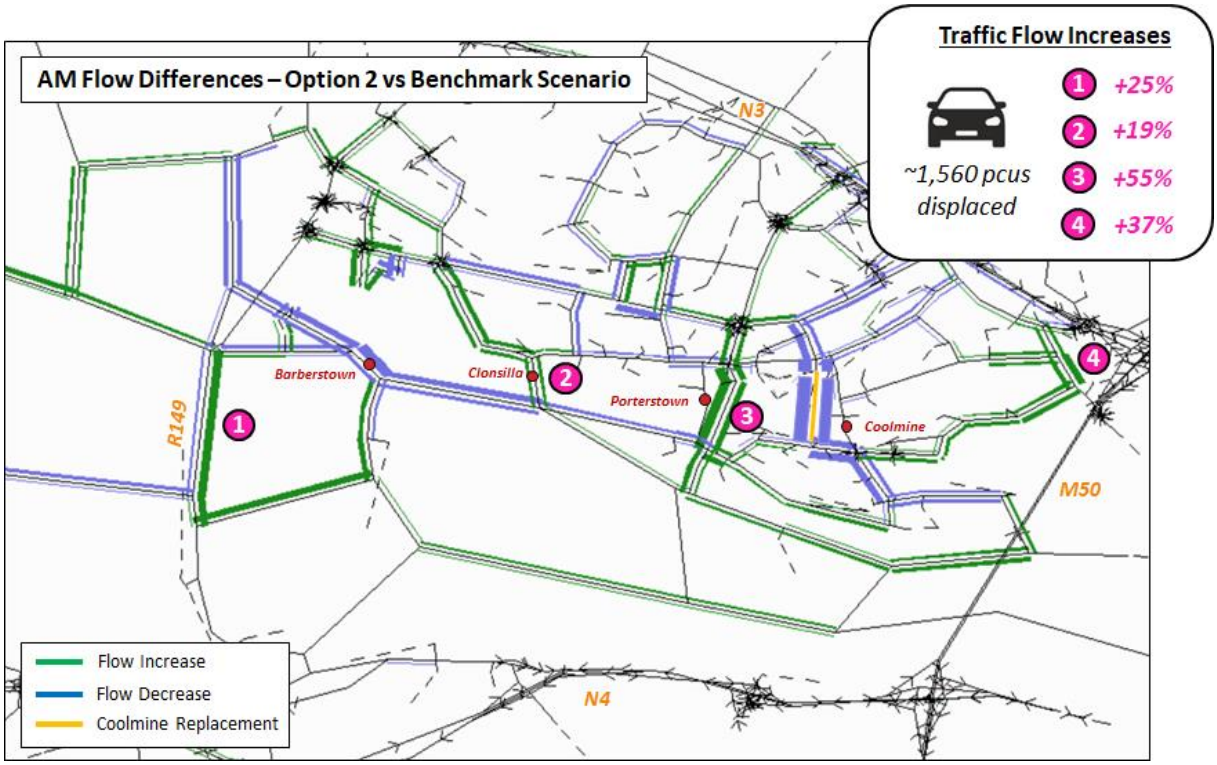


Figure 6.9 AM Flow Difference Plot – Option2 vs Benchmark Scenario

6.4.3 The results in Figure 6.9 indicate a significant reduction in traffic volumes at Barberstown and Coolmine due to the level crossing closures with approximately 1,560 pcus displaced onto alternative crossing locations.

6.4.4 Without the replacement road infrastructure at Barberstown, the R149 experiences a larger increase in traffic volumes when compared to Option 1 (25% in Option 2 vs 20% in Option 1). This would suggest that the junctions along this route will experience increases in congestion and delay in Option 2.

6.4.5 The alternative bridge crossings at Diswellstown Road and Castleknock Road (R806) also experience quite significant increases in traffic volumes of 55% and 37% respectively, primarily due to the re-routing of vehicles from the closed crossing at Coolmine.

KPI-2 Volume over Capacity

6.4.6 Figure 6.10, overleaf, displays the demand weighted average V/C (as a percentage) for a number of identified key junctions within the study area for Option 2 and the Benchmark scenario.

6.4.7 The results in Figure 6.10 indicate a general increase in V/C for junctions located in close proximity to the Diswellstown Road and the R806 Castleknock Road. These areas are already quite heavily congested in the peak hours, and the re-routing of additional traffic to these locations due to the closure of Coolmine crossing is likely to cause further capacity issues leading to increased congestion and delay.

KPI-3 Junction Delay & KPI-4 Journey Times

6.4.8 Figure 6.11 displays the change in total junction delay (in seconds) between Option 2 and the benchmark scenario for a number of junctions within the study area. The modelling results indicate that the junctions in close proximity to the closed level crossings at Barberstown and Coolmine experience a reduction in delay due to reduced traffic volumes.

6.4.9 Junctions that experience increases in traffic volumes (KPI-1), and V/C (KPI-2), due to the re-routing of vehicles from the closed crossings, see a significant rise in congestion and delay. This is particularly prevalent for junctions around the alternative bridge crossings at Diswellstown Road, Castleknock and Clonsilla. In total, junctions in Option 2 experience an increase in delay of 18% in the AM (08:00 – 09:00), and 15% in the PM (17:00 – 18:00), peak hours when compared to the benchmark scenario.

6.4.10 Select Link Analysis was used to identify the people who would want to use the Maynooth line level crossings if they remained open, including their desired origin and destination of travel. Journey times for these origin-destination movements were extracted and compared for Option 2 and the Benchmark scenario. The results indicate that Option 2 experiences a 23% (AM) and 14% (PM) increase in journey times for vehicles who would want to use the level crossings during the peak hours. This increase in journey time is primarily due to the re-routing required to alternative crossing points, along with the increased levels of congestion and delay at these locations.

Table 6.3 Option2 Road Based Assessment Summary Results

Option	**KPI-1** Flows Displaced (pcus)		**KPI-3** Change in Delay (vs Benchmark)		**KPI-4** Change in Journey Times (vs Benchmark)[16]	
	AM	PM	AM	PM	AM	PM
Option 2	1,561	1,475	18%	15%	23%	14%

[16] Represents change in journey times for people who previously would have used the crossings that are now closed

Figure 6.10 AM Average V/C – Option 2 vs Benchmark Scenario

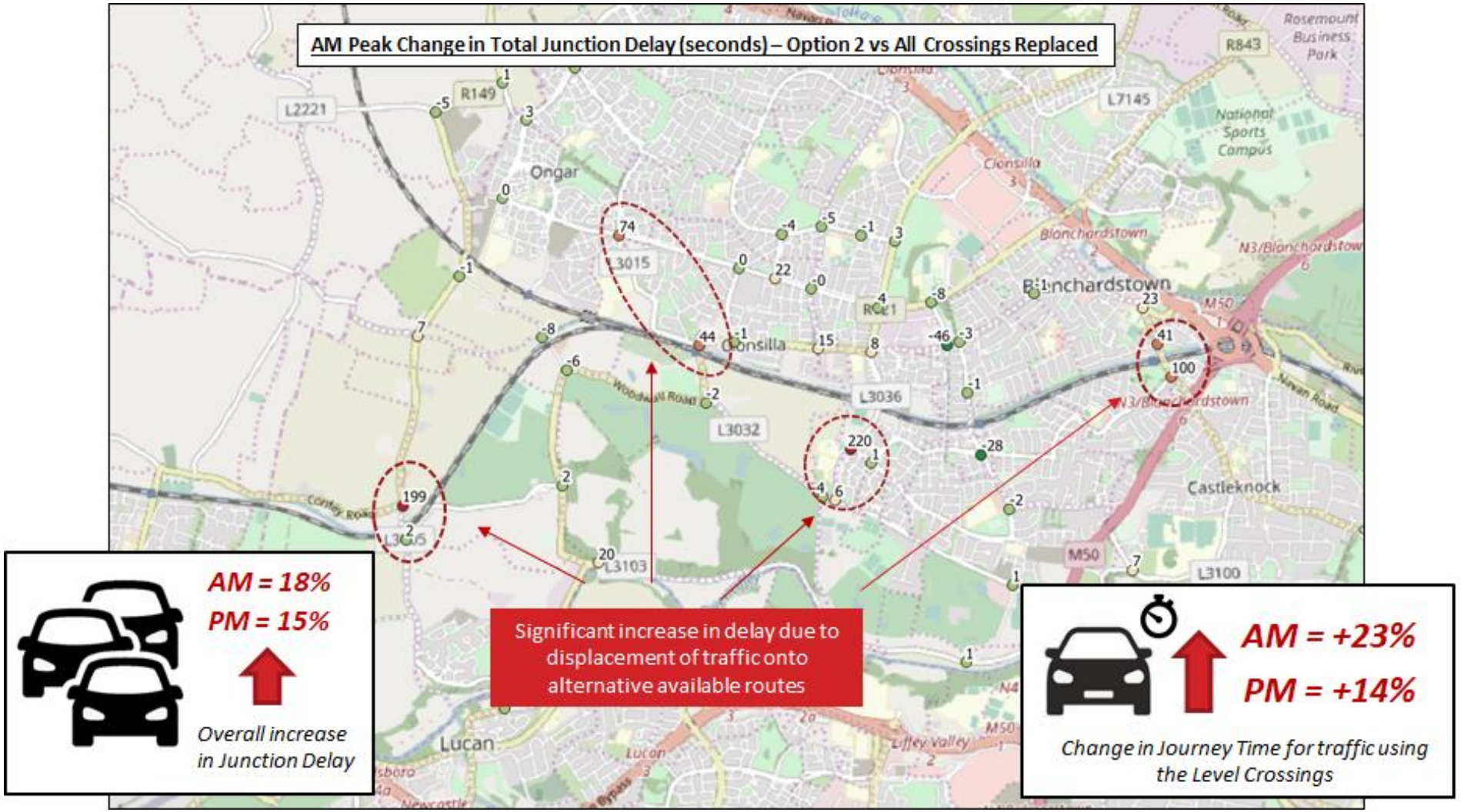


Figure 6.11 AM Change in Junction Delay – Option2 vs Benchmark Scenario

6.5 Option 3

6.5.1 Option 3 includes the closure of the level crossings at Barberstown, Clonsilla, Porterstown and Coolmine with a new road bridge constructed over the canal and rail line at Coolmine (see Figure 5.6 above).

KPI-1 Vehicles Displaced

6.5.2 Figure 6.12 shows a difference plot illustrating the change in forecast traffic flows for Option 3 when compared against the benchmark scenario (i.e. replacement road infrastructure provided at Coolmine, Clonsilla and Barberstown). The green bands represent an increase in flow, whilst the blue bands represent a decrease in traffic flow on each link. The width of the bands provide an indication of the magnitude of the change, with the thicker bands representing larger increases/decreases in traffic volumes.

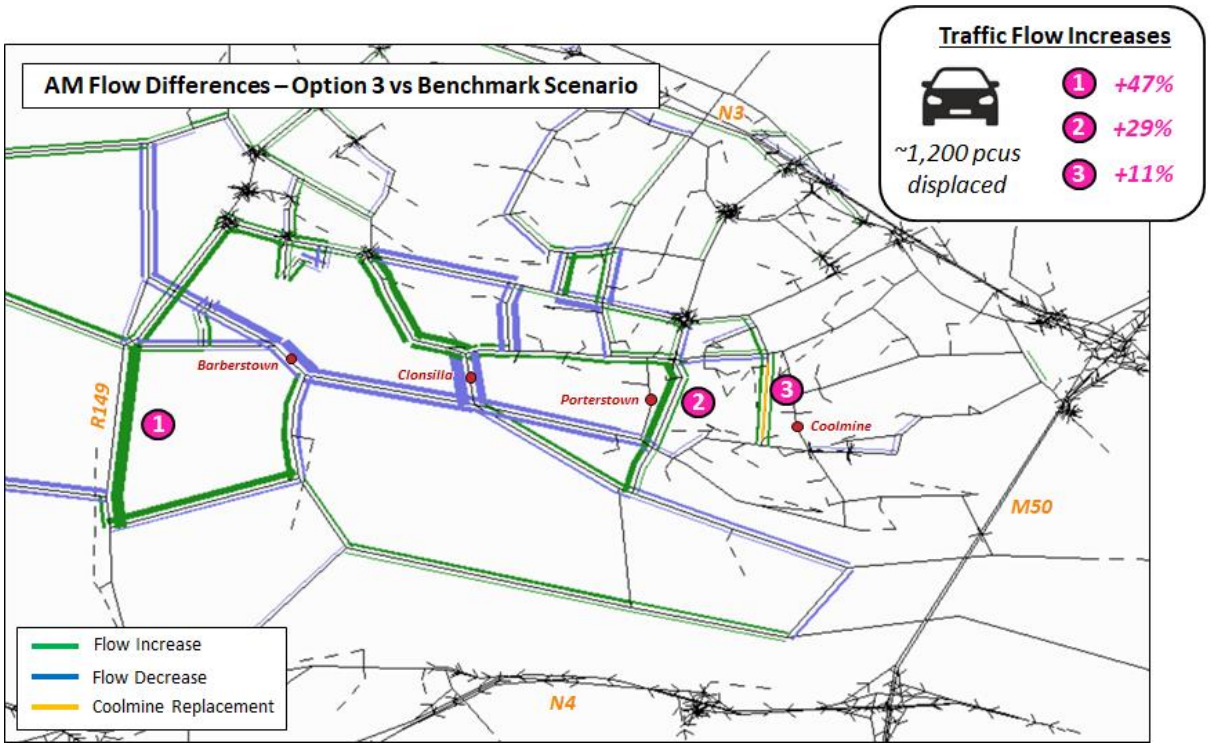


Figure 6.12 AM Flow Difference Plot – Option3 vs Benchmark Scenario

6.5.3 The results in Figure 6.12 illustrate a significant reduction in traffic volumes at Barberstown and Clonsilla due to the level crossing closures with approximately 1,200 pcus displaced onto alternative crossing locations.

6.5.4 The replacement road infrastructure provided at Coolmine alleviates some of the traffic growth experienced on the Diswellstown Road, and the R806 Castleknock Road, when compared to the Do Minimum, Option 1 and Option 2. This is likely to lead to reduced levels of congestion and delay at these locations.

6.5.5 The closure of both Clonsilla and Barberstown level crossings causes a large number of vehicles to re-route via the R149 leading to a significant increase in traffic volumes (approx. 47% in the AM peak). This would suggest that the junctions along this route will experience increases in congestion and delay when compared to Options 1 and 2 presented previously.

KPI-2 Volume over Capacity

6.5.6 Figure 6.13 displays the demand weighted average V/C (as a percentage) for a number of identified key junctions within the study area for Option 3 and the Benchmark scenario.

6.5.7 The results in Figure 6.13 indicate a general increase in V/C for junctions located along the R149, and north of the Diswellstown Road and Coolmine bridge crossings. However, the magnitude of the V/C increase is not as significant as that experienced under the Do Minimum, Option 1 or Option 2 scenarios analysed previously.

KPI-3 Junction Delay & KPI-4 Journey Times

6.5.8 Figure 6.14 displays the change in total junction delay (in seconds) between Option 3 and the benchmark scenario for a number of junctions within the study area. The modelling results indicate that the junctions in the area around Diswellstown Road, Coolmine and Castleknock experience very minor changes in delay due to the availability of the replacement road crossing at Coolmine.

6.5.9 Due to the closure of Barberstown and Clonsilla level crossings, traffic accessing areas such as Ongar, Hansfield and Clonee are required to re-route via the R149, or the Diswellstown Road/Coolmine bridge crossings and the L3016. As such, the results in Figure 6.14 indicate that junctions along these routes experience a rise in congestion and delay. In total, junctions in Option 3 experience an increase in delay of 7% in the AM (08:00 – 09:00), and 5% in the PM (17:00 – 18:00), peak hours when compared to the benchmark scenario.

6.5.10 Select Link Analysis was used to identify the people who would want to use the Maynooth line level crossings if they remained open, including their desired origin and destination of travel. Journey times for these origin-destination movements were extracted and compared for Option 3 and the Benchmark scenario. The results indicate that Option 3 experiences a 8% (AM) and 6% (PM) increase in journey times for vehicles who would want to use the level crossings during the peak hours. This increase in journey time is primarily due to the re-routing required to alternative crossing points, along with the increased levels of congestion and delay at these locations.

Table 6.4 Option3 Road Based Assessment Summary Results

Option	**KPI-1** Flows Displaced (pcus)		**KPI-3** Change in Delay (vs Benchmark)		**KPI-4** Change in Journey Times (vs Benchmark)[17]	
	AM	PM	AM	PM	AM	PM
Option 3	1,218	1,110	7%	5%	8%	6%

[17] Represents change in journey times for people who previously would have used the crossings that are now closed

The modelling analysis for Options 1-3 (a single bridge relief scenario) suggests that, of the three level crossings in the N3/N4/M50 boundary area, the replacement road infrastructure at Coolmine is the most critical as:

- With Coolmine replaced, fewer vehicles overall are required to be displaced and accommodated on alternative crossing points; and
- The junction delay and journey time results indicate improved performance with Coolmine replaced when compared against replacing Clonsilla or Barberstown in isolation.

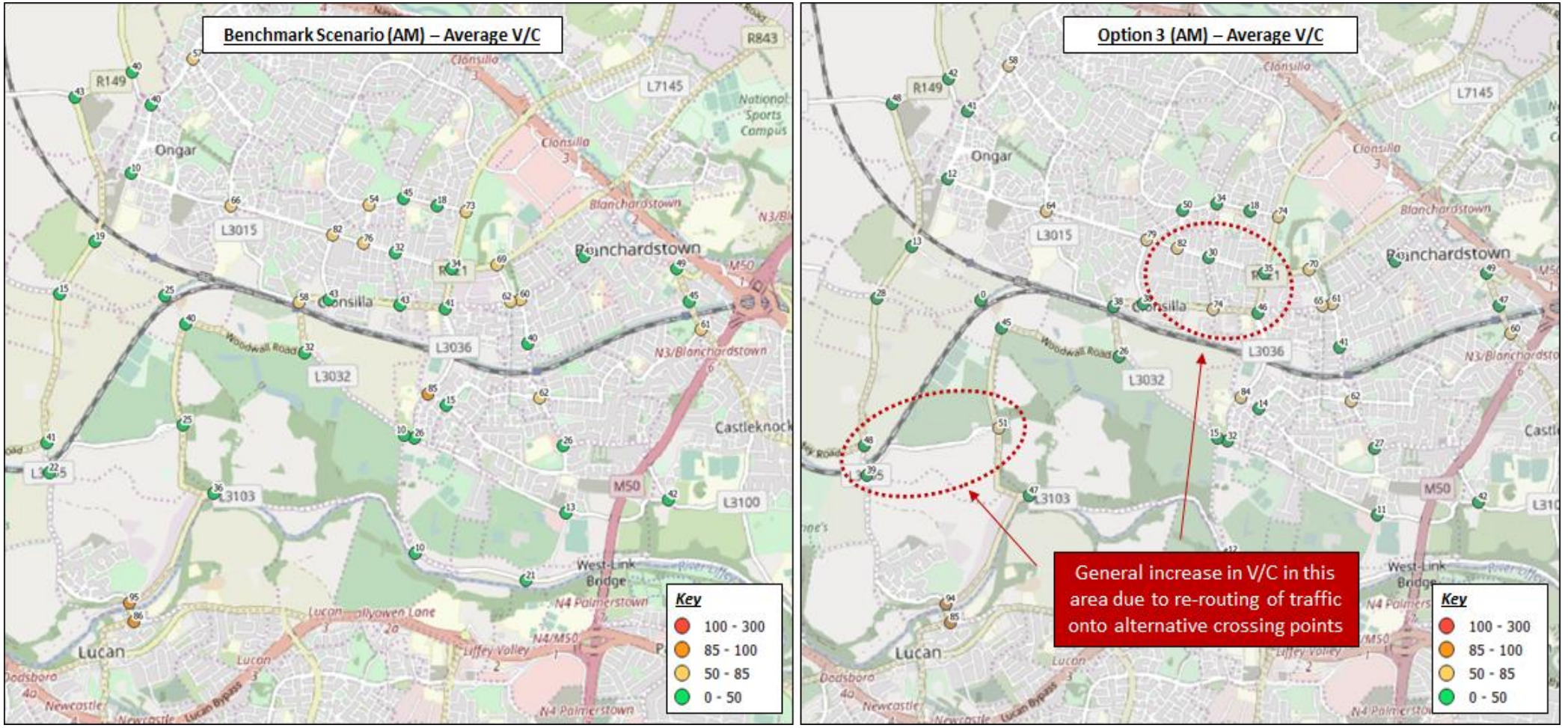


Figure 6.13 AM Average V/C – Option 3 vs Benchmark Scenario

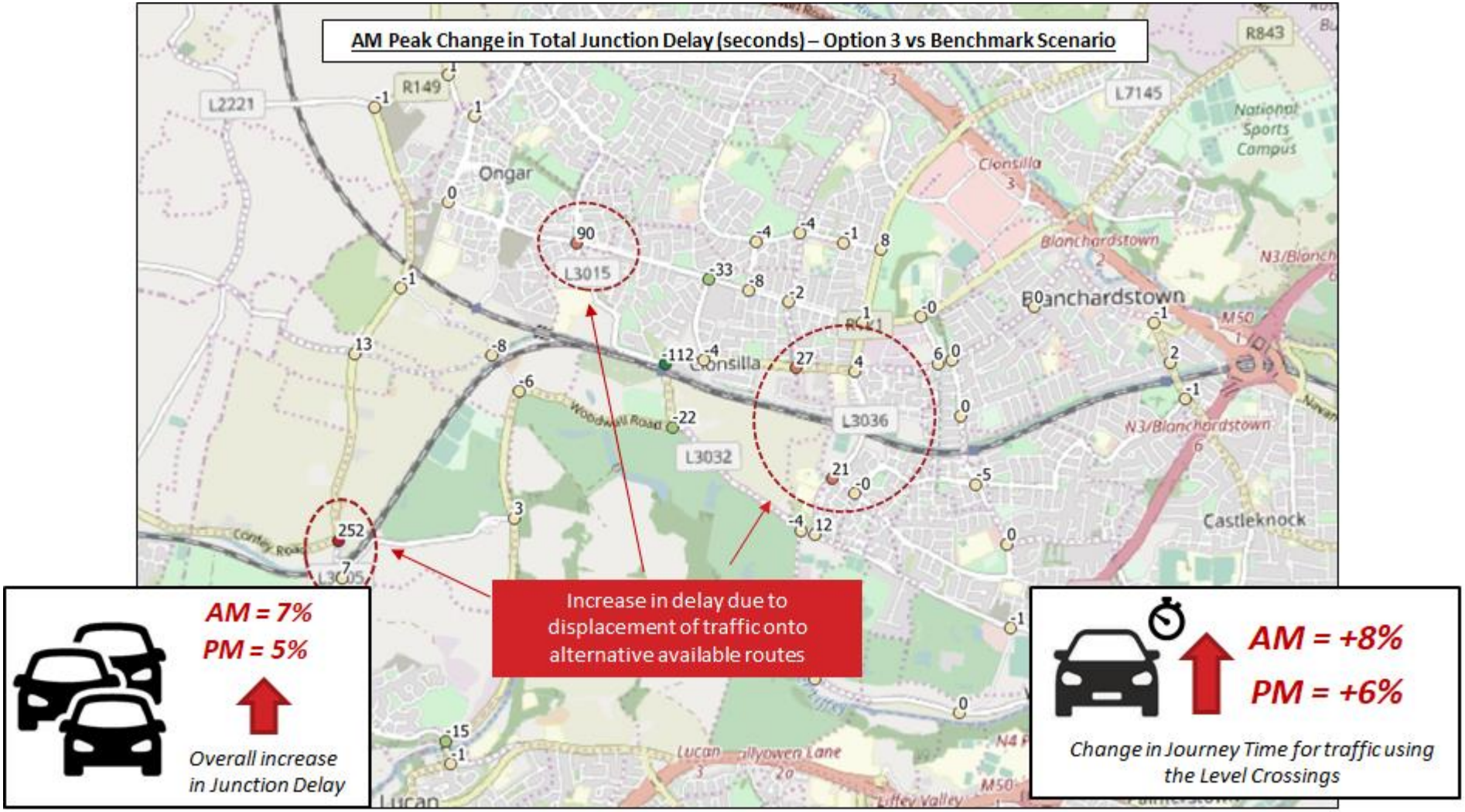


Figure 6.14 AM Change in Junction Delay – Option3 vs Benchmark Scenario

6.6 Option 4

6.6.1 Option 4 includes the closure of the level crossings along the Maynooth rail line with new replacement road infrastructure provided at Barberstown and Clonsilla (see Figure 5.7 above).

KPI-1 Vehicles Displaced

6.6.2 Figure 6.15 shows a difference plot illustrating the change in forecast traffic flows for Option 4 when compared against the benchmark scenario (i.e. replacement road infrastructure provided at Coolmine, Clonsilla and Barberstown). The green bands represent an increase in flow, whilst the blue bands represent a decrease in traffic flow on each link. The width of the bands provide an indication of the magnitude of the change, with the thicker bands representing larger increases/decreases in traffic volumes.

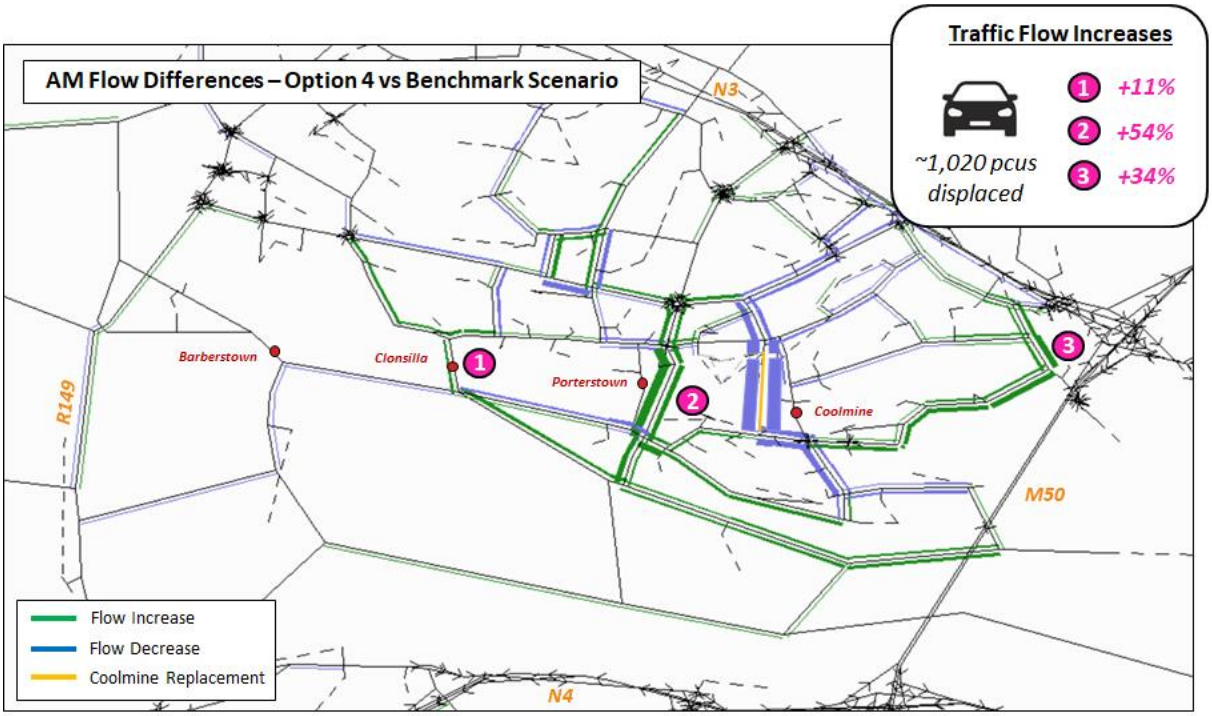


Figure 6.15 AM Flow Difference Plot – Option4 vs Benchmark Scenario

6.6.3 The results in Figure 6.15 illustrate a significant reduction in traffic volumes at Coolmine due to the level crossing closures with approximately 1,020 pcus displaced onto alternative crossing locations.

6.6.4 Traffic previously using the Coolmine crossing are re-routed primarily onto the alternative bridge crossings at Diswellstown Road and Castleknock Road (R806). These areas are already congested in the peak hours and experience increases in traffic volumes of approx. 54% and 34% respectively.

KPI-2 Volume over Capacity

6.6.5 Figure 6.16, below, displays the demand weighted average V/C (as a percentage) for a number of identified key junctions within the study area for Option 4 and the Benchmark scenario.

6.6.6 The results in Figure 6.16 indicate a general increase in V/C for junctions located in close proximity to the Diswellstown Road and the R806 Castleknock Road. These areas are already quite heavily congested in the peak hours, and the re-routing of additional traffic to these locations due to the closure of Coolmine crossing is likely to cause further capacity issues leading to increased congestion and delay.

KPI-3 Junction Delay & KPI-4 Journey Times

6.6.7 Figure 6.17 below displays the change in total junction delay (in seconds) between Option 4 and the benchmark scenario for a number of junctions within the study area. The modelling results indicate that the junctions in close proximity to the closed level crossing at Coolmine experience a reduction in delay due to reduced traffic volumes.

6.6.8 Junctions that experience increases in traffic volumes (KPI-1), and V/C (KPI-2), due to the re-routing of vehicles from the closed crossing at Coolmine, also see a significant rise in congestion and delay. This is particularly prevalent for junctions around the alternative bridge crossings at Diswellstown Road and Castleknock. In total, junctions in the Do Minimum scenario experience an increase in delay of 12% in the AM (08:00 – 09:00), and 10% in the PM (17:00 – 18:00), peak hours when compared to the benchmark scenario.

6.6.9 Select Link Analysis was used to identify the people who would want to use the Maynooth line level crossings if they remained open, including their desired origin and destination of travel. Journey times for these origin-destination movements were extracted and compared for Option 4 and the Benchmark scenario. The results indicate that Option 4 experiences a 27% (AM) and 9% (PM) increase in journey times for vehicles who would want to use the level crossings during the peak hours. This increase in journey time is primarily due to the re-routing required to alternative crossing points, along with the increased levels of congestion and delay at these locations.

Table 6.5 Option4 Road Based Assessment Summary Results

Option	**KPI-1** Flows Displaced (pcus)		**KPI-3** Change in Delay (vs Benchmark)		**KPI-4** Change in Journey Times (vs Benchmark)[18]	
	AM	PM	AM	PM	AM	PM
Option 4	1,023	1,068	12%	10%	27%	9%

The modelling results indicate that the overall impact on junction delay, and journey times, is reduced in Option 3 (i.e. replacing Coolmine in isolation) when compared to providing road replacement infrastructure at both Clonsilla and Barberstown (Option 4). This further confirms the importance of retaining a road crossing at Coolmine in the future.

[18] Represents change in journey times for people who previously would have used the crossings that are now closed

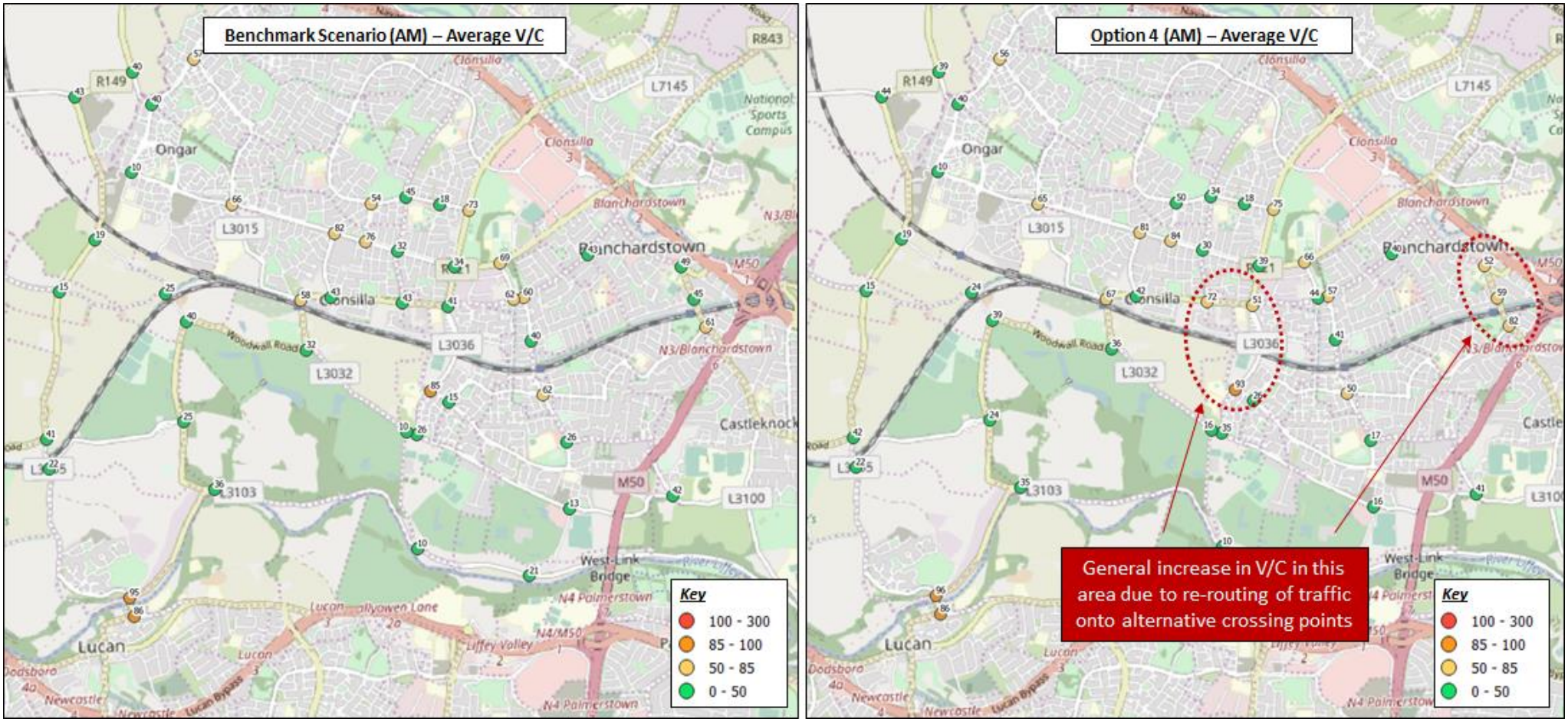


Figure 6.16 AM Average V/C – Option 4 vs Benchmark Scenario

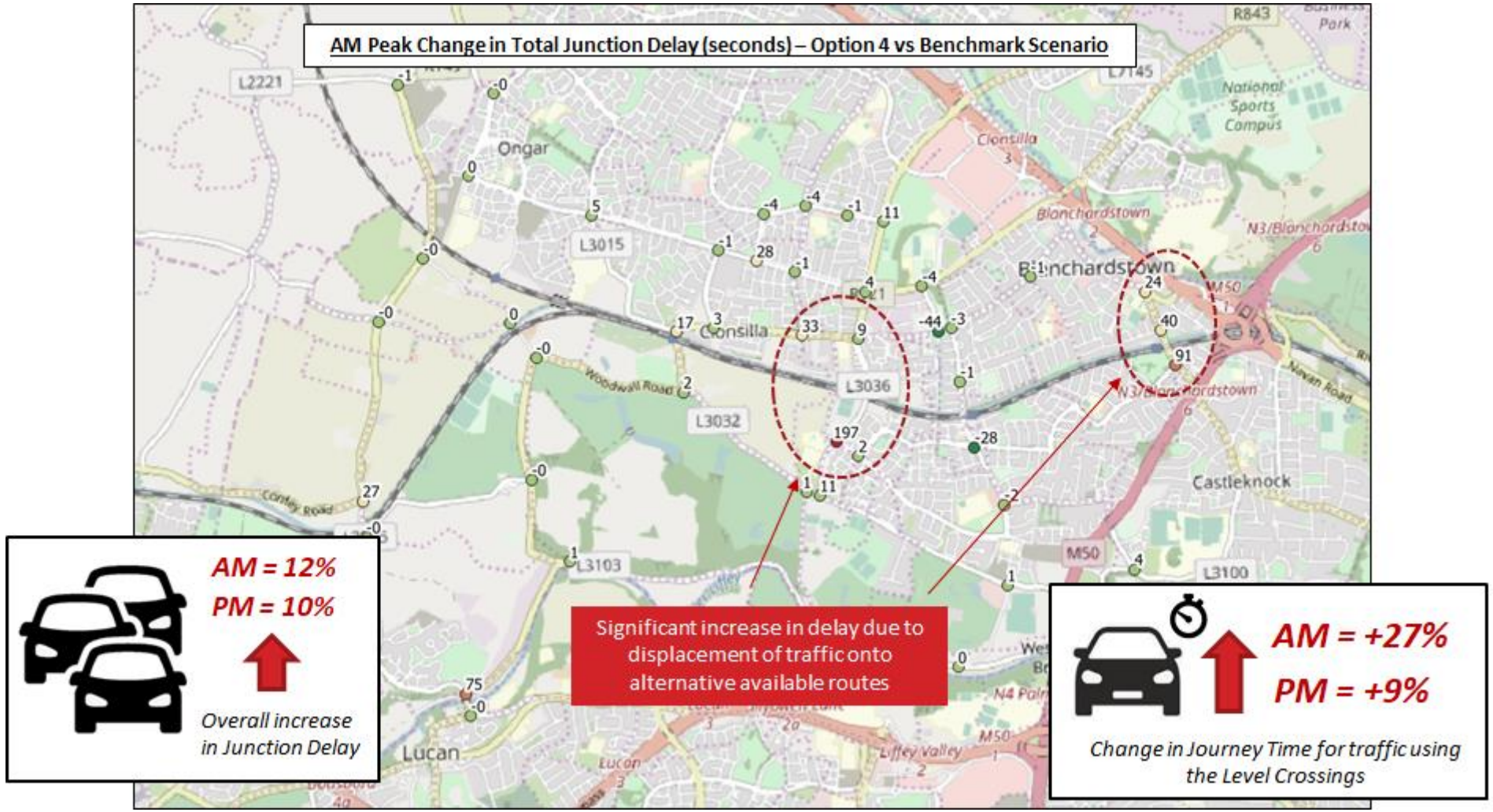


Figure 6.17 AM Change in Junction Delay – Option4 vs Benchmark Scenario

6.7 Option 5

6.7.1 Option 5 includes the closure of the level crossings along the Maynooth rail line with new replacement road infrastructure constructed at Barberstown and Coolmine (see Figure 5.8 above).

KPI-1 Vehicles Displaced

6.7.2 Figure 6.18 shows a difference plot illustrating the change in forecast traffic flows for Option 5 when compared against the benchmark scenario (i.e. replacement road infrastructure provided at Coolmine, Clonsilla and Barberstown). The green bands represent an increase in flow, whilst the blue bands represent a decrease in traffic flow on each link. The width of the bands provide an indication of the magnitude of the change, with the thicker bands representing larger increases/decreases in traffic volumes.

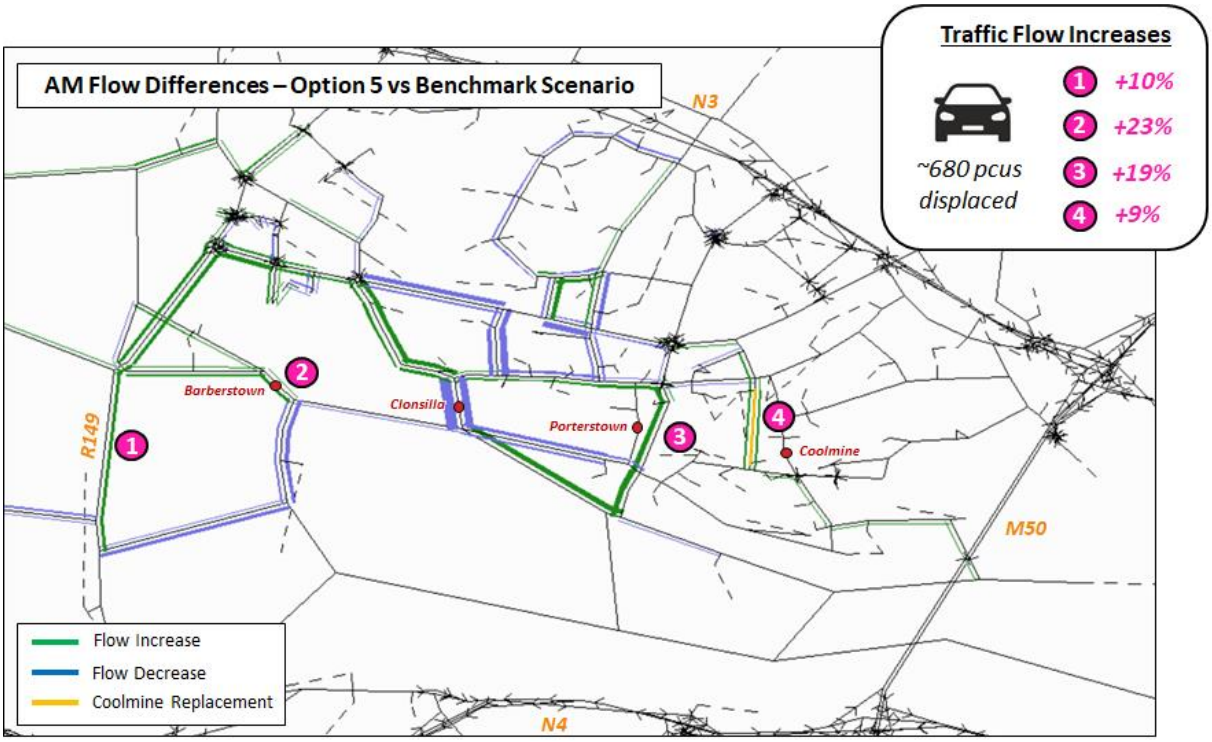


Figure 6.18 AM Flow Difference Plot – Option5 vs Benchmark Scenario

6.7.3 The results in Figure 6.18 illustrate a balanced re-distribution of traffic from the closed Clonsilla level crossing (approx. 680 pcus) to alternative available routes. As such, no specific area on the network is particularly overloaded due to the closure of Clonsilla. Alternative crossing points at the R149, Barberstown, Diswellstown Road and Coolmine all see relatively minor increases in traffic volumes of between 9% - 23%.

KPI-2 Volume over Capacity

6.7.4 Figure 6.19, below, displays the demand weighted average V/C (as a percentage) for a number of identified key junctions within the study area for Option 5 and the Benchmark scenario.

6.7.5 The results in Figure 6.19 indicate a general increase in V/C for junctions located around the Coolmine and Diswellstown Road crossings. However, the magnitude of the V/C increase is very minor, particularly when compared to the options analysed previously in this chapter.

KPI-3 Junction Delay & KPI-4 Journey Times

6.7.6 Figure 6.20 displays the change in total junction delay (in seconds) between Option 5 and the benchmark scenario for a number of junctions within the study area. Due to the closure of the Clonsilla level crossing, traffic is re-distributed to alternative locations at Barberstown, Diswellstown Road and Coolmine. However, as outlined above, this is a balanced re-distribution with no one area becoming heavily overloaded. As such, junctions in these areas experience a minor increase in delay. The results in Figure 6.20 indicate that, in total, junctions in Option 5 experience a 1% increase in delay in the AM (08:00 – 09:00) and PM (17:00 – 18:00) peak hours when compared to the benchmark scenario.

6.7.7 Select Link Analysis was used to identify the people who would want to use the Maynooth line level crossings if they remained open, including their desired origin and destination of travel. Journey times for these origin-destination movements were extracted and compared for Option 5 and the Benchmark scenario. The results indicate that Option 5 experiences a 3% increase in journey times for vehicles who would want to use the level crossings during the AM and PM peak hours.

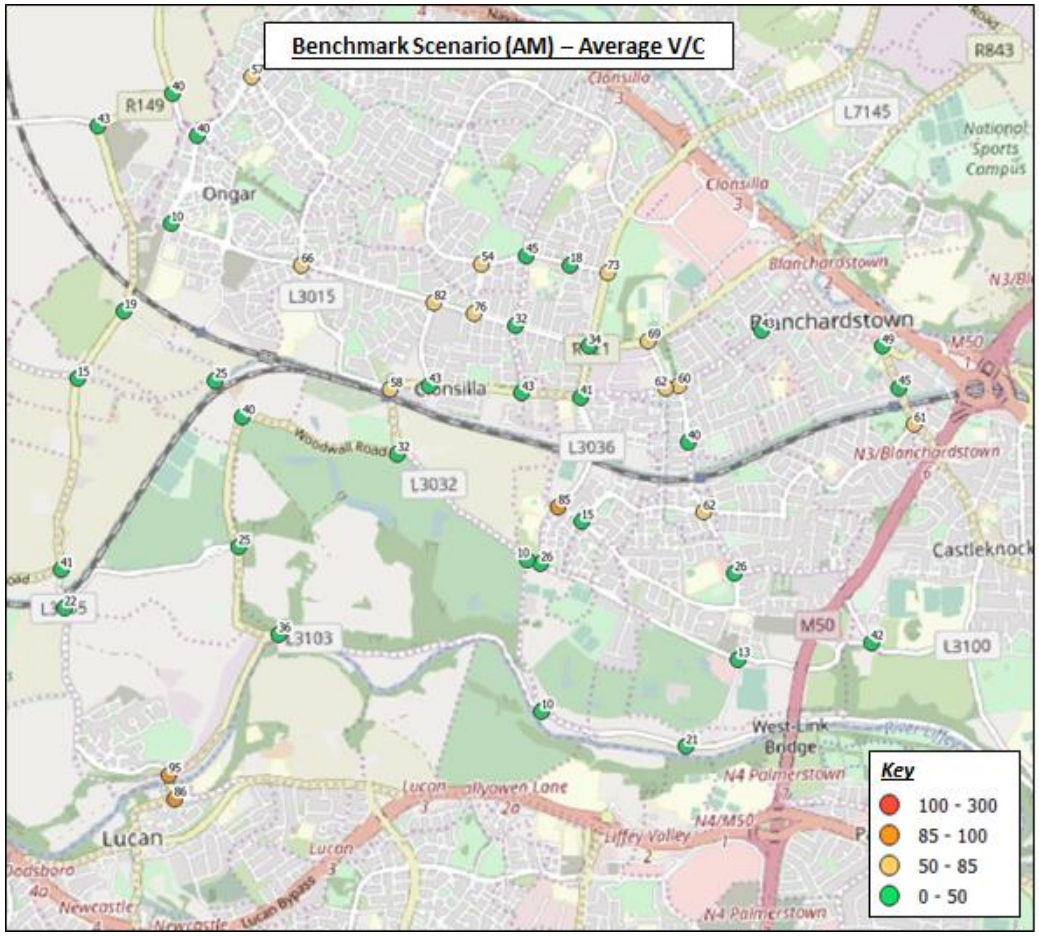
Table 6.6 Option5 Road Based Assessment Summary Results

Option	**KPI-1** Flows Displaced (pcus)		**KPI-3** Change in Delay (vs Benchmark)		**KPI-4** Change in Journey Times (vs Benchmark)[19]	
	AM	PM	AM	PM	AM	PM
Option 5	680	704	1%	1%	3%	3%

The modelling analysis indicates that, if replacement road infrastructure is provided at Coolmine and Barberstown, a road based alternative may not be required at the Clonsilla level crossing due to the following:

- The number of vehicles displaced and re-routed onto alternative crossing locations is relatively minor when compared to other scenarios (approx. 680 pcus in the AM peak hour);
- Flow difference plots indicate that this demand (displaced vehicles) is re-distributed to other areas of the network in a balanced manner with no one area becoming heavily overloaded; and
- Closing the Clonsilla level crossing provides relatively comparable results in terms of overall junction delay, and journey times, to providing a replacement at this location, if alternative road infrastructure is provided at Coolmine and Barberstown.

[19] Represents change in journey times for people who previously would have used the crossings that are now closed



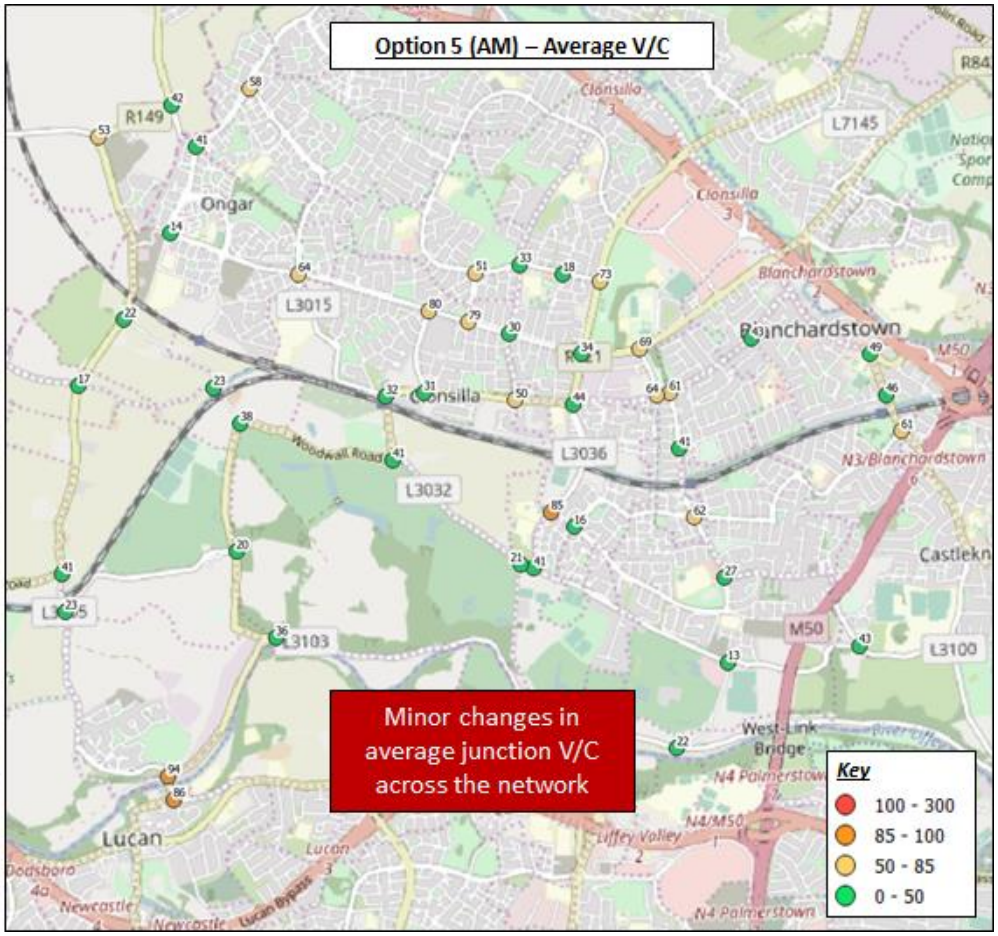


Figure 6.19 AM Average V/C – Option 5 vs Benchmark Scenario

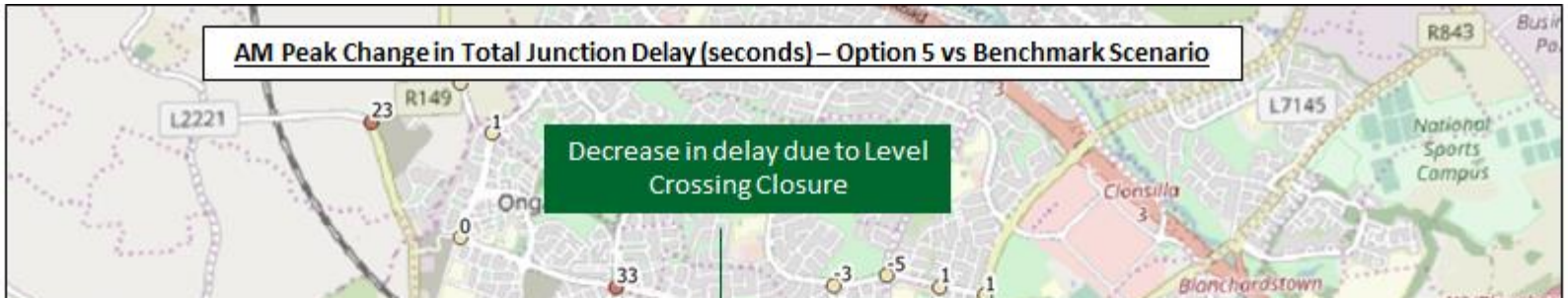


Figure 6.20 AM Change in Junction Delay – Option5 vs Benchmark Scenario

6.8 Option 6

6.8.1 Option 6 includes the closure of the level crossings along the Maynooth rail line with new replacement road infrastructure provided at Clonsilla and Coolmine (see Figure 5.9 above).

KPI-1 Vehicles Displaced

6.8.2 Figure 6.21 shows a difference plot illustrating the change in forecast traffic flows for Option 6 when compared against the benchmark scenario (i.e. replacement road infrastructure provided at Coolmine, Clonsilla and Barberstown). The green bands represent an increase in flow, whilst the blue bands represent a decrease in traffic flow on each link. The width of the bands provide an indication of the magnitude of the change, with the thicker bands representing larger increases/decreases in traffic volumes.

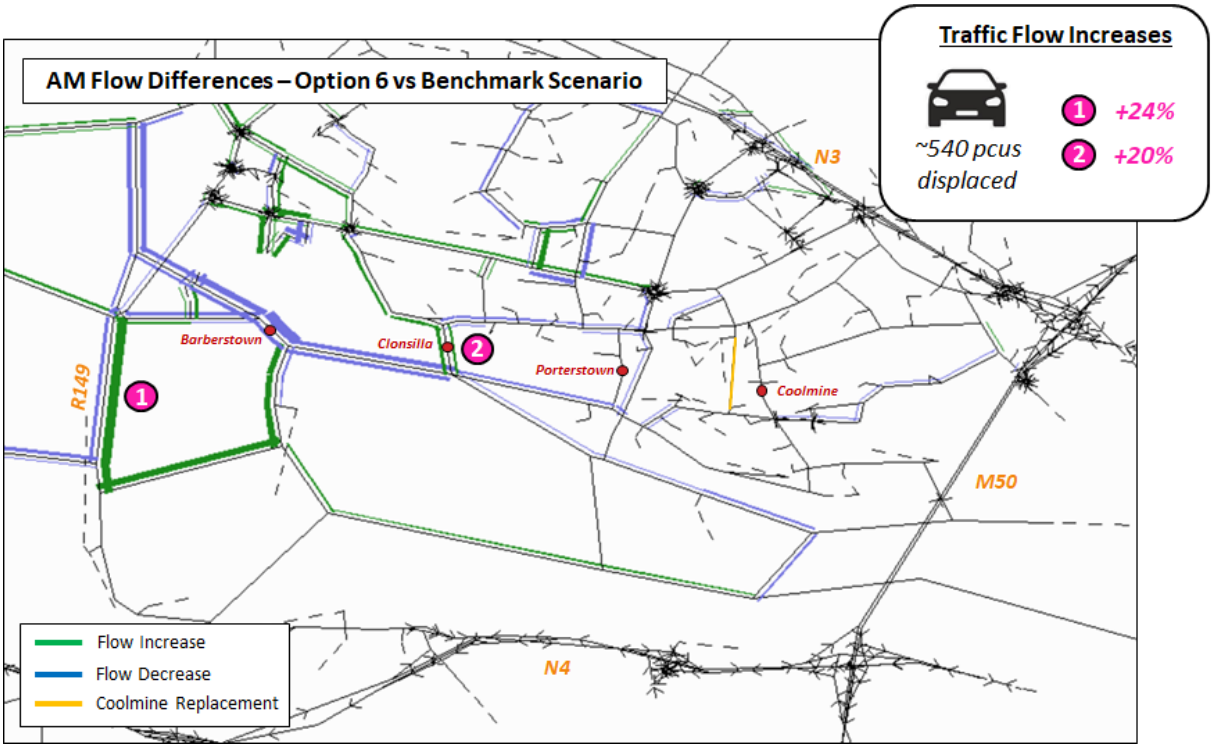


Figure 6.21 AM Flow Difference Plot – Option6 vs Benchmark Scenario

6.8.3 The results in Figure 6.21 illustrate a significant reduction in traffic volumes at Barberstown due to the level crossing closure with approximately 540 pcus displaced onto alternative crossing locations.

6.8.4 The closure of Barberstown level crossing causes a number of vehicles to re-route via the R149 and the Clonsilla crossing, leading to an increase in traffic volumes of approx. 24% and 20% respectively at these locations in the AM peak. This would suggest that the junctions along these routes will experience increases in congestion and delay when compared to the benchmark scenario.

KPI-2 Volume over Capacity

6.8.5 Figure 6.22 below, displays the demand weighted average V/C (as a percentage) for a number of identified key junctions within the study area for Option 6 and the Benchmark scenario.

6.8.6 The modelling results suggest that the re-distribution of traffic from the closed crossing at Barberstown will lead to a general increase in V/C for junctions located along the R149, and north of the new bridge crossing at Clonsilla in close proximity to the Hansfield Strategic Development Zone (SDZ) lands.

KPI-3 Junction Delay & KPI-4 Journey Times

6.8.7 Figure 6.23 displays the change in total junction delay (in seconds) between Option 6 and the benchmark scenario for a number of junctions within the study area. The modelling results indicate that the junctions in close proximity to the closed level crossing at Barberstown experience a reduction in delay due to reduced traffic volumes.

6.8.8 Junctions that experience increases in traffic volumes (KPI-1), and V/C (KPI-2), due to the re-routing of vehicles from the closed crossing at Barberstown, see a rise in congestion and delay. This is particularly prevalent for junctions along the R149 and north of the replacement bridge crossing at Clonsilla. In total, junctions in Option 6 experience an increase in delay of 7% in the AM (08:00 – 09:00), and 5% in the PM (17:00 – 18:00), peak hours when compared to the benchmark scenario.

6.8.9 Select Link Analysis was used to identify the people who would want to use the Maynooth line level crossings if they remained open, including their desired origin and destination of travel. Journey times for these origin-destination movements were extracted and compared for Option 6 and the Benchmark scenario. The results indicate that Option 6 experiences a 12% increase in journey times for vehicles who would want to use the level crossings during the AM peak hour, and 5% in the PM peak. This increase in journey time is primarily due to the re-routing required to alternative crossing points, along with the increased levels of congestion and delay at these locations.

Table 6.7 Option6 Road Based Assessment Summary Results

Option	**KPI-1** Flows Displaced (pcus)		**KPI-3** Change in Delay (vs Benchmark)		**KPI-4** Change in Journey Times (vs Benchmark)[20]	
	AM	PM	AM	PM	AM	PM
Option 6	538	406	7%	5%	12%	5%

The modelling analysis suggests that providing replacement road infrastructure at Barberstown is more important than at Clonsilla, as the increase in journey times, and overall junction delay across the network, is greater with no replacement provided at Barberstown (See results for Option 6 Figure 6.23 vs Option 5 Figure 6.20).

[20] Represents change in journey times for people who previously would have used the crossings that are now closed

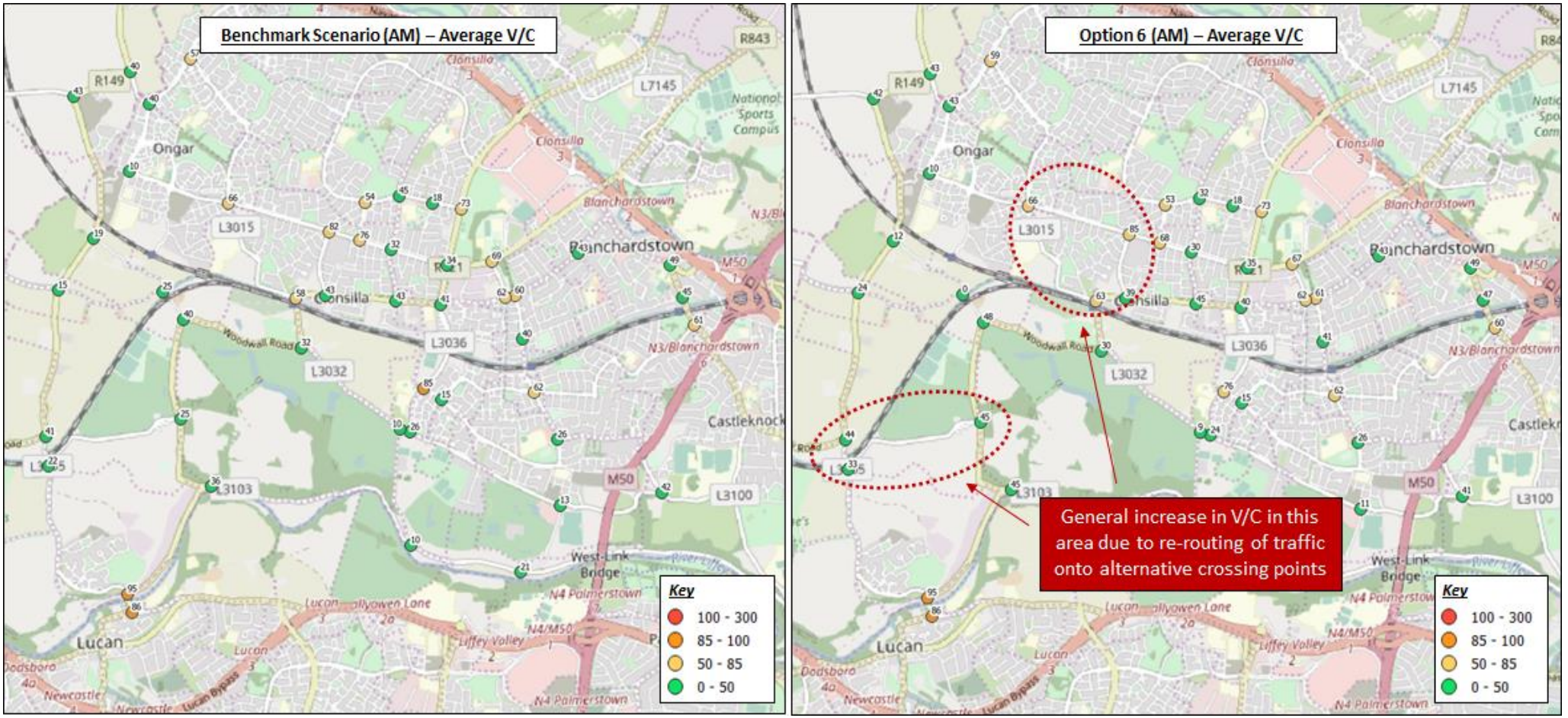


Figure 6.22 AM Average V/C – Option 6 vs Benchmark Scenario

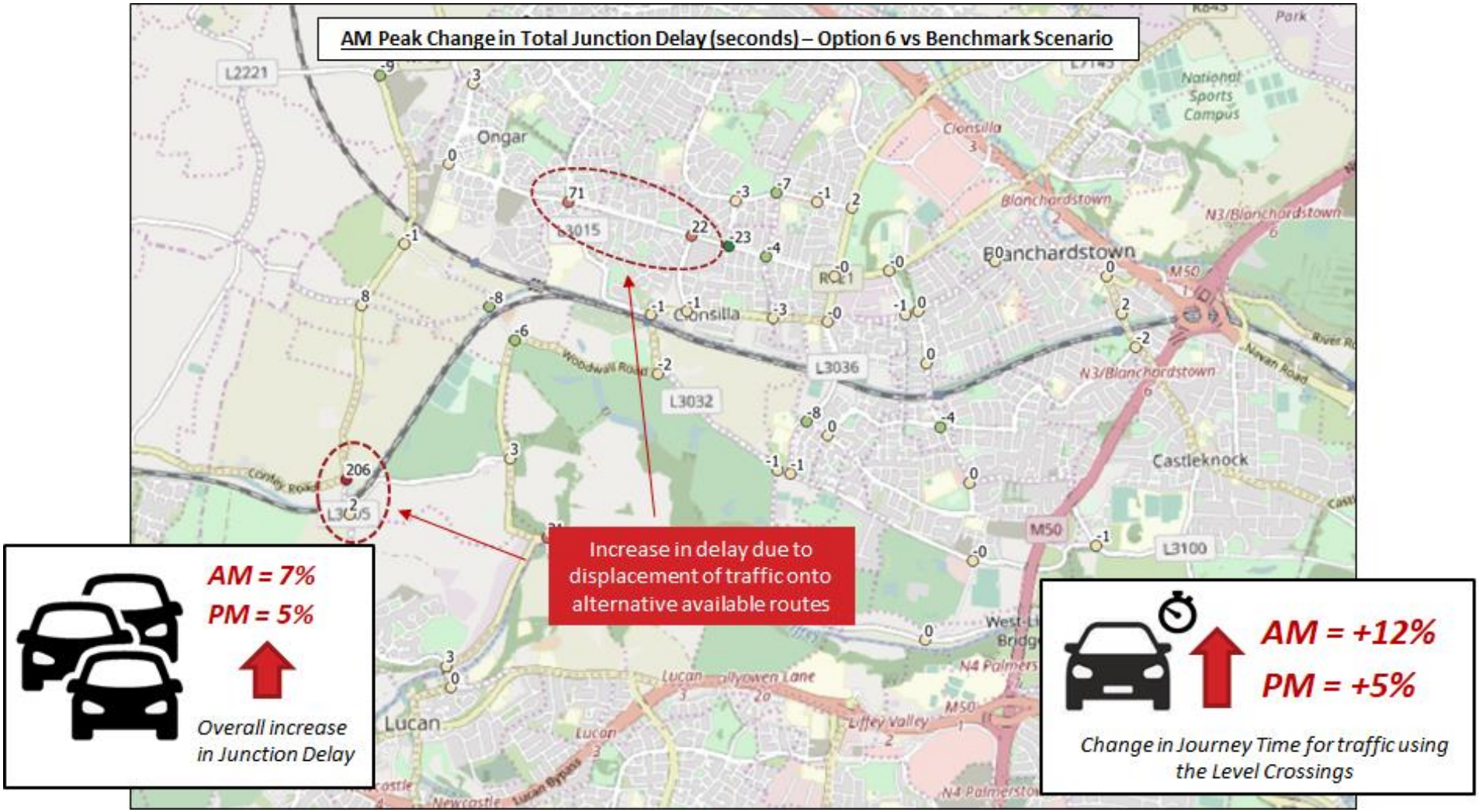


Figure 6.23 AM Change in Junction Delay – Option6 vs Benchmark Scenario

6.9 Option 7

6.9.1 Option 7 concentrates on the impact of closing the Ashtown level crossing to vehicular traffic. As outlined previously, Options 1-6 are specifically focused on the four level crossings within the N3/N4/M50 boundary area. These crossings are located within close proximity to each other, and as such, the closure of one has a knock-on impact on the others. Ashtown is more remote from other level crossing points and, as such, the impact of its closure is tested in isolation within the Ashtown LAM (see Figure 4.3).

KPI-1 Vehicles Displaced

6.9.2 Figure 6.24 shows a difference plot illustrating the change in forecast traffic flows for Option 7 when compared against the benchmark scenario (i.e. replacement road infrastructure provided at Ashtown). The green bands represent an increase in flow, whilst the blue bands represent a decrease in traffic flow on each link. The width of the bands provide an indication of the magnitude of the change, with the thicker bands representing larger increases/decreases in traffic volumes.

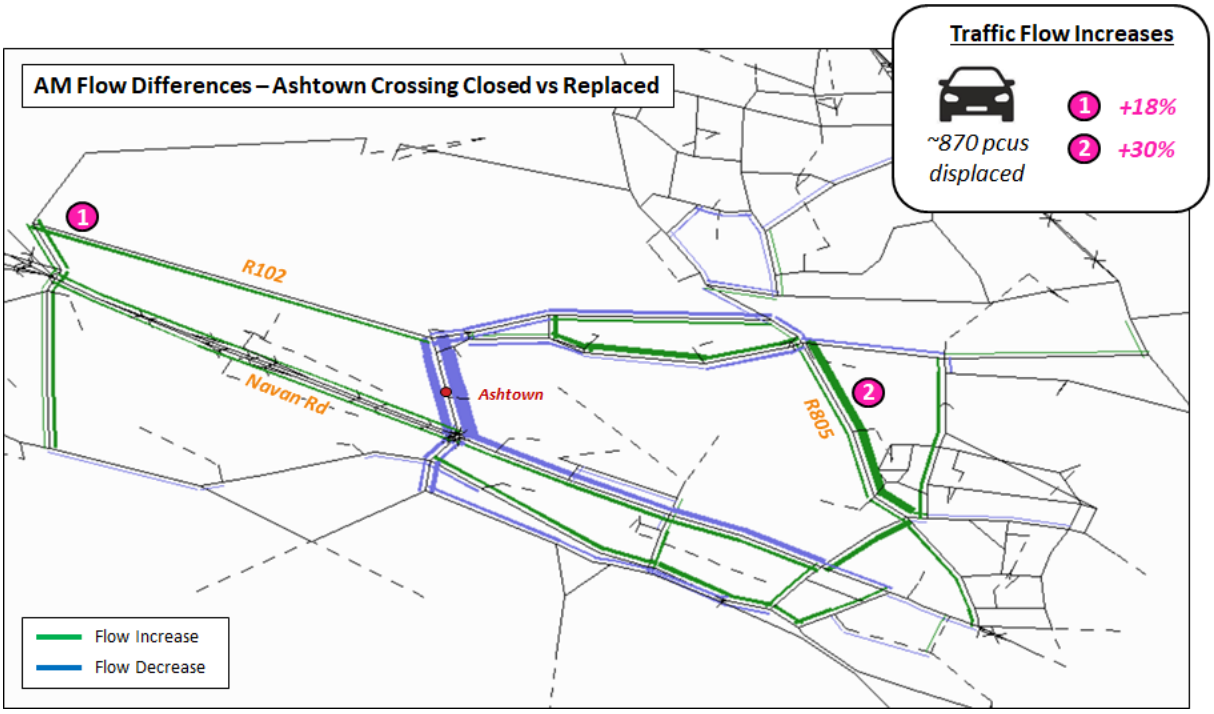


Figure 6.24 AM Flow Difference Plot – Option7 vs Benchmark Scenario

6.9.3 The results in Figure 6.24 indicate that the R102 and R805 experience increases in traffic flows of 18% and 30% respectively in the AM peak hour due to the re-routing of traffic from the closed level crossing at Ashtown.

6.9.4 These routes, and in particular their connections with the Navan Road, currently experience high levels of congestion and delay during the AM and PM peak periods. The increase in traffic flows at these locations due to the closure of the Ashtown level crossing is likely to further exacerbate this issue.

KPI-2 Volume over Capacity

6.9.5 Figure 6.25, overleaf, displays the demand weighted average V/C (as a percentage) for a number of identified key junctions within the study area for the 'With Ashtown

Replacement' (Benchmark) and 'Without Ashtown Replacement' (Option 7) scenarios.

6.9.6 The results in Figure 6.25 indicate a general increase in V/C for junctions that experience a growth in traffic volumes due to the re-routing of vehicles from the closed level crossing. In particular, junctions along the R805 and R102, and their connections with the Navan Road, experience quite high levels of average V/C (75%-100%) indicating that these areas are quite heavily congested.

KPI-3 Junction Delay & KPI-4 Journey Times

6.9.7 Figure 6.26 displays the change in total junction delay (in seconds) between the with, and without, Ashtown replacement scenarios for a number of junctions within the study area. The modelling results indicate that the junctions in close proximity to the closed level crossing at Ashtown experience a minor reduction in delay due to reduced traffic volumes.

6.9.8 Junctions that experience increases in traffic volumes (KPI-1), and V/C (KPI-2), due to the re-routing of vehicles from the closed Ashtown crossing, see a significant rise in congestion and delay. In total, junctions in the 'Without Ashtown Replacement' scenario experience an increase in delay of 18% and 12% in the AM (08:00 – 09:00) and PM (17:00 – 18:00) peak hours respectively when compared to the 'With Ashtown Replacement' scenario.

6.9.9 Select Link Analysis was used to identify the people who would want to use the Ashtown level crossing if it remained open, including their desired origin and destination of travel. Journey times for these origin-destination movements were extracted and compared for the with, and without, Ashtown replacement scenarios. The results indicate that the 'Without Ashtown Replacement' scenario experiences a 38% (AM) and 29% (PM) increase in journey times for vehicles who would want to use the level crossing during the peak hours. This increase in journey time is primarily due to the re-directing of traffic to alternative routes such as the R102 and R805, along with the increased levels of congestion and delay at these locations as described above.

Table 6.8 Option7 Road Based Assessment Summary Results

Option	**KPI-1** Flows Displaced (pcus)		**KPI-3** Change in Delay (vs Benchmark)		**KPI-4** Change in Journey Times (vs Benchmark)[21]	
	AM	PM	AM	PM	AM	PM
Option 7	867	705	18%	12%	38%	29%

[21] Represents change in journey times for people who previously would have used the crossings that are now closed

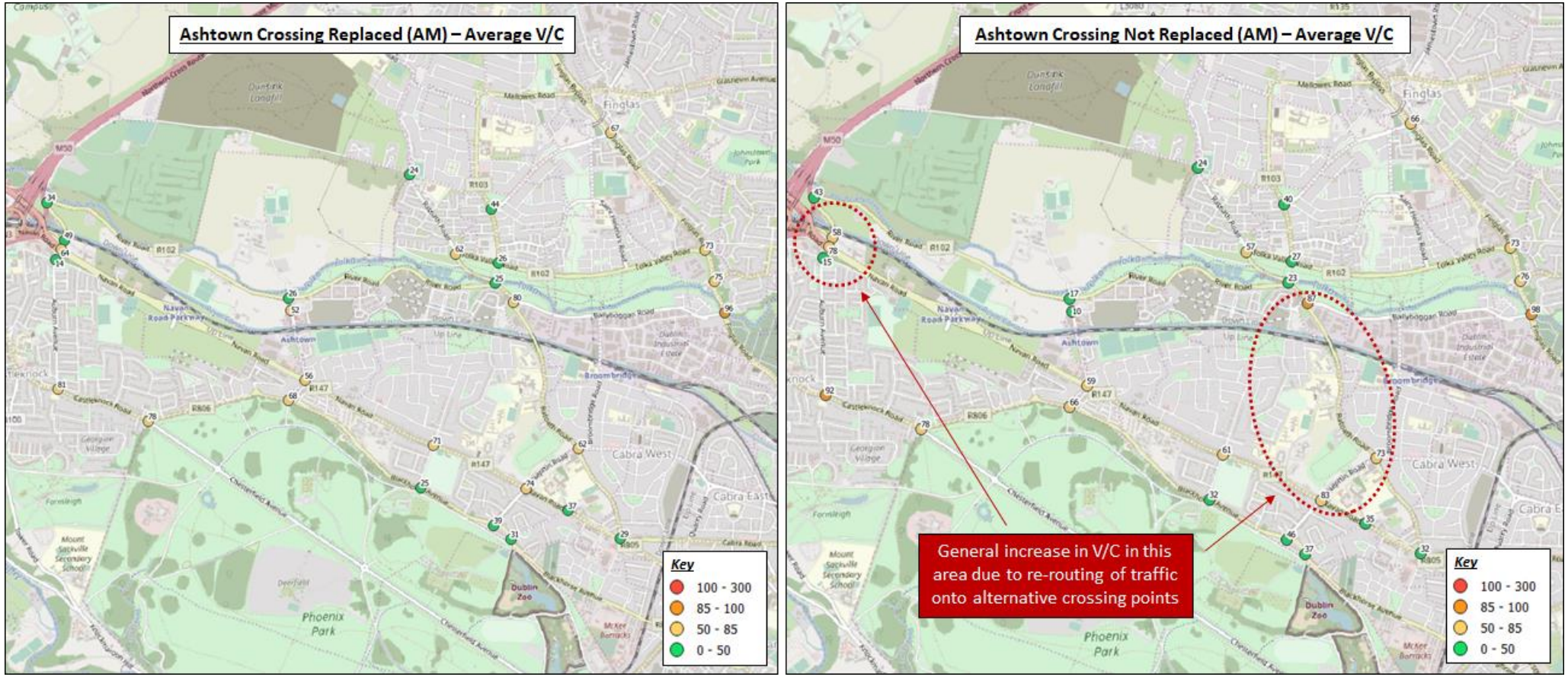


Figure 6.25 AM Average V/C – Ashtown Level Crossing Replaced vs Not Replaced

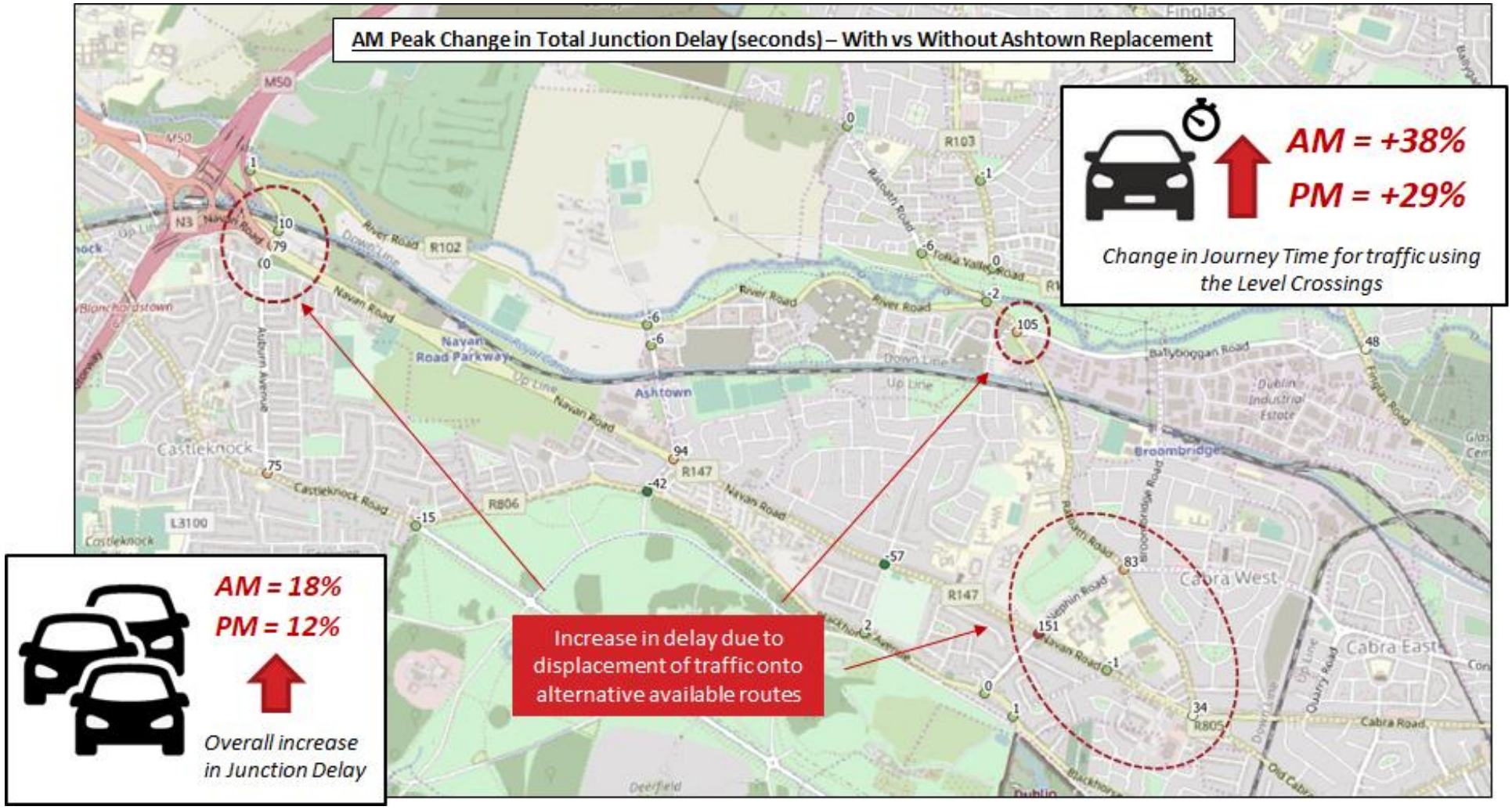


Figure 6.26 AM Change in Junction Delay – Ashtown Level Crossing Replaced vs Not Replaced

6.10 Blakestown Level Crossing

6.10.1 Due to the rural nature of the Blakestown level crossing, it was not deemed necessary to undertake a detailed modelling assessment of its closure in the ERM. Instead, a review was undertaken of Automatic Traffic Counts (ATC) to gain an understanding of the volume of daily traffic using the level crossing.

6.10.2 As described in Chapter 3 previously, two week ATCs were carried out at the Blakestown level crossing covering 24 hours between Monday 28th January, and Sunday 10th February 2019. These counts were processed to identify traffic volumes, by hour, for an average workday, and the results are illustrated in Figure 6.27 below.

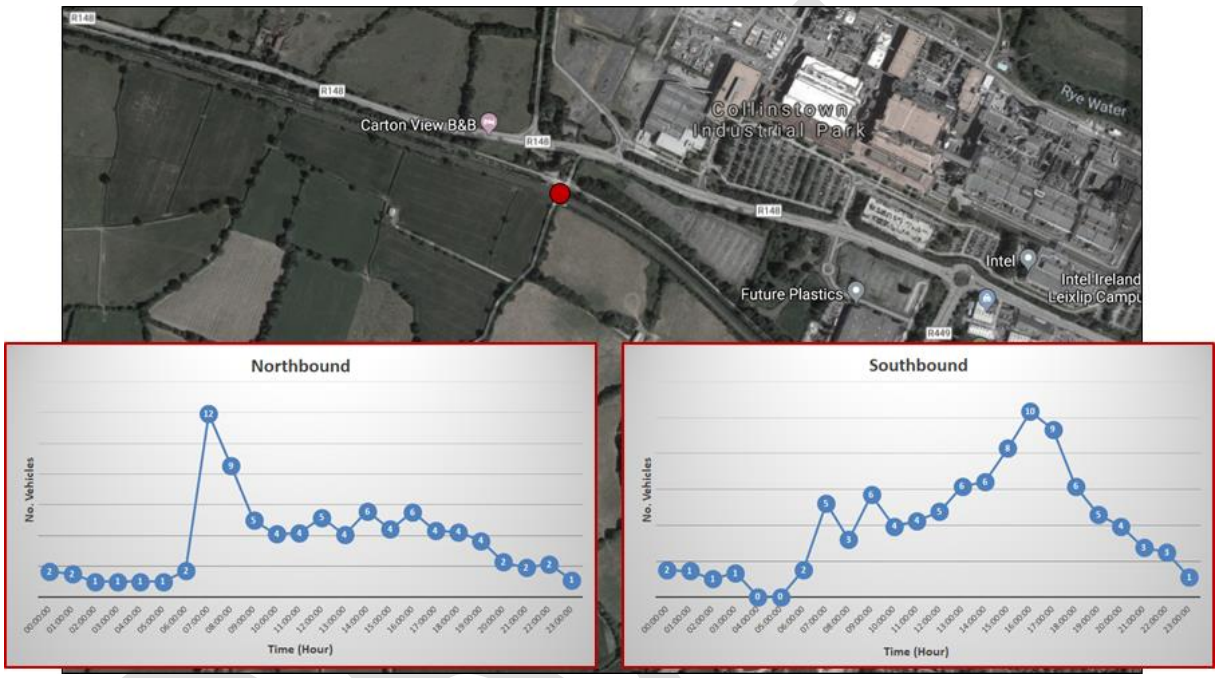


Figure 6.27 Blakestown Level Crossing Daily Traffic Volumes

6.10.3 The results indicate that a very low volume of traffic use the level crossing at Blakestown. The counts appear to be tidal in nature with a maximum of 12 vehicles travelling northbound in the AM from 07:00 – 08:00, and a maximum of 10 vehicles travelling southbound in the PM from 16:00 – 17:00. This would suggest that a small number of people are currently using the Blakestown level crossing as a rat-run for commuting to work.

6.10.4 The Blakestown level crossing also has a high capacity alternative road link (the R449) approximately 700 metres to the east. Given the low density of residential development in the vicinity of the Blakestown level crossing, it is envisaged that re-routing via the R449 would have a very minor impact on overall journey times.

Analysis of the Blakestown Level Crossing indicates that replacement infrastructure for vehicular traffic would not be required at this location as:

- ATC survey data suggest a low level of usage – max of 12 vehicles in an hour throughout the day; and
- There is a viable alternative crossing point to the immediate east (the R449) which means that journey times should not be significantly impacted if the crossing at Blakestown is closed and not replaced.

6.11 'Do Nothing' Journey Time Comparison

6.11.1 As noted in Section 6.1 previously, journey times for each option were also compared against a 2027 'Do Nothing' scenario. In this scenario it is assumed there are no increases in rail frequencies on the Maynooth line in 2027 and that the level crossings remain open, with closure times equal to those currently experienced. Replacement infrastructure can therefore be evaluated against current conditions in which delay is inherent at the crossing due to the need to cross at-grade (whereas every replacement scenario assumes a grade-separated crossing with no inherent delay).

6.11.2 Current AM (08:00-09:00) and PM (17:00-18:00) closure time information was provided by Irish Rail. This data was used to identify the average time the level crossing barrier is open and closed during each closure event, as outlined in Table 6.9 below.

Table 6.9 2019 Level Crossing Closure Times (hh:mm:ss)

Crossing	AM		PM	
	Avg. Time Open	Avg. Time Closed	Avg. Time Open	Avg. Time Closed
Ashtown	00:05:08	00:06:07	00:05:08	00:06:05
Coolmine	00:02:18	00:04:37	00:04:16	00:04:53
Porterstown	00:04:20	00:04:41	00:05:15	00:03:20
Clonsilla	00:04:52	00:04:25	00:08:14	00:06:38
Barberstown	00:07:42	00:04:21	00:06:51	00:03:26
Blakestown	00:06:56	00:04:46	00:08:13	00:03:39

6.11.3 The above closure times were included in the Blanchardstown and Ashtown LAM SATURN road models, which represent average traffic conditions across the full peak hour. Modelled delay at a level crossing is therefore the average delay for all vehicles in the modelled hour. Actual, experienced delay may be significantly higher or lower on a per vehicle basis. The results of the 'Do Nothing' journey time comparison are detailed in Table 6.10, overleaf, for the AM and PM peaks.

Table 6.10 2027 Do Nothing Journey Time Comparison

Option	Level Crossing	Replacement Vehicular Infrastructure				Change in Journey Times[22]	
		Barberstown	Clonsilla	Coolmine	Ashtown	AM	PM
Do Minimum	All Closed					25%	15%
Option 1	All Closed	✓			✓	18%	11%
Option 2	All Closed		✓		✓	15%	6%
Option 3	All Closed			✓	✓	3%	4%
Option 4	All Closed	✓	✓		✓	18%	4%
Option 5	All Closed	✓		✓	✓	-1%	-2%
Option 6	All Closed		✓	✓	✓	2%	2%
Option 7	All Closed	✓	✓	✓		14%	13%
Benchmark	All Closed	✓	✓	✓	✓	-10%	-8%

6.11.4 The results in Table 6.10 indicate that both Option 5 and the Benchmark scenario offer a journey time reduction in the peak hours when compared to having the level crossings closed for a proportion of the hour. Option 5 experiences a reduction in journey times of approx. 1% in the AM, and 2% in the PM peak hour. This suggests that, even without the provision of replacement vehicular infrastructure at Clonsilla, the availability of free-flowing alternatives at Barberstown, Diswellstown (already existing) and Coolmine lead to a reduction in journey times for vehicles currently crossing the railway corridor, when compared against a scenario with the existing closures in operation.

6.11.5 The Benchmark scenario experiences a reduction in journey times for users of the level crossing of approx. 8%-10% due to the availability of free-flow replacement infrastructure at Barberstown, Clonsilla, Coolmine and Ashtown.

6.11.6 In the other options, the provision of free-flowing replacement infrastructure is not sufficient to offset the increase in journey times due to the required re-routing of traffic to alternative locations, and the associated increase in congestion (as described previously in this chapter for each scenario).

6.11.7 As noted previously, the results in Table 6.10 represent an average for the peak hour. As such, vehicles are likely to experience more, or less, of a journey time change depending on whether the level crossing is closed or open when they arrive. For

[22] Journey times compared against 2027 'Do Nothing' with existing Closure Times. Represents change in journey times for people who previously would have used the crossings that are now closed.

users who arrive at the level crossings as soon as they close, the analysis in Table 6.9 indicate that they could experience a delay of up to 6 minutes. In these instances, the user is more likely to experience a journey time benefit through providing replacement free-flow infrastructure. However, vehicles who currently arrive at the level crossings when it is open are likely to experience either a similar journey time, or an increase depending on the number and locations of replacement infrastructure provided.

6.11.8 As such, the modelling results indicate that the removal of the existing delay at barrier closures, and the provision of replacement free-flow infrastructure at the correct locations, can lead to a reduction in journey times for users of the level crossings, when compared to a scenario with existing closure times.

6.12 Road Based Assessment Results – Summary & Conclusions

6.12.1 The previous sections in this chapter provide an overview of the results from the road based options assessment using the Blanchardstown and Ashtown LAMs. Table 6.11,

below, provides a summary of the options tested along with the key performance indicators that were extracted. In summary, the modelling analysis indicates that:

- The closure of all level crossings on the Maynooth line, without any replacement infrastructure (Do Minimum), has an extremely negative impact on the road network with increases in delay of up to 38% in the peak hours.
- Of the three level crossings in the N3/N4/M50 boundary area (Options 1-3), Coolmine requires replacement infrastructure the most because:
  - With Coolmine replaced, fewer vehicles overall will be displaced to alternative crossing points; and
  - The junction delay and journey time results indicate improved performance with Coolmine replaced when compared with replacing Clonsilla or Barberstown in isolation.
- The modelling results indicate that the overall impact on junction delay and journey times is reduced in Option 3 (i.e. replacing Coolmine in isolation) when compared to providing road replacement infrastructure at both Clonsilla and Barberstown (Option 4). This further confirms the importance of retaining a road crossing at Coolmine in the future.
- If replacement road infrastructure is provided at Coolmine and Barberstown, a road based alternative may not be required at the Clonsilla level crossing due to the following:
  - The number of vehicles re-routed onto alternative crossing locations is relatively minor when compared to other scenarios (approx. 680 pcus in the AM peak hour);
  - Flow difference plots indicate that this demand is re-distributed to other areas of the network in a balanced manner with no one area becoming heavily overloaded; and
  - Closing the Clonsilla level crossing provides relatively comparable results in terms of overall junction delay, and journey times, to providing a replacement at this location, if alternative road infrastructure is provided at Coolmine and Barberstown.
- The increase in journey times, and overall junction delay across the network, is greater with no replacement provided at Barberstown when compared to providing no replacement at Clonsilla (Option 6 vs Option 5). This suggests that alternative road infrastructure at Barberstown is more effective than at Clonsilla.
- The closure of the Ashtown level crossing leads to a significant increase in traffic volumes on the R102 and R805. These areas are currently congested in the peak hours, and the increase in traffic flows due to the closure of Ashtown leads to a substantial rise in journey times and delay across the network.

6.12.2 Due to the rural nature of the Blakestown level crossing, its closure was assessed outside of the LAMs using traffic count data. The analysis indicates that replacement infrastructure for vehicular traffic would not be required at Blakestown as:

- ATC survey data suggest a low level of usage – max of 12 vehicles in an hour throughout the day; and

- There is a viable alternative crossing point to the immediate east (the R449) which means that journey times should not be significantly impacted if the crossing at Blakestown is closed and not replaced.

6.12.3 The change in journey times for each option were compared against a 2027 'Do Nothing' scenario with no increases in train frequencies, and existing level crossing closure times. In summary:

- The provision of replacement free-flow infrastructure at Barberstown, Coolmine and Ashtown leads to a reduction in journey times of approx. 1% the AM and 2% in the PM, when compared to having all crossings closed for a proportion of the hour;

- All other Options experience journey time increases when compared to having the level crossings closed for a proportion of the hour. This indicates that the provision of replacement free-flowing infrastructure is not sufficient to offset the increase in journey times due to the required re-routing of traffic to alternative locations, and the associated increase in congestion in these scenarios;

- It should be noted that the modelling analysis covers the entire peak hour, and as such, the delay experienced at the existing level crossings represent an average. As such, vehicles are likely to experience more, or less, of a journey time change depending on whether the level crossing is closed or open when they arrive; and

- The results indicate that the removal of the existing delay at barrier closures, and the provision of replacement free-flow infrastructure at the correct locations, can lead to a reduction in journey times for users of the level crossings, when compared to a scenario with existing closure times.

Therefore, based on the above modelling results, it is recommended that Ashtown, Coolmine and Barberstown would require road based replacement infrastructure to facilitate closure of all level crossings on the Maynooth line to vehicular traffic.

Table 6.11 Road Based Assessment Summary Results

Option	Level Crossing	Replacement Vehicular Infrastructure			Flows Displaced (pcus)		Change in Delay[1] (vs Benchmark)		Change in Journey Times[2] (vs Benchmark)		Change in Journey Times[3] (vs Do Nothing)	
		Barberstown	Clonsilla	Coolmine	AM	PM	AM	PM	AM	PM	AM	PM
Do Minimum	All Closed	✗	✗	✗	2,241	2,179	38%	22%	19%	20%	25%	15%
Option 1	All Closed	✓	✗	✗	1,703	1,772	22%	11%	13%	15%	18%	11%
Option 2	All Closed	✗	✓	✗	1,561	1,475	18%	15%	23%	14%	15%	6%
Option 3	All Closed	✗	✗	✓	1,218	1,110	7%	5%	8%	6%	3%	4%
Option 4	All Closed	✓	✓	✗	1,023	1,068	12%	10%	27%	9%	18%	4%
Option 5	All Closed	✓	✗	✓	680	704	1%	1%	3%	3%	-1%	-2%
Option 6	All Closed	✗	✓	✓	538	406	7%	5%	12%	5%	2%	2%
Option 7	Ashtown Closed	Compared to replacement road infrastructure provided at Ashtown			867	705	18%	12%	38%	29%	14%	13%

1. Represents total delay at all junctions analysed within the study area
2. Represents change in journey times for people who previously would have used the crossings that are now closed
3. Journey times compared against 2027 'Do Nothing' with existing Closure Times. Represents change in journey times for people who previously would have used the crossings that are now closed

7. PEDESTRIAN AND CYCLIST ASSESSMENT RESULTS

7.1 Introduction

7.1.1 The following chapter provides an overview of the analysis undertaken to determine the impact of the proposed level crossing closures on pedestrians and cyclists. As outlined in Chapter 4 previously, modelling analysis was undertaken to identify the change in journey time, and distance travelled, for people who would want to use the existing level crossings if they were closed. This was combined with a mapping analysis of key destinations to identify areas that could have reduced accessibility due to crossing closures, but may not be captured fully in the modelling assessment e.g. amenities such as playing pitches, parks, GAA grounds etc.

7.1.2 The results and recommendations from the road based assessment in Chapter 6 have also been taken into consideration when assessing the impact on pedestrians and cyclists. Where replacement road infrastructure has been recommended, it is assumed that this will be constructed in-line with DMRB and the National Cycle Manual guidance to ensure adequate provision is included for pedestrians and cyclists. In these areas such as Ashtown, Coolmine and Barberstown, the analysis focuses on whether additional pedestrian/cyclist infrastructure is also required at the existing level crossing location.

7.2 Coolmine Level Crossing

Road Replacement Crossing Assessment

7.2.1 The results of the road based options assessment suggest that replacement road infrastructure be provided at Coolmine in lieu of permanent level crossing closure. As outlined in Chapter 5 (Figure 5.6), this replacement includes a new bridge spanning the railway and canal approx. 160 metres west of the existing crossing.

7.2.2 2027 walk and cycle demand was generated by the ERM and assigned to the local network. Select Link Analysis was used to identify the number of people travelling via the existing level crossing including their origin and destination of travel. This demand was then re-assigned to a network with the Coolmine crossing closed, but with the replacement road infrastructure in place, to identify the impact on travel times and distances.

7.2.3 The results of this analysis are presented for pedestrians travelling northbound in the AM peak in Figure 7.1, overleaf. The areas shaded in blue represent key origins of travel with the darker colour representing larger demand levels. Likewise, the areas shaded in green represent the key destinations of travel in the AM peak. The red bands illustrate the pedestrian flows if the Coolmine crossing is closed. The width of the bands provide an indication of the magnitude of the pedestrian flows, with the thicker bands representing larger volumes.

7.2.4 The results in Figure 7.1 indicate that, in the AM peak, the majority of pedestrians using the Coolmine level crossing northbound are originating in the large housing estates to the south, and travelling to schools in the north such as St Francis Xavier and Coolmine Community School.

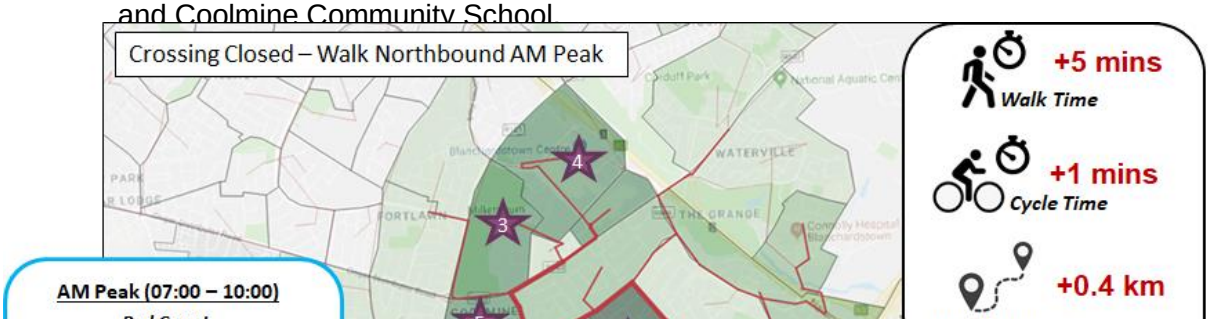


Figure 7.1 Coolmine Level Crossing Modelling Analysis

7.2.5 With the existing crossing at Coolmine closed, the majority of pedestrians re-route via the replacement infrastructure to the west, whilst some choose to cross the rail line at the R806 Castleknock Road. Table 7.1 provides an overview of the change in journey times, and distance travelled, for pedestrians and cyclists due to the closure of the Coolmine Level Crossing in the AM and PM peak hours.

Table 7.1 Coolmine Level Crossing Closure Pedestrian and Cyclist Modelling Results

7.2.6 The modelling results indicate that the closure of the Coolmine level crossing leads to an increase in journey times of approx. 5-7 minutes for pedestrians, and 1-2 minutes for cyclists in the AM and PM peak hours.

Time Period	Mode	Parameter	Coolmine Northbound	Coolmine Southbound
AM	Walk	Journey Time Change (min)	5.12	6.82
		Distance Change (km)	0.44	0.58
	Cycle	Journey Time Change (min)	1.13	2.01
		Distance Change (km)	0.36	0.51
PM	Walk	Journey Time Change (min)	6.73	5.28
		Distance Change (km)	0.57	0.45
	Cycle	Journey Time Change (min)	1.70	1.21
		Distance Change (km)	0.44	0.36

Existing Crossing Accessibility

7.2.7 As noted in the baseline conditions review in Chapter 3, the existing footbridge at Coolmine does not include ramps/lifts. Therefore, if this level crossing is closed to pedestrian/cyclists in the future, the existing bridge is not adequate for universal access to both sides of the train station for mobility impaired users e.g. wheelchair, pushchairs, elderly users etc.

7.2.8 It is not feasible for these mobility impaired passengers to use the proposed replacement road infrastructure to access either side of the train station due to its location approx. 160 metres west. Therefore, it is recommended that, if Coolmine level crossing is to be closed to pedestrians and cyclist in the future, then the existing footbridge will need to be upgraded with lifts/ramps to facilitate universal access for cyclists, and mobility impaired passengers, to either side of the platform.

Royal Canal Way Access

7.2.9 Another item to consider, which cannot be accurately assessed within our pedestrian and cycling modelling, is accessibility to the Royal Canal Way. This is a great public amenity which is likely to be utilised by residents of the housing estates in close proximity to the Coolmine level crossing, particularly in the evenings and weekends. This section of the Royal Canal Way is also due to be upgraded in the near future with planning to be lodged in 2019, and construction programmed to start in 2020[23].

7.2.10 Currently, access to the Royal Canal Way at Coolmine is located immediately north of the level crossing. If this crossing is closed to pedestrians and cyclists in the future, then it will significantly impede accessibility to this amenity for residents to the south.

7.2.11 The proposed replacement road infrastructure to the west is not currently envisaged to connect with the Royal Canal Way (See Figure 7.2 below[24]). Therefore, this would mean that the nearest access point for residents to the south of the Coolmine level crossing would be either at Porterstown (approx. 1 km west), or at the R806 Castleknock Road (approx. 1.5 km east). In the future, access to the Royal Canal Way could be maintained by:

- Ensuring the design of the replacement road bridge at Coolmine includes pedestrian and cyclist ramps linking to the Royal Canal Way; or
- Allowing the upgraded bridge at Coolmine station to be open to all members of the public.

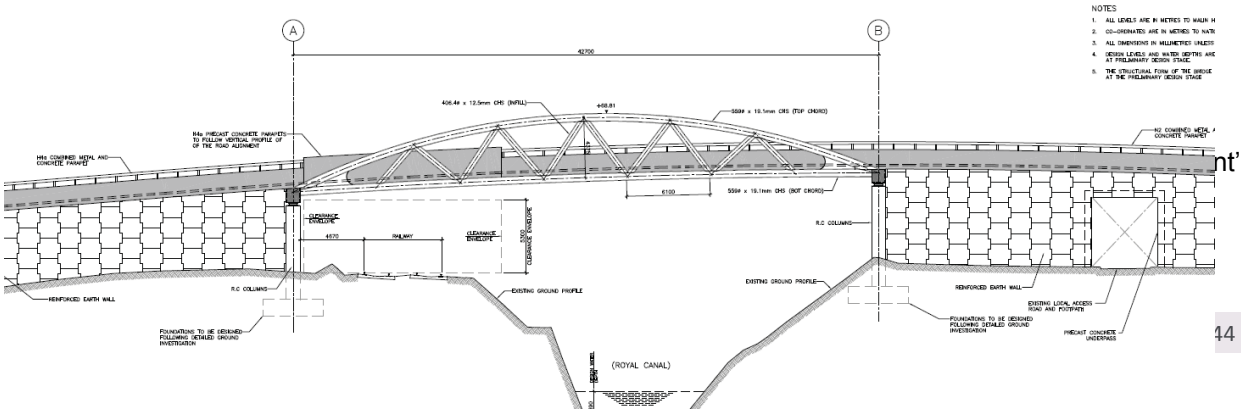


Figure 7.2 Potential Coolmine Bridge Cross Section

Coolmine Level Crossing – Key Points

- The modelling results indicate that the closure of the Coolmine level crossing leads to an increase in journey times of approx. 5-7 minutes for pedestrians, and 1-2 minutes for cyclists in the AM and PM peak hours;
- If Coolmine level crossing is to be closed to pedestrians and cyclist in the future, then the existing footbridge will need to be upgraded with lifts/ramps to facilitate universal access for cyclists, and mobility impaired passengers, to either side of the platform; and
- In the future, access to the Royal Canal Way could be maintained by:
  - Ensuring the design of the replacement road bridge at Coolmine includes pedestrian and cyclist ramps linking to the Royal Canal Way; or
  - Allowing the upgraded bridge at Coolmine train station to be open to all members of the public.

7.3 Porterstown Level Crossing

Modelling Assessment

7.3.1 Porterstown Level Crossing has an existing replacement for vehicular traffic to the immediate east, and as such, replacement road based infrastructure is not deemed necessary at this location. However, modelling analysis was undertaken to determine whether separate pedestrian and cyclist infrastructure should be provided.

7.3.2 As outlined above, 2027 ERM walk and cycle demand was assigned to the local network and Select Link Analysis was used to identify the persons who would use the crossing if it was available. This demand was then assigned to networks with, and without, Porterstown level crossing to identify the impact on travel times, and distances, if it is closed.

7.3.3 The results of this analysis are presented for pedestrians travelling Southbound in the AM peak in Figure 7.3, below. The areas shaded in blue represent key origins of travel

with the darker colour representing larger demand levels. Likewise, the areas shaded in green represent the key destinations of travel in the AM peak. The red bands illustrate the pedestrian flows if the Porterstown crossing is closed. The width of the bands provide an indication of the magnitude of the pedestrian flows, with the thicker bands representing larger volumes.

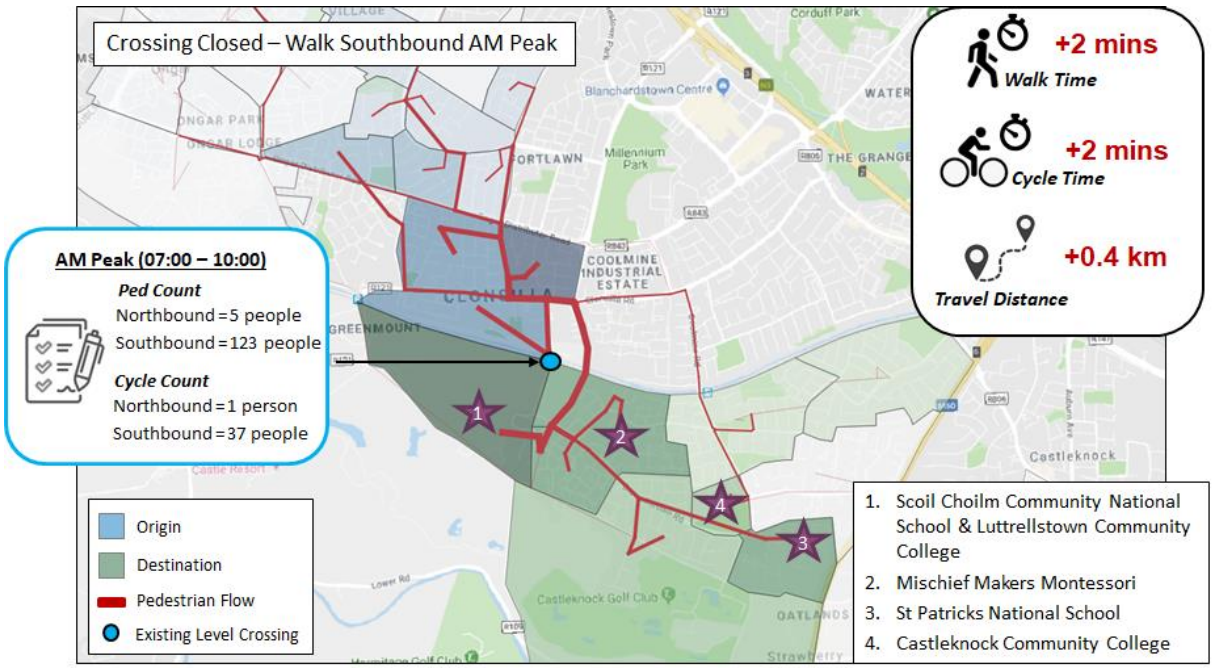


Figure 7.3 Porterstown Level Crossing Modelling Analysis

7.3.4 The results in Figure 7.3 indicate that, in the AM peak, the majority of pedestrians using the Porterstown level crossing southbound are originating in the housing estates to the north, and travelling to schools in the south. The pedestrian counts, undertaken in 2018, suggest that a substantial number of pedestrians (123 people) use the existing crossing in the AM peak, primarily to access Scoil Choilm Community National School and Luttrellstown Community College to the south.

7.3.5 With the existing crossing at Porterstown closed, the majority of pedestrians re-route via the L3036 Diswellstown Road to the east. Table 7.2, overleaf, provides an overview of change in journey times, and distance travelled, for pedestrians and cyclists due to the closure of the Porterstown Level Crossing in the AM and PM peak hours.

7.3.6 The modelling results indicate that the closure of the Porterstown level crossing leads to an increase in journey times of approx. 2-3 minutes for pedestrians, and 2 minutes for cyclists in the AM and PM peak hours.

Table 7.2 Porterstown Level Crossing Closure Pedestrian and Cyclist Modelling Results

Time Period	Mode	Parameter	Porterstown Northbound	Porterstown Southbound
AM	Walk	Journey Time Change (min)	2.61	2.28
		Distance Change (km)	0.22	0.19
	Cycle	Journey Time Change (min)	2.24	2.44
		Distance Change (km)	0.61	0.65
PM	Walk	Journey Time Change (min)	2.39	2.74
		Distance Change (km)	0.20	0.23
	Cycle	Journey Time Change (min)	2.24	2.44
		Distance Change (km)	0.61	0.65

Other Items to Consider

7.3.7 As mentioned previously, there are some amenities that cannot be captured accurately in peak hour modelling as they are most heavily utilised outside of the peaks, or at weekends, and access to these should be considered when making a decision as to whether the level crossing at Porterstown could be closed or not.

7.3.8 Specific amenities in close proximity to the Porterstown level crossing are illustrated in Figure 7.4, overleaf, and include:

- **St. Mochtas Football Club:** Located immediately south of the Porterstown level crossing and contains a number of playing pitches that may be used by residents of the housing estates to the north; and
- **The Royal Canal Way:** As noted in Section 7.2, the Royal Canal Way is due to be upgraded at this location in the near future for pedestrians and cyclists, with access provided north of the existing level crossing.

7.3.9 Figure 7.4 illustrates the proposed route alignment for the upgraded Royal Canal Way. Currently, it is envisaged that Diswellstown Road (Dr. Troy Bridge) will not connect to the proposed greenway. Therefore, if the Porterstown level crossing is closed to pedestrians and cyclists, this will sever access to The Royal Canal Way from the south at this location. This becomes more of an issue if the proposed 1,000 homes are delivered as part of the Kellystown LAP in the future, particularly if Clonsilla level crossing is also closed to pedestrians and cyclists. In the future, access to the Royal Canal Way could be maintained by:

- Providing replacement infrastructure for pedestrians and cyclists at the existing level crossing; or
- Connecting the Diswellstown Road (Dr. Troy Bridge) to the Royal Canal Way via pedestrian and cyclist ramps. However, this would potentially be very difficult due to the changes in elevation required.

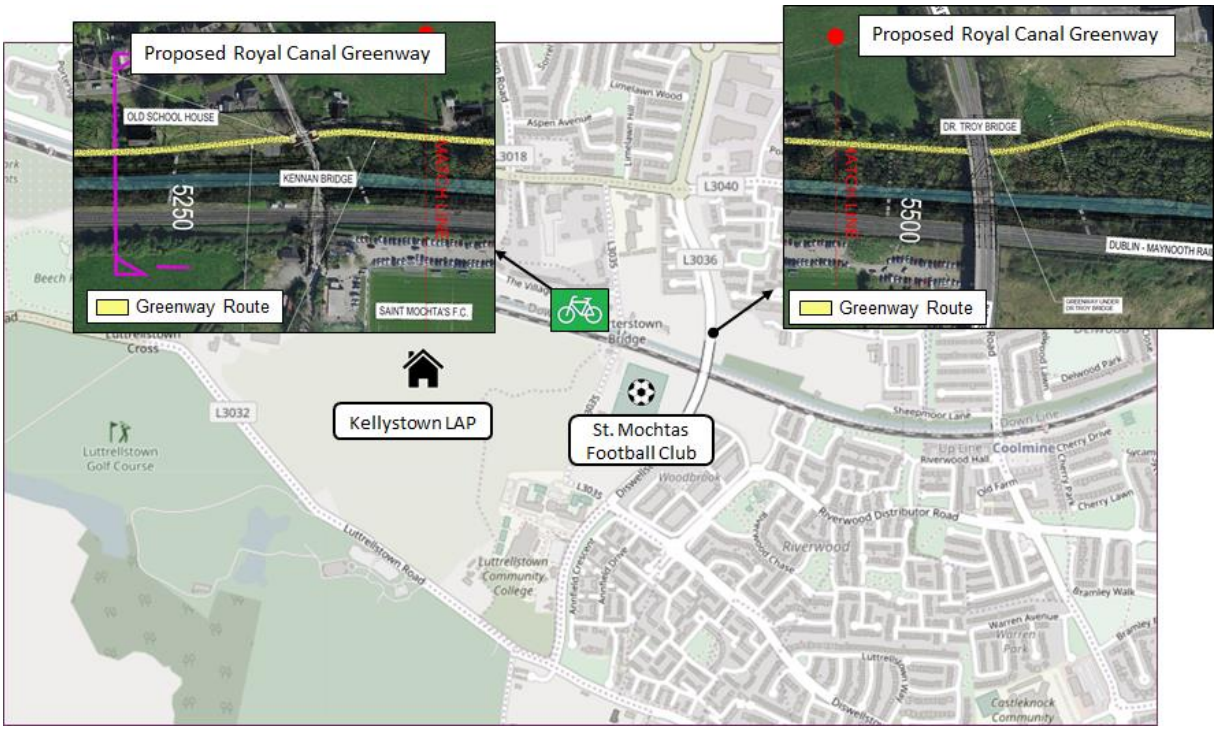


Figure 7.4 Porterstown Level Crossing Local Amenities

Porterstown Level Crossing – Key Points

- The modelling results indicate that the closure of the Porterstown level crossing leads to an increase in journey times of approx. 2-3 minutes for pedestrians, and 2 minutes for cyclists in the AM and PM peak hours;
- Access to local amenities such as St. Mochtas Football Club, and The Royal Canal Way, should be considered when deciding on the closure of Porterstown level crossing;
- In the future, access to the Royal Canal Way could be maintained by:
  - Providing replacement infrastructure for pedestrians and cyclists at the existing level crossing; or
  - Connecting the Diswellstown Road (Dr. Troy Bridge) to the Royal Canal Way via pedestrian and cyclist ramps.

7.4 Ashtown Level Crossing

Road Replacement Crossing Assessment

7.4.1 The results of the road based options assessment suggest that replacement road infrastructure be provided at Ashtown if the level crossing is to be closed in the future. As outlined in Chapter 5 (Figure 5.10), this replacement includes a re-routing of the Ashtown Road along Mill Lane and passing under the railway and the Royal Canal.

7.4.2 2027 walk and cycle demand generated by the ERM was assigned to the local network. Select Link Analysis was used to identify the number of people travelling via the existing Ashtown level crossing, including their origin and destination of travel. This demand was then re-assigned to a network with the Ashtown crossing closed, but with the replacement road infrastructure in place, to identify the impact on travel times and distances.

7.4.3 The results of this analysis are presented for pedestrians travelling southbound in the AM peak in Figure 7.5. The areas shaded in blue represent key origins of travel with the darker colour representing larger demand levels. Likewise, the areas shaded in green represent the key destinations of travel in the AM peak. The red bands illustrate the pedestrian flows if the Ashtown crossing is closed. The width of the bands provide an indication of the magnitude of the pedestrian flows, with the thicker bands representing larger volumes.

7.4.4 The results in Figure 7.5 indicate that, in the AM peak, the majority of pedestrians using the Ashtown level crossing southbound are originating in the Rathborne and Royal Canal Park apartments, and travelling to the Phoenix Park and other employment locations, and schools, to the south.

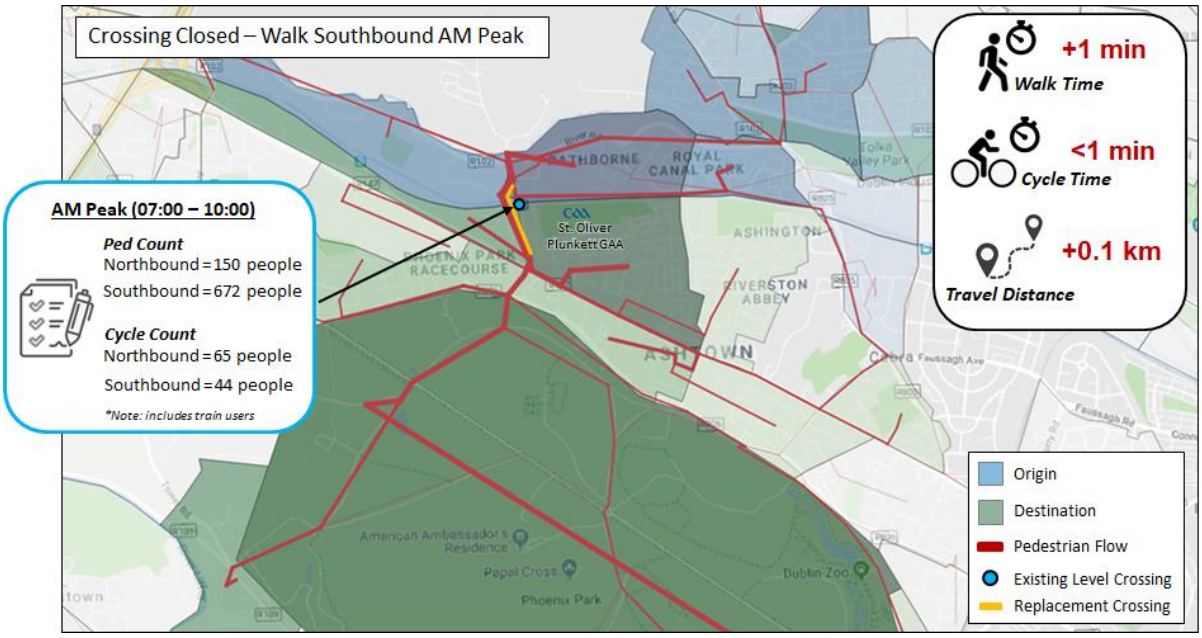


Figure 7.5 Ashtown Level Crossing Modelling Analysis

7.4.5 With the existing crossing at Ashtown closed, the majority of pedestrians re-route via the replacement infrastructure to the west. Table 7.3 provides an overview of the change in journey times, and distance travelled, for pedestrians and cyclists due to the closure of the Ashtown Level Crossing in the AM and PM peak hours.

Table 7.3 Ashtown Level Crossing Closure Pedestrian and Cyclist Modelling Results

Time Period	Mode	Parameter	Ashtown Northbound	Ashtown Southbound
AM	Walk	Journey Time Change (min)	1.14	0.99
		Distance Change (km)	0.10	0.08
	Cycle	Journey Time Change (min)	0.39	0.40
		Distance Change (km)	0.06	0.08
PM	Walk	Journey Time Change (min)	1.01	1.09
		Distance Change (km)	0.09	0.09
	Cycle	Journey Time Change (min)	0.39	0.48
		Distance Change (km)	0.05	0.12

7.4.6 The modelling results indicate that the road replacement infrastructure at Ashtown provides a viable alternative route if the level crossing is closed, with a minor increase in journey times of approx. 1 minute for pedestrians, and less than a minute for cyclists in the AM and PM peak hours.

Existing Crossing Accessibility

7.4.7 As noted in the baseline conditions review in Chapter 3, the existing footbridge at Ashtown does not include ramps/lifts. Therefore, if this level crossing is closed to pedestrian/cyclists in the future, the existing bridge is not adequate for universal access to both sides of the train station for mobility impaired users e.g. wheelchair, pushchairs, elderly users etc.

7.4.8 The proposed design for the new road infrastructure at Ashtown includes ramps to access north and south of the rail line, as illustrated in Figure 7.6, overleaf. However, the distance required to travel from one platform to another is quite significant (approx. 300 metres), particularly for mobility impaired passengers. Through consultation with Irish Rail, it was noted that the existing footbridge at Ashtown does not lend itself to being upgraded due to the configuration of the deck. As such, it is recommended that, if Ashtown level crossing is to be closed to pedestrians and cyclist in the future, then the existing footbridge within the station will need to be replaced with a new fully accessible footbridge to facilitate universal access for mobility impaired passengers to either side of the platform.

Figure 7.6 Ashtown Train Station Crossing Distance

Ashtown Level Crossing – Key Points

- The modelling results indicate that the road replacement infrastructure at Ashtown provides a viable alternative route if the level crossing is closed, with a minor increase in journey times of approx. 1 minute for pedestrians, and less than a minute for cyclists in the AM and PM peak hours; and
- If Ashtown level crossing is to be closed to pedestrians and cyclist in the future, then the existing footbridge within the station will need to be replaced with a new fully accessible footbridge to facilitate universal access for mobility impaired passengers to either side of the platform.

7.5 Clonsilla Level Crossing

7.5.1 The results of the road options assessment, outlined in Chapter 6, suggest that replacement road based infrastructure may not be required at Clonsilla level crossing if it is closed in the future. This section describes further analysis that was undertaken to determine whether separate pedestrian and cyclist infrastructure should be provided at this location.

7.5.2 Counts, undertaken in 2018, indicate a relatively low usage of the existing level crossing with 38 pedestrians, and three cyclists, surveyed in the AM peak period of 07:00-10:00. This is to be expected given the low levels of development to the south of Clonsilla train station.

7.5.3 However, as illustrated in Figure 7.7 below, there are a number of amenities located south of the Clonsilla level crossing, which are likely to be utilised by residents of housing estates to the north outside of the peak hours e.g. evenings and weekends.

These would include the Beech Park Allotments, playground and playing pitches. If the level crossing at Clonsilla is closed, then the nearest available crossing point to access these locations would be at Porterstown, approximately 1.4km to the east.

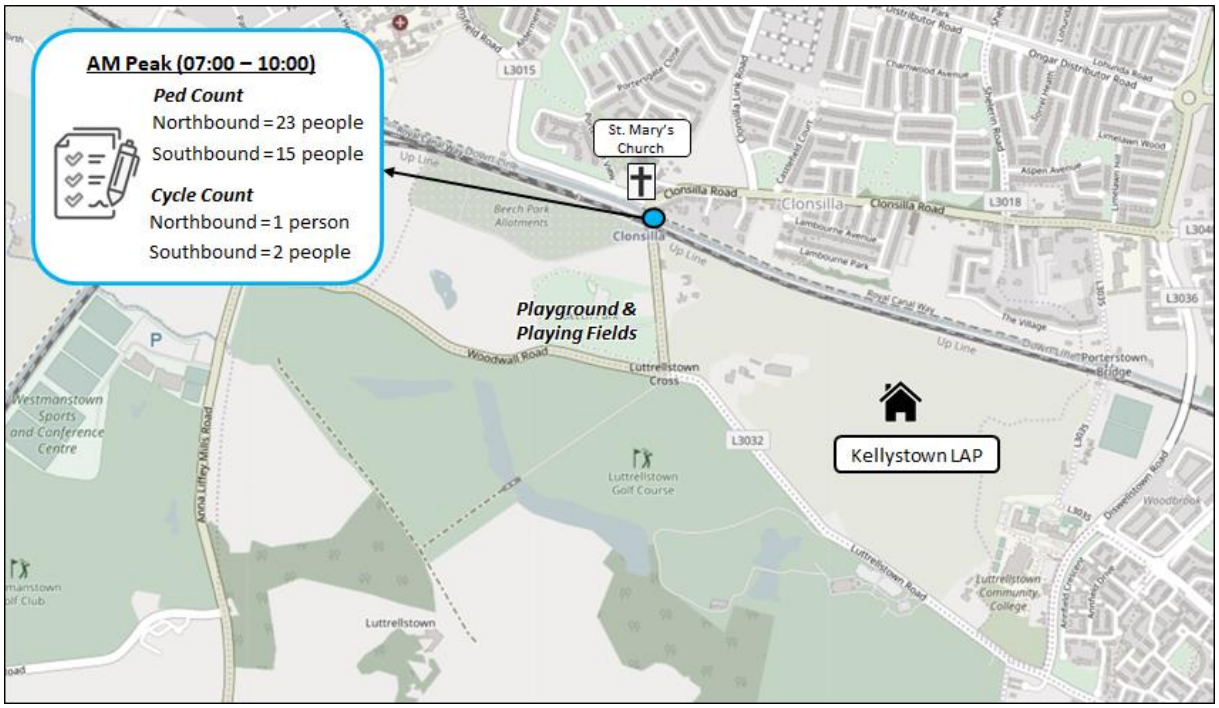


Figure 7.7 Clonsilla Level Crossing Pedestrian Counts

7.5.4 Therefore, due to the risk of severance to these local amenities, it is recommended that replacement infrastructure for pedestrian and cyclists be provided over the bridge and rail line in the vicinity of the Clonsilla level crossing. This could be delivered in a number of ways:

- **Replacement Pedestrian and Cyclist Bridge**: Construction of a new bridge at the existing level crossing to cater for pedestrian and cyclist movements; and
- **Use of existing infrastructure:** Currently, Clonsilla level crossing contains lift facilities to allow universal access to either side of the station platform for cyclists and mobility impaired passengers (e.g. elderly, wheelchair etc.). This infrastructure could be opened to the general public to provide access for pedestrians and cyclists north and south of the rail line if the existing level crossing is closed.

7.6 Barberstown Level Crossing

7.6.1 The results of pedestrian surveys at the existing Barberstown level crossing, undertaken in 2018, indicate a very low level of usage with zero pedestrians, and three cyclists, in total surveyed in the AM (07:00-10:00) and PM (16:00-19:00) peak periods. This is not surprising given the current low density of development in the area.

7.6.2 However, this may change in the future with the proposed development of approximately 1,150 dwellings at the Barnhill LAP to the west of the crossing. This is likely to lead to increased pedestrian and cyclist volumes travelling to parks and

recreational amenities to the southeast including Westmanstown Sports Centre, Luttrellstown Golf Course etc.

7.6.3 The results of the road based options assessment in Chapter 6 suggest that replacement road infrastructure be provided at Barberstown if the level crossing is to be closed in the future. This will include the construction of a new bridge over the canal and rail line linking the L7005 and the R121 (See Figure 5.4 above). It is assumed that this will be constructed in-line with DMRB and the National Cycle Manual guidance to ensure adequate provision is included for pedestrians and cyclists.

7.6.4 Therefore, it is envisaged that this replacement road infrastructure will be sufficient to cater for future pedestrian and cyclist movements, and as such, the existing level crossing at Barberstown could be closed.

7.7 Blakestown Level Crossing

7.7.1 As noted in Section 6.10, due to the low usage level, and the availability of a viable alternative route to the east, it is recommended that Blakestown level crossing could be closed to vehicular traffic. In order to assess whether replacement pedestrian and cyclist infrastructure is required at this location, counts undertaken in 2018 were analysed, and the results are illustrated in Figure 7.8 below.

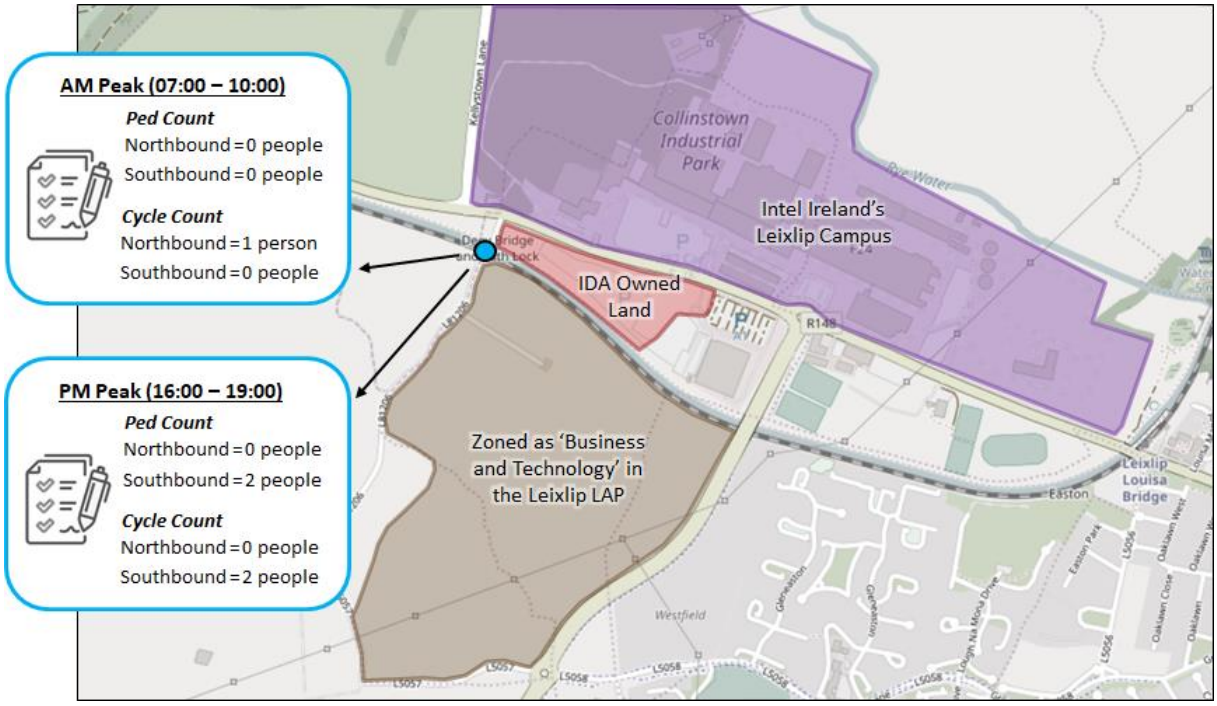


Figure 7.8 Blakestown Level Crossing Pedestrian Counts

7.7.2 The results in Figure 7.8 indicate a very low level of usage with a total of two pedestrians, and three cyclists, surveyed in the AM (07:00-10:00) and PM (16:00-19:00) peak periods combined.

7.7.3 As per the Leixlip Local Area Plan 2017-2023, the lands to the south of the level crossing are zoned as 'Business and Technology'. Therefore, it is unlikely that there

will be any large scale residential development in this area in the future which could potentially lead to increased volumes of pedestrians and cyclists.

7.7.4 Therefore, due to the low usage level of this crossing, low density of residential development in the area, and the availability of high quality walking and cycling infrastructure on the R449 to the east, it is recommended that the no replacement infrastructure for pedestrians and cyclists is required at the Blakestown level crossing.

7.8 Pedestrian and Cyclist Assessment – Summary and Conclusions

7.8.1 The previous sections in this chapter provide an overview of the analysis undertaken to determine the requirement for provision of pedestrian and cyclist replacement infrastructure at the level crossings along the Maynooth rail line. In summary:

Coolmine Level Crossing

- The modelling results indicate that the closure of the Coolmine level crossing leads to an increase in journey times of approx. 5-7 minutes for pedestrians, and 1-2 minutes for cyclists in the AM and PM peak hours;
- If Coolmine level crossing is to be closed to pedestrians and cyclist in the future, then the existing footbridge will need to be upgraded with lifts/ramps to facilitate universal access for cyclists, and mobility impaired passengers, to either side of the platform; and
- In the future, access to the Royal Canal Way could be maintained by:
  - Ensuring the design of the replacement road bridge at Coolmine includes pedestrian and cyclist ramps linking to the Royal Canal Way; or
  - Allowing the upgraded bridge at Coolmine train station to be open to all members of the public.

Porterstown Level Crossing

- The modelling results indicate that the closure of the Porterstown level crossing leads to an increase in journey times of approx. 2-3 minutes for pedestrians, and 2 minutes for cyclists in the AM and PM peak hours;
- Access to local amenities such as St. Mochtas Football Club, and The Royal Canal Way, should be considered when deciding on the closure of Porterstown level crossing;
- In the future, access to the Royal Canal Way could be maintained by:
  - Providing replacement infrastructure for pedestrians and cyclists at the existing level crossing; or
  - Connecting the Diswellstown Road (Dr. Troy Bridge) to the Royal Canal Way via pedestrian and cyclist ramps. However, this would potentially be very difficult due to the changes in elevation required.

Ashtown Level Crossing

- The modelling results indicate that the road replacement infrastructure at Ashtown provides a viable alternative route if the level crossing is closed, with a minor increase in journey times of approx. 1 minute for pedestrians, and less than a minute for cyclists in the AM and PM peak hours;

- If Ashtown level crossing is to be closed to pedestrians and cyclist in the future, then the existing footbridge within the station will need to be replaced to facilitate universal access for mobility impaired passengers to either side of the platform.

Clonsilla Level Crossing

- Due to the risk of severance for residents to local amenities, it is recommended that replacement infrastructure for pedestrian and cyclists be provided over the bridge and rail line in the vicinity of the Clonsilla level crossing. This could be delivered in a number of ways:

  - **Replacement Pedestrian and Cyclist Bridge**: Construction of a new bridge at the existing level crossing to cater for pedestrian and cyclist movements; or

  - **Use of existing infrastructure**: Currently, Clonsilla level crossing contains lift facilities to allow universal access to either side of the station platform for cyclists and mobility impaired passengers (e.g. elderly, wheelchair etc.). This infrastructure could be opened to the general public to provide access for pedestrians and cyclists north and south of the rail line if the existing level crossing is closed.

Barberstown Level Crossing

- The results of pedestrian surveys at the existing Barberstown level crossing, undertaken in 2018, indicate a very low level of usage with zero pedestrians, and three cyclists, in total surveyed in the AM (07:00-10:00) and PM (16:00-19:00) peak periods;

- It is envisaged that the replacement road infrastructure proposed at this location will be sufficient to cater for future pedestrian and cyclist movements, and as such, alternative infrastructure is not required at the existing level crossing at Barberstown.

Blakestown Level Crossing

- Pedestrian and cyclist counts, undertaken in 2018, indicate a very low level of usage of the Blakestown level crossing with a total of two pedestrians, and three cyclists, surveyed in the AM (07:00-10:00) and PM (16:00-19:00) peak periods combined;

- Due to the low usage level of this crossing, low density of residential development in the area, and the availability of high quality walking and cycling infrastructure on the R449 to the east, it is recommended that the no

replacement infrastructure for pedestrians and cyclists is required at the Blakestown level crossing.

8. SUMMARY AND CONCLUSIONS

8.1 Overview

8.1.1 The National Transport Authority (NTA), in collaboration with Iarnród Éireann (IÉ), have commissioned Clifton Scannell Emerson and Associates (CSEA) and SYSTRA Ltd. to carry out a study to assess the transport implications associated with the permanent closure of the six level crossings on the Maynooth rail line. The Study examines options for their full or partial replacement with new infrastructure, and the impacts across walk, cycle, public transport and private car.

8.1.2 This Final Report builds on the Stage 1 Options Assessment, and provides an overview of Maynooth Line Transport Study including:

- National, regional and local planning and policy documents guiding the study;
- Current traffic conditions at the level crossings, including key issues identified during site visits;
- Options identified, and the methodology used, to assess the impact of the level crossing closures on vehicular traffic, as well as pedestrians and cyclists; and
- The results of the road based assessment using calibrated and validated Local Area Models, along with a pedestrian and cyclist assessment using the ERM; and
- Conclusions and recommendations drawn from the assessment results.

Review of Planning and Policy Documents

8.1.3 Chapter 2 of this report provided an overview of relevant National, Regional and local polices, and guidelines, along with previous studies undertaken in the area, which were used to inform this study. Key points pertinent to the Maynooth Line Transport Study include:

- There are a number of key transport infrastructure measures which form a part of the Government's Project Ireland 2040 - National Planning Framework (NPF) and National Development Plan (NDP) 2018-2027, and the NTA Greater Dublin Area (GDA) Transport Strategy. These key infrastructure measures include DART Expansion, Metro Link, Luas, and Bus Connects;

- These schemes, which will support the delivery of an environmentally sustainable low-carbon public transport system, will ensure that public transport will be able to meet the significant growth in passenger demand for public transport services in the Eastern and Midlands Region by 2040;

- The DART Expansion Programme consists of a number of investment projects that will significantly expand the heavy rail capacity, frequency, and connectivity in Dublin city centre and throughout the GDA. These projects include the Electrification of the Sligo Line to Maynooth, together with the removal of level crossings and re-signalling on this line;

- A number of Local Area Plans (LAPs) and planning applications have been prepared along the railway line boundary lands, including the Ashtown-Pelletstown LAP, Hansfield SDZ and Barnhill LAP;

- Previous studies have been undertaken by Clifton Scannell Emerson and Roughan & O'Donovan in 2011, 2012 and 2013, to assess the replacement and removal of the six level crossings along the Maynooth Line. The results and recommendations from these reports have been used to inform the Maynooth Line Transport Study.

Baseline Transport Assessment

8.1.4 Chapter 3 provided an overview of existing traffic and transport conditions within the study area, with a particular focus on the following:

- **Traffic Survey Results**: A review of traffic counts undertaken within the study area to gain a greater understanding of traffic demand at key locations, journey times across the network and pedestrian and cyclists volumes using the existing level crossings;

- **Public Transport Review:** Provides an overview of the nature and characteristics of existing Maynooth Line Rail services and the resultant level crossing closure patterns. Also included is information on existing bus services that may be impacted by the proposed level crossing closures; and

- **Level Crossing Existing Conditions Review:** A review of the existing level crossings with particular focus on facilities, and accessibility, for pedestrians, cyclists and vehicular traffic.

8.1.5 In summary:

Traffic Survey Results

- The ATC data suggests that the hours experiencing the highest levels of traffic are from 08:00-09:00 in the AM, and 17:00-18:00 in the PM;

- The overbridge at Diswellstown Road is the most heavily utilised crossing point in both the AM peak and PM peaks with two-way flows of 1,573 and 1,647 vehicles respectively;

- Of the level crossings, Coolmine experiences the largest traffic volumes with 518 vehicles on average in the AM peak, and 447 in the PM;

- Blakestown experiences relatively low levels of traffic volumes in both the AM and PM peaks with two-way flows of 12 and 13 vehicles respectively;

- Pedestrian and cyclist counts indicate that Ashtown is the most heavily utilised level crossing with 822 pedestrians counted in the AM, and 791 in the PM. However, it is envisaged that the majority of those surveyed were accessing the train station;

- Coolmine is the second most heavily utilised level crossing. Given its location in the middle of high density residential development, it is highly likely that it is frequently used for travel outside of accessing the train, particularly during non-peak periods e.g. visiting friends, recreational walks, accessing local shops etc;

- The pedestrian and cyclist counts indicate a relatively high level of usage of the Porterstown level crossing for accessing schools to the south from residential areas to the north;

- Barberstown and Blakestown have a very low level of activity with no pedestrians surveyed at Barberstown, and just two pedestrians counted at Blakestown in the PM;

- SYSTRA/CSEA received journey time information from the NTA's satellite navigation database. This data is used to calibrate and validate the local area models to ensure that they are providing a robust representation of current levels of delay on the network at the correct locations; and

- JTC data was collected for numerous junctions throughout the study area. This data is utilised within the Local Area Model calibration to ensure that the flow of vehicles through the main junctions on the network is being represented accurately.

Public Transport Review

- Coolmine level crossing is closed for the longest duration during the AM peak hour. In total, Coolmine is closed for approx. 41 minutes during the hour from 08:00 to 09:00 with 9 separate closure events;

- On average, the time the barriers are down per closure range from approx. four and a half minutes to six minutes across all the level crossings;

- In the PM peak, Ashtown level crossing has the longest overall closure time of 36 and a half minutes;

- Barberstown and Blakestown experience the lowest total closure times in both the AM and PM peaks ranging from approx. 20 to 26 minutes;

- Currently, only bus route 239 operated by Go Ahead Ireland travels via the existing level crossings. This service operates approximately once per hour throughout the day in each direction, with one service in each of the AM and PM peaks; and

- As part of the Bus Connects network redesign, it is proposed that the 239 will be replaced by Route 252. It is envisaged that the 252 will follow a similar route to the 239 via Clonsilla level crossing.

Level Crossing Existing Conditions Review

- Issues identified for pedestrians and cyclists:

    - To cross the level crossings, pedestrian and cyclist have to share the road space with the general traffic. There is no dedicated pedestrian path on the crossing or the dedicated path by markings is narrow. Also, it must accommodate all users, i.e. pedestrian, cyclist, wheelchair users, pushchairs, etc.;

- The existing footbridges beside the train stations don't provide ramps/lifts, therefore they are not adequate for universal access (wheelchair, cyclists, pushchairs, elderly users, mobility impairs, etc.);
- Narrow footpath on the roads approaching from the north and the south. Generally, these footpaths present obstructions, e.g. lamp posts, road signs, etc.
- There are no dedicated cycle facilities. Cyclist must dismount to share the pedestrian paths or must share traffic lanes.

- Issues identified for general traffic:
  - Long queues to cross the level crossing on the busiest roads;
  - The bridges over the Royal Canal are generally very narrow with high crests leading to low levels of forward visibility;
  - Clonsilla and Ashtown Train stations have no car parking / drop off areas.

Assessment Methodology

8.1.6 Chapter 4 outlined the methodology used to assess the impact of closing the level crossings along the Maynooth rail line to vehicular traffic, along with pedestrian and cyclists. In summary:

- Demographic and land-use estimates for 2027, including population, and levels of employment and education, were developed in consultation with the NTA.
- The NTA's ERM was used to generate 2027 travel demand for road users, along with pedestrians and cyclists.
- Two calibrated and validated Local Area Models were developed to provide a robust basis for assessing the impacts on the road network of any future closure/replacement of the level crossings within the model areas.
- The LAMs were used to test various options for closure, and replacement, of the level crossings on the Maynooth rail line, with the following KPIs extracted to assess the performance of each test option:
  - **Number of vehicles displaced** from closed crossings onto alternative routes;
  - **Volume over Capacity (V/C)** at key junctions;
  - Overall **junction delay** within the study area; and
  - **Journey times** for existing users of the level crossings.
- Due to the rural nature of the Blakestown level crossing, it was not assessed using the LAMs. Instead, a review was undertaken of usage levels from ATC data to determine whether a road based replacement would be required at this location.

- The ERM's active modes model was used to test the closure of each level crossing to pedestrians and cyclists, and identify the impact on journey times and travel distances.

- Where replacement road infrastructure is recommended, this has been tested in the active modes assignment to investigate whether it is sufficient to cater for pedestrian and cyclist movements, or whether additional infrastructure is also required at the existing level crossing location.

- A mapping analysis was undertaken of key destinations to identify areas that could have reduced pedestrian and cyclist accessibility due to crossing closures, but may not be captured fully in the modelling assessment.

Options for Assessment

8.1.7 The options, described in Chapter 5, have been developed to identify what scale of replacement road infrastructure, if any, is required to allow the level crossings on the Maynooth line to be closed without having significant impacts on network performance.

8.1.8 Based on a review of proposed DART expansion train frequencies, and existing closure times, it is envisaged that all level crossings on the Maynooth rail line will need to be closed completely in the future year.

8.1.9 It is envisaged that both the Ongar to Barnhill Distributor Road, and Kellystown Link Road, will be constructed prior to the 2027 test year, and as such, have been included in all options for testing, including the Do Minimum.

8.1.10 It is assumed that Porterstown level crossing will not require replacement infrastructure for vehicular traffic due to the availability of a high quality alternative bridge to the immediate east (L3036 Diswellstown Road).

8.1.11 Due to the rural nature of the Blakestown level crossing, it was not deemed necessary to undertake a detailed modelling assessment of its closure.

8.1.12 In Summary:

- The **Do Minimum** scenario looks at the impact of closing all the level crossings to vehicular traffic, without providing any replacement infrastructure;

- **Options 1-3** investigate if providing a replacement at one of the level crossings within the N3/N4/M50 boundary area would be sufficient to accommodate the re-routing of traffic from other closed crossings;

- **Options 4-6** include providing replacement infrastructure at a combination of level crossings, to identify if there is any particular location where a road based alternative may not be required; and

- **Option 7** focuses on closing the Ashtown level crossing to vehicular traffic to identify the impact this would have on the surrounding road network.

Road Based Assessment Results

8.1.13 Chapter 6 of this report provided an overview of the results from the road based options assessment using the Blanchardstown and Ashtown LAMs. In summary, the modelling analysis indicates that:

- The closure of all level crossings on the Maynooth line, without any replacement infrastructure (Do Minimum), has an extremely negative impact on the road network with increases in delay of up to 38% in the peak hours.
- Of the three level crossings in the N3/N4/M50 boundary area (Options 1-3), Coolmine requires replacement infrastructure the most because:
  - With Coolmine replaced, fewer vehicles overall are required to be displaced to alternative crossing points; and
  - The junction delay and journey time results indicate improved performance with Coolmine replaced when compared with replacing Clonsilla or Barberstown in isolation.
- The modelling results indicate that the overall impact on junction delay and journey times is reduced under Option 3 (i.e. replacing Coolmine in isolation) when compared to providing road replacement infrastructure at both Clonsilla and Barberstown (Option 4). This further confirms the importance of retaining a road crossing at Coolmine in the future.
- If replacement road infrastructure is provided at Coolmine and Barberstown, a road based alternative may not be required at the Clonsilla level crossing due to the following:
  - The number of vehicles displaced and re-routed onto alternative crossing locations is relatively minor when compared to other scenarios (approx. 680 pcus in the AM peak hour);
  - Flow difference plots indicate that this demand is re-distributed to other areas of the network in a balanced manner with no one area becoming heavily overloaded; and
  - Closing the Clonsilla level crossing provides relatively comparable results in terms of overall junction delay, and journey times, to providing a replacement at this location, if alternative road infrastructure is provided at Coolmine and Barberstown.
- The increase in journey times, and overall junction delay across the network, is greater with no replacement provided at Barberstown when compared to providing no replacement at Clonsilla (Option 6 vs Option 5). This suggests that alternative road infrastructure at Barberstown is more effective than at Clonsilla.
- The closure of the Ashtown level crossing leads to a significant increase in traffic volumes on the R102 and R805. These areas are currently congested in the peak hours, and the increase in traffic flows due to the closure of Ashtown leads to a substantial rise in journey times and delay across the network.

8.1.14 Due to the rural nature of the Blakestown level crossing, its closure was assessed outside of the LAMs using traffic count data. The analysis indicates that replacement infrastructure for vehicular traffic would not be required at Blakestown as:

- ATC survey data suggest a low level of usage – max of 12 vehicles in an hour throughout the day; and
- There is a viable alternative crossing point to the immediate east (the R449) which means that journey times should not be significantly impacted if the crossing at Blakestown is closed and not replaced.

8.1.15 The change in journey times for each option were compared against a 2027 'Do Nothing' scenario with no increases in train frequencies, and existing level crossing closure times. In summary:

- The provision of replacement free-flow infrastructure at Barberstown, Coolmine and Ashtown leads to a reduction in journey times of approx. 1% the AM and 2% in the PM, when compared to having all crossings closed for a proportion of the hour;
- All other Options experience journey time increases when compared to having the level crossings closed for a proportion of the hour. This indicates that the provision of replacement free-flowing infrastructure is not sufficient to offset the increase in journey times due to the required re-routing of traffic to alternative locations, and the associated increase in congestion in these scenarios;
- It should be noted that the modelling analysis covers the entire peak hour, and as such, the delay experienced at the existing level crossings represent an average. As such, vehicles are likely to experience more, or less, of a journey time change depending on whether the level crossing is closed or open when they arrive; and
- The results indicate that the removal of the existing delay at barrier closures, and the provision of replacement free-flow infrastructure at the correct locations, can lead to a reduction in journey times for users of the level crossings, when compared to a scenario with existing closure times.

Therefore, based on the above results, it is recommended that Ashtown, Coolmine and Barberstown would require road based replacement infrastructure to facilitate closure of all level crossings on the Maynooth line to vehicular traffic.

Pedestrian and Cyclist Assessment Results

8.1.16 Chapter 7 outlined the results of the analysis undertaken to determine the requirement for provision of pedestrian and cyclist replacement infrastructure at the level crossings along the Maynooth rail line. In summary:

Coolmine Level Crossing

- The modelling results indicate that the closure of the Coolmine level crossing leads to an increase in journey times of approx. 5-7 minutes for pedestrians, and 1-2 minutes for cyclists in the AM and PM peak hours;
- If Coolmine level crossing is to be closed to pedestrians and cyclist in the future, then the existing footbridge will need to be upgraded with lifts/ramps to facilitate universal access for cyclists, and mobility impaired passengers, to either side of the platform; and
- In the future, access to the Royal Canal Way could be maintained by:
  - Ensuring the design of the replacement road bridge at Coolmine includes pedestrian and cyclist ramps linking to the Royal Canal Way; or
  - Allowing the upgraded bridge at Coolmine train station to be open to all members of the public.

Porterstown Level Crossing

- The modelling results indicate that the closure of the Porterstown level crossing leads to an increase in journey times of approx. 2-3 minutes for pedestrians, and 2 minutes for cyclists in the AM and PM peak hours;
- Access to local amenities such as St. Mochtas Football Club, and The Royal Canal Way, should be considered when deciding on the closure of Porterstown level crossing;
- In the future, access to the Royal Canal Way could be maintained by:
  - Providing replacement infrastructure for pedestrians and cyclists at the existing level crossing; or
  - Connecting the Diswellstown Road (Dr. Troy Bridge) to the Royal Canal Way via pedestrian and cyclist ramps. However, this would potentially be very difficult due to the changes in elevation required.

Ashtown Level Crossing

- The modelling results indicate that the road replacement infrastructure at Ashtown provides a viable alternative route if the level crossing is closed, with a minor increase in journey times of approx. 1 minute for pedestrians, and less than a minute for cyclists in the AM and PM peak hours;
- If Ashtown level crossing is to be closed to pedestrians and cyclist in the future, then the existing footbridge within the station will need to be replaced to facilitate universal access for mobility impaired passengers to either side of the platform.

Clonsilla Level Crossing

- Due to the risk of severance for residents to local amenities, it is recommended that replacement infrastructure for pedestrian and cyclists be provided over the bridge and rail line in the vicinity of the Clonsilla level crossing. This could be delivered in a number of ways:

  - **Replacement Pedestrian and Cyclist Bridge**: Construction of a new bridge at the existing level crossing to cater for pedestrian and cyclist movements; or

  - **Use of existing infrastructure**: Currently, Clonsilla level crossing contains lift facilities to allow universal access to either side of the station platform for cyclists and mobility impaired passengers (e.g. elderly, wheelchair users etc.). This infrastructure could be opened to the general public to provide access for pedestrians and cyclists north and south of the rail line if the existing level crossing is closed.

Barberstown Level Crossing

- The results of pedestrian surveys at the existing Barberstown level crossing, undertaken in 2018, indicate a very low level of usage with zero pedestrians, and three cyclists, in total surveyed in the AM (07:00-10:00) and PM (16:00-19:00) peak periods;

- It is envisaged that the replacement road infrastructure proposed at this location will be sufficient to cater for future pedestrian and cyclist movements, and as such, alternative infrastructure is not required at the existing level crossing at Barberstown.

Blakestown Level Crossing

- Pedestrian and cyclist counts, undertaken in 2018, indicate a very low level of usage of the Blakestown level crossing with a total of two pedestrians, and three cyclists, surveyed in the AM (07:00-10:00) and PM (16:00-19:00) peak periods combined;

- Due to the low usage level of this crossing, low density of residential development in the area, and the availability of high quality walking and cycling infrastructure on the R449 to the east, it is recommended that the no replacement infrastructure for pedestrians and cyclists is required at the Blakestown level crossing.

Appendix A – Level Crossing Closure CCTV Analysis

Table 1. SLIGO LINE LEVEL CROSSING CLOSURES ON 22ND MARCH 2019 (CCTV ANALYSIS) (HR.MIN.SEC)

Ashtown	0800 - 0900	Time – Min.Secs TRAIN ID	1300 - 1400	Time - Min.Secs TRAIN ID	1700 - 1800	Time - Min.Secs TRAIN ID
1	07.57.30 - 08.07.00	**9.30** D300/P652/P302	12.58.50 - 13.01.40	**2.50** D915	16.55.28 - 17.04.05	**8.37** D924/P320
2	08.13.15 - 08.17.50	**4.35** P734/D906	13.05.00 - 1309.00	**4.00** P744	17.06.47 - 17.13.50	**7.03** D312
3	08.21.30 - 08.30.15	**8.45** D905/P653	13.12.25 - 13.15.35	**3.10** A906	17.21.28 - 17.30.20	**8.52** A912/P753/P321
4	08.36.20 - 08.40.30	**4.10** D301/A901	13.28.45 - 13.32.17	**3.30** D916	17.33.55 - 17.41.50	**7.55** D925/D313/P754
5	08.43.48 - 08.50.40	**7.02** P303/D907/P654	13.35.46 - 13.37.40	**1.54** P745	17.45.00 - 17.46.50	**1.50** D926
6	08.57.00 - 08.59.50	**2.50** P304	13.51.57 - 13.54.32	**2.35** A907	17.55.25 - 17.57.40	**2.15** P322
7			13.59.02 - 14.03.26	**4.24** D917		
Total Time		**36.52**		**22.25**		**36.32**
Coolmine	**0800 - 0900**	**Time – Min.Secs TRAIN ID**	**1300 - 1400**	**Time - Min.Secs TRAIN ID**	**1700 - 1800**	**Time - Min.Secs TRAIN ID**
1	08.04.00 - 08.07.20	**3.20** P734	12.58.04 - 13.01.06	**3.02** P744	16.57.26 - 17.00.30	**3.01** D311 LATE
2	08.09.35 - 08.14.35	**5.00** D300/	13.04.30 - 13.10.47	**6.17** D915	17.09.20 - 17.16.44	**7.24** D924/P753
3	08.14.35 - 08.17.15	**2.40** D906/P653	13.17.32 - 13.20.05	**2.33** A906	17.18.45 - 17.23.00	**4.15** D312
4	08.19.35 - 08.26.52	**7.17** P653/D906	13.28.10 - 13.30.50	**2.40** P745	17.25.57 - 17.33.50	**7.53** P321/P754/A912

5	08.29.45 - 08.35.35	**5.50** D905/A901/P303	13.37.00 - 13.41.00	**4.00** D916	17.42.40 - 17.47.23	**4.43** D313/D925
6	08.39.35 - 08.42.40	**3.05** D301	13.51.00 - 13.52.40	**1.40** A907	17.49.25 - 17.52.25	**3.00** P322
7	08.44.25 - 08.48.20	**3.55** P654			17.53.20 - 17.57.15	**3.55** D926
8	08.49.15 - 08.56.45	**7.30** D907/P304				
9	08.58.40 - 09.01.38	**2.58** P735				
Total Time		**41.35**		**19.32**		**34.11**
Porterstown	**0800 - 0900**	**Time – Min.Secs TRAIN ID**	**1300 - 1400**	**Time - Min.Secs TRAIN ID**	**1700 - 1800**	**Time - Min.Secs TRAIN ID**
1	08.01.50 - 08.06.12	**4.22** C303/P734	13.04.15 - 13.06.00	**1.45** J900	17.12.15 - 17.15.50	**3.35** D924/P753
2	08.11.47 - 08.16.10	**4.23** D300/P653	13.08.52 - 13.11.38	**2.46** D915	17.22.06 - 17.23.55	**1.49** D312
3	08.20.58 - 08.25.48	**4.50** D906/A901	13.17.55 - 13.20.52	**2.57** A906	17.25.35 - 17.27.55	**2.20** P321
4	08.30.00 - 08.32.20	**2.20** P303	13.25.10 - 13.29.55	**4.45** P745	17.29.09 - 17.32.47	**3.38** A912/P754
5	08.34.08 - 08.41.37	**7.29** D905/P654	13.40.30 - 13.42.07	**1.37** D916	17.46.50 - 17.48.50	**2.00** D313
6	08.47.15 - 08.51.19	**4.04** D301	13.49.53 - 13.52.10	**2.17** A907	17.51.54 - 17.58.29	**6.35** D926/P322
7	08.55.20 - 09.00.38	**5.18** D907/P735	13.58.50 - 14.03.15	**3.25** P746		
Total Time		**32.46**		**19.32**		**19.57**

Clonsilla	0800 - 0900	Time – Min.Secs TRAIN ID	1300 - 1400	Time - Min.Secs TRAIN ID	1700 - 1800	Time - Min.Secs TRAIN ID
1	07.58.35 - 08.03.45	**5.10** C303/P734	13.00.38 - 1302.15	**2.37** P744	17.09.22 - 17.16.05	**6.43** D924/P753
2	08.09.24 - 08.15.00	**5.36** D300/P653	13.09.45 - 13.11.40	**1.55** D915	17.21.30 - 17.31.20	**9.50** D312/P321/A912/P754
3	08.20.42 - 08.23.40	**3.58** D906/A901	13.17.25 - 13.20.50	**3.15** A906	17.46.50 - 17.53.40	**6.50** D925/D313/P322
4	08.26.00 - 08.30.20	**4.20** P303	13.24.00 - 13.27.47	**3.47** P745	17.57.28 - 18.00.35	**3.07** A911
5	08.34.35 - 08.39.35	**5.00** D905/P654	13.39.50 - 13.42.25	**2.35** D916		
6	08.45.30 - 08.49.17	**3.47** D907/P304	13.46.55 - 13.50.47	**3.52** A907		
7	08.54.35 - 08.58.42	**4.07** P735	13.57.38 - 14.01.20	**3.42** P746		
Total Time		**31.58**		**21.43**		**26.30**

Barberstown	0800 - 0900	Time – Min.Secs TRAIN ID	1300 - 1400	Time - Min.Secs TRAIN ID	1700 - 1800	Time - Min.Secs TRAIN ID
1	07.56.40 - 08.03.38	**6.58** D904/P734	13.00.02 - 13.02.50	**2.48** P744	17.07.48 - 17.12.10	**4.22** P753
2	08.08.50 - 08.12.35	**3.45** P653	13.10.52 - 13.14.50	**3.58** D915	17.16.20 - 17.18.54	**2.34** D924
3	08.20.15 - 08.27.08	**6.53** D906/A901	13.20.06 - 13.26.18	**6.12** A906/P745	17.25.25 - 17.29.15	**3.50** P754
4	08.32.28 - 08.34.08	**1.38** D905/P654	13.42.55 - 13.45.20	**2.25** D916	17.30.47 - 17.33.50	**3.03** A912
5	08.52.58 - 08.57.04	**4.06** D907	13.47.40 - 13.50.36	**2.56** A907	17.50.54 - 17.53.22	**2.28** D925

6	08.58.34 - 09.01.15	**2.41** P735	13.55.39 - 13.59.56	**4.17** P746	17.58.20 - 18.02.40	**4.20** D926/A911
Total Time		**26.01**		**22.36**		**20.37**
Blakestown	**0800 - 0900**	**Time – Min.Secs TRAIN ID**	**1300 - 1400**	**Time - Min.Secs TRAIN ID**	**1700 - 1800**	**Time - Min.Secs TRAIN ID**
1	07.58.10 - 08.01.34	**3.24** P653/	13.13.12 - 13.15.45	**2.33** P745	16.59.59 - 17.03.00	**3.01** D923
2	08.10.22 - 08.16.56	**6.34** D904/A901	13.21.32 - 13.23.35	**2.03** D915	17.16.24 - 17.18.35	**2.11** P754
3	08.23.55 - 08.26.55	**3.00** P654/	13.27.30 - 13.29.42	**2.12** A906	17.25.40 - 17.27.59	**2.19** D924
4	08.29.20 - 08.32.55	**3.35** D906	13.41.23 - 13.44.57	**3.34** A907	17.36.40 - 17.39.20	**2.40** A912
5	08.42.25 - 08.49.40	**7.15** D905/P735	13.50.10 - 13.51.12	**1.02** P746	17.47.50 - 17.55.00	**7.10** D925/A911
6			13.52.17 - 13.54.00	**1.43** D916	17.58.27 - 18.03.00	**4.33** P755
Total Time		**23.48**		**13.07**		**21.54**

Note: The timings are taken from when the barriers are fully lowered till they are fully raised. Addition 35 seconds could be added for crossing activation to crossing deactivation (i.e. initial warning to final all clear).

Appendix B – Existing Conditions Review

Introduction

The existing conditions review has been focused on the existing pedestrian and cyclist facilities, from an universal access perspective. In addition, the existing road conditions to accommodate the general traffic has been examined. This involved site visits by two qualified engineers and desktop review to provide an understanding of the existing transportation issues in the study area.

Most of the level crossings share similar issues, however some crossings provide higher quality facilities than others.

Study area overview

The character of the study area is conditioned by a series of conditions and constraints:

- Royal Canal. The topography demarcated by the Royal Canal is in cutting, with a very steep slop from the railway line. The existing overbridges over the Royal Canal are protected structures, with a narrow carriageway and high crest restricting the required forward visibility. The access to the Royal Canal Greenway is directly from the northern side of the canal.
- Railway Line. The railway line presents a severance for communities. The level crossings are narrow and have to accommodate all users, e.g. cars, HGVs, pedestrian, cyclists, etc.
- Road network. The roads crossing the railway line are narrow and in most of the cases don't provide the required pedestrian facilities.
- Train Stations. Ashtown, Coolmine and Clonsilla level crossings are besides the Train Stations. Walkways over the Royal Canal are provided for pedestrian and cyclists. These level crossings present a high pedestrian activity due to the train station access. In general the access to the train station. Within the railway line ownership lands there is the provision of footbridges. In this chapter it is outlined the type of footbridge provided.

Existing Pedestrian and Cyclist Facilities - Review

The review of the existing pedestrian and cyclist conditions across the six level crossings has been undertaken to identify the existing conditions and main issues faced by pedestrian, cyclists and railway users:

- Facilities for walking/cycling: e.g. lighting, footpath (continuity, width, pavement conditions), dropped kerbs/tactile paving, footpath obstructions, existing road signs and markings, pedestrian crossings, cycle facilities, etc.
- Access to train stations – both sides of crossing.
- Access to royal canal greenway.

These features were assessed in accordance with the standards set out in the following best practice guidance documents:

- Design Manual for Urban Roads and Streets (Department of Transport, Tourism and Sport)
- National Cycle Manual (National Transport Authority)
- Pedestrian Crossing Specification and Guidance (Transport Infrastructure Ireland).

Existing Road Network - Review

As part of this study the road capacity at the 6no. level crossings has been reviewed, i.e. number of lanes, approx. width, type of junctions both sides of the crossing/bridge, etc.

Severance of community through closure

Closing a level crossing can often sever important connections to the communities on either side of the rail tracks. Without a convenient and safe way to access either side of the tracks, it could cause severance issues that will undermine nearby residential areas, schools, sporting facilities, etc. As part of the assessment, the consequences of the road closure for pedestrian and cyclists have been identified.

Ashtown Level Crossing

Description

Maynooth railway line crosses Ashtown Road, dividing Ashtown north-south. The area to the immediate north has recently been developed and includes retail and residential blocks. The Royal Canal runs parallel to the railway line on the northern side, there is a narrow road bridge crossing the canal. Ashtown train station is located on the eastern side of the Ashtown Road, and south of the railway line. Southern to the train station there is a horse-riding school on the western side of Ashtown Road and established residential estates on the eastern side.

There is a walkway over the canal on the eastern side for pedestrian and cyclist to cross the Royal Canal. A footbridge is provided within the Railway line boundary which connects both platforms of the train station.

Ashtown Road is a single lane 2-way road which connects Navan Road (R147) with River Road (R102). In general, the road is in good conditions. The pinch point is on the river crossing as the width of the bridge is approximately 5m, which limits the use for pedestrians and cyclists, the walkway is an appropriate alternative.

There is no car parking area provided for the train station users. Cycle parking is provided within the train station premises.

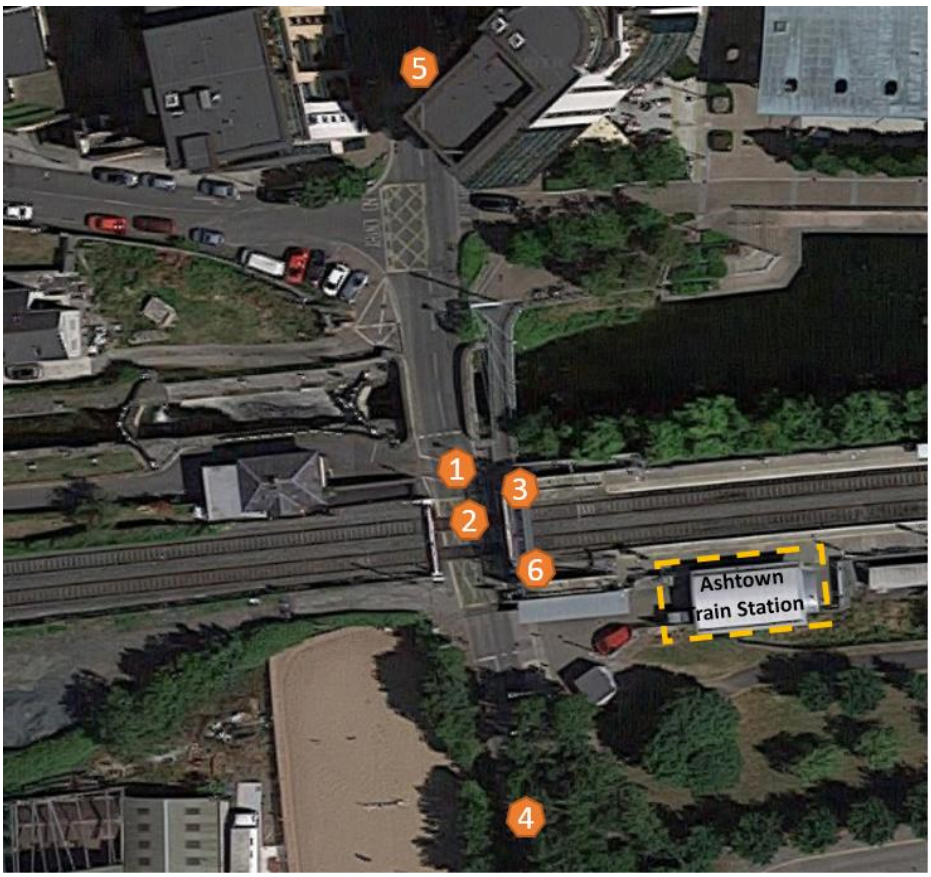


Figure 1. Ashtown Level Crossing

ASHTOWN LEVEL CROSSING - PHOTOS

PHOTO 1 - Footpath markings for level crossing

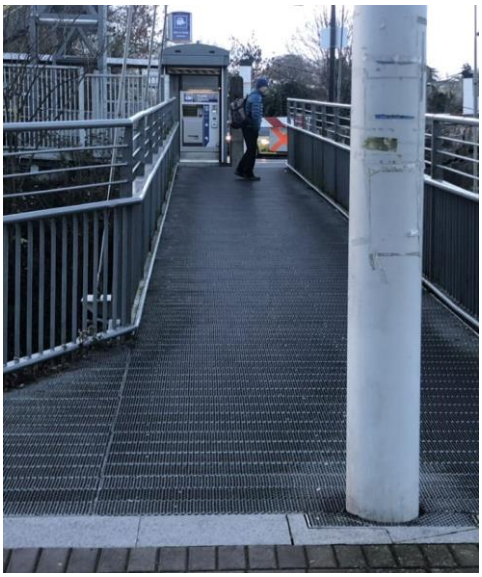


PHOTO 2 - Walkway over the canal

PHOTO 3 - Level crossing and access to train station

PHOTO 4 - Access from southern approach

PHOTO 5 - Road approaching the level crossing from the north

PHOTO 6 - Footbridge connecting both platforms

Sumary of issues identified for pedestrian / cylists:

- To cross the level crossings, pedestrian and cyclist have to share the road space with the general traffic. The path provided for pedestrians is narrow (approx. 1.5m) and delineated by road markings. Also, it must accommodate all users, i.e. pedestrian, cyclist, wheelchair users, pushchairs, etc.;
- The existing footbridge within the land ownership of Irish Rail doesn't provide ramps/lifts, therefore it is not adequate for universal access (wheelchair, cyclists, pushchairs, elderly users, mobility impaired users, etc.);
- Narrow footpath approaching from the south, only on the eastern side. No crossings provided from the Navan Road roundabout junction to the level crossing;
- There are no dedicated cycle facilities. Cyclist must dismount to share the pedestrian paths or must share traffic lanes.

Sumary of issues for general traffic:

- The level crossing is manually operated, creating long queues and increasing the waiting time for vehicles;
- The bridge over the Royal Canal is narrow;
- Inappropriate vertical visibility across the overbridge due to the high crest;
- No car parking / drop off area for accessing the Train Station.

Coolmine Level Crossing

Description

Maynooth railway line crosses Coolmine Road / Carpenterstown Road, with Coolmine on the north and Carpenterstown on the South. The general character around this crossing is low density residential, e.g. detached houses in residential estates. The Royal Canal runs parallel of the railway line on the northern side.

Coolmine train station is located on the eastern side of the Coolmine Road, and south of the railway line. There is a walkway over the canal on the eastern side for pedestrian and cyclists. A footbridge is provided within the Railway line boundary which connects both platforms of the train station.

Coolmine station car park is located south of the station with pedestrian access to the station facilities, the station is equipped of cycle parking as well.

Coolmine Road is a two-way single lane road. The existing road bridge over the canal is very narrow which limits the use for pedestrians and cyclists, the walkway is an appropriate alternative.

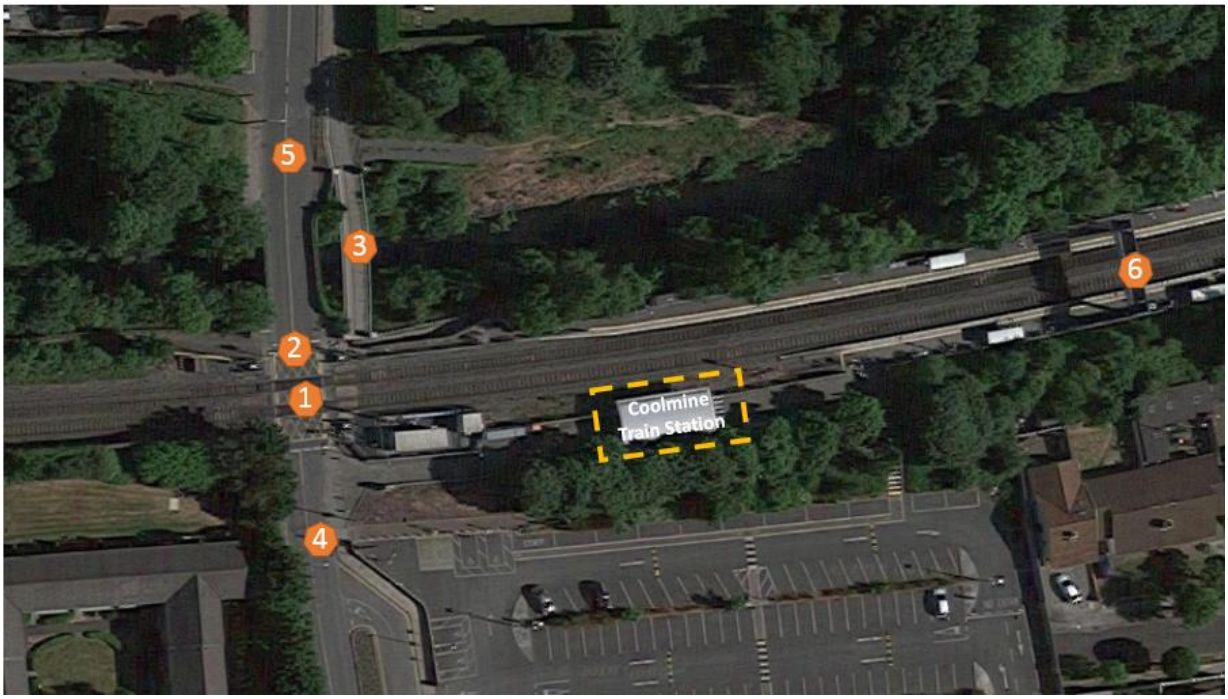


Figure 2. Coolmine Level Crossing

COOLMINE LEVEL CROSSING

PHOTO 1 - Footpath markings for level crossing

PHOTO 2 - Walkway over the canal

PHOTO 3 – Royal Canal Bridge

PHOTO 4 – Carperstown Road and entrance to car park

PHOTO 5 - Road approaching the level crossing from the north

PHOTO 6 - Footbridge connecting both platforms

Sumary of issues identified for pedestrian / cylists:

- To cross the level crossings, pedestrian and cyclist have to share the road space with the general traffic. The path provided for pedestrians is narrow (less than 1m) and delineated by road markings. Also, it must accommodate all users, i.e. pedestrian, cyclist, wheelchair users, pushchairs, etc.
- The existing footbridge within the land ownership of Irish Rail is off the desire line and it doesn't provide ramps/lifts, therefore it is not adequate for universal access (wheelchair, cyclists, pushchairs, elderly users, mobility impairs, etc.)
- Narrow footpath in Carperstown Road (south approach) on the western side, no pedestrian crossing provided from the western footpath to the eastern footpath and to access the train station;
- No pedestrian crossing provided in Coolmine Road (north approach);
- There are no dedicated cycle facilities. Cyclist must dismount to share the pedestrian paths or must share traffic lanes.

Sumary of issues for general traffic:

- Queues and waiting time to cross the level crossing;
- The bridge over the Royal Canal is a narrow protected structure.

Severance of community through closure:

- Following the road closure, the only pedestrian/cyclist connection both sides of the railway line will be the existing footbridge within the Irish Rail land ownership. As indicated previously this footbridge doesn't have universal access and it is off the desire pedestrian line.

Porterstown Level Crossing

Description

Porterstown Road connects Clonsilla Road to the north to Luttrellstown Road to the south. The level crossing is located immediately adjacent to the Royal Canal on the south, the bridge over the canal is narrow, allowing only one car and doesn't provide any pedestrian facilities. In the vicinity, the existing land uses is mixed, including low density residential and St. Mochta's National School to the north of the crossing and St. Mochta's football club, Scoil Choilm Community NS and Luttrellstown Community College to the south.

There is a continuous footpath on the western side approaching from the north to the level crossing, this footpath present a couple of pinch points. The footpath on the eastern side is discontinuous. There are no crossing provided. On the southern approach there is a continuous footpath on the western side very narrow.

Site visit was during day time furthermore the public lighting wasn't assessed. It is anticipated that the existing trees canopies would impede appropriate lighting.

Figure 3. Porterstown Level Crossing

PORTERSTOWN LEVEL CROSSING

PHOTO 1 - Road markings for level crossing

PHOTO 2 – Road south of the level crossing, footpath on the western side only

PHOTO 3 – Royal Canal Bridge

PHOTO 4 – Level crossing from the south side

PHOTO 5 – Narrow footpath on the western side of Porterstown Road

PHOTO 6 – Level crossing approaching from the south

Sumary of issues identified for pedestrian / cylists:

- To cross the level crossings, pedestrian and cyclist have to share the road space with the general traffic. There is no dedicated pedestrian path on the level crossing;
- The Royal Canal overbridge is very narrow, there are no pedestrian or cyclist facilities provided;
- Narrow and discontinuous footpaths approaching from the north and the south, no pedestrian crossings provided;
- There are no dedicated cycle facilities.

Sumary of issues for general traffic:

- The bridge over the Royal Canal is very narrow, allowing only one car. No road signs provided warning drivers of the narrow bridge ahead and regulating the give way.

Severance of community through closure:

- Following the road closure, the nearest pedestrian connection is along Porterstown/Diswellstown viaduct 200 metres to the east of the level crossing. Pedestrian and cyclist facilities are provided along this road.

Clonsilla Level Crossing

Description

Clonsilla level crossing is located in Clonsilla Road (R121) adjacent to Clonsilla Train Station and the Royal Canal. The train station is located north-west of the crossing.

There is a walkway over the Royal Canal on the western side. The approach roads from the north provide appropriate footpaths and crossings, as well as cycle lanes up to the junction. There is a cycle parking on the traffic lights junction and in the train station premises.

The south side of the crossing, there is a continuous footpath on the western side only, this footpath is narrow and presents street furniture obstructions, e.g. posts, road signs.

There is no provision of footpaths along the crossing, where pedestrian have to share the road space.

Within the railway station there are two footbridges to connect both platforms, footbridge closer to platform 3 (Photo 7) has lifts and furthermore universal access.

The land uses around the trains station is predominantly residential, Beechpark is located south of the crossing and the Church on the North.

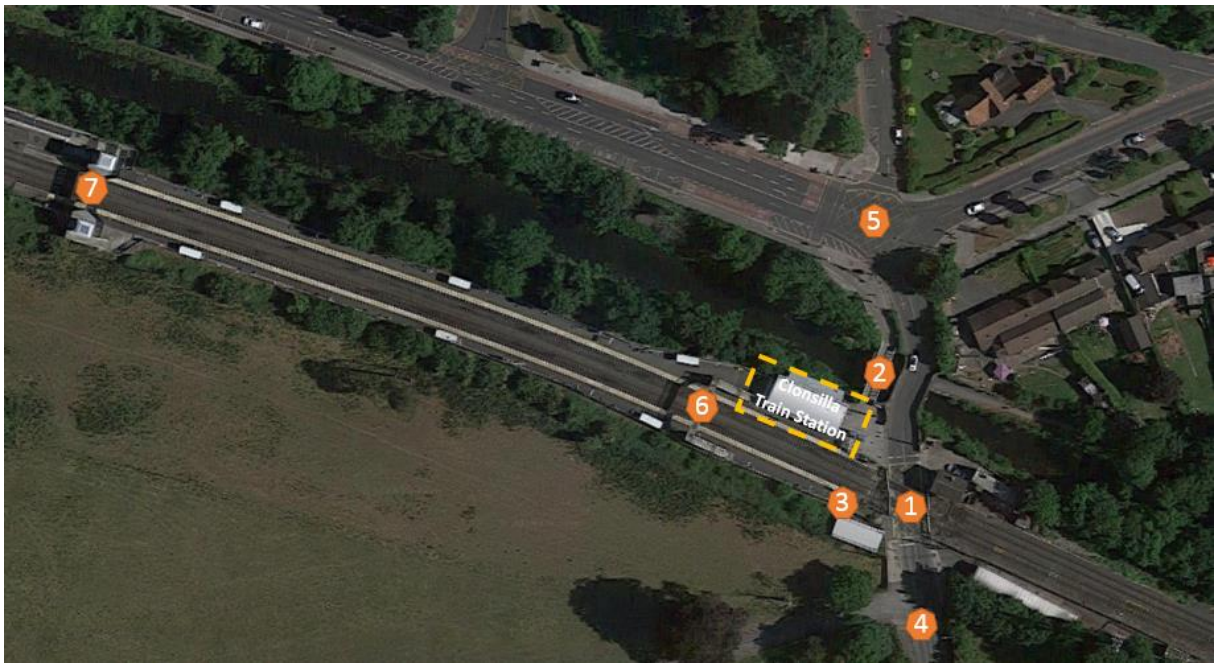


Figure 4. Clonsilla Level Crossing

CLONSILLA LEVEL CROSSING

PHOTO 1 - Road markings for level crossing

PHOTO 2 – Walkway over the Royal Canal

PHOTO 3 – Access to the south platform

PHOTO 4 – Road approaching the level crossing from the south

PHOTO 5 – Main Junction in Clonsilla Road

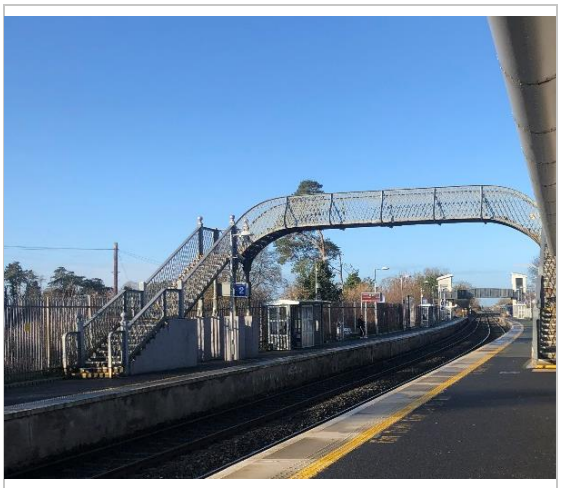


PHOTO 6 - Footbridge connecting both platforms

PHOTO 7 - Footbridge connecting both platforms with lifts.

Sumary of issues identified for pedestrian / cylists:

- To cross the level crossings, pedestrian and cyclist have to share the road space with the general traffic. There is no dedicated pedestrian path on the crossing. Also, it must accommodate all users, i.e. pedestrian, cyclist, wheelchair users, pushchairs, etc.;
- The existing footbridge beside the train station doesn't provide ramps/lifts, therefore it is not adequate for universal access (wheelchair, cyclists, pushchairs, elderly users, mobility impairs, etc.);

- There is another footbridge with universal access located approximately 185m off the desire line.
- Narrow footpath only on the eastern side approaching from the south. This footpath presents obstructions, e.g. lamp posts, road signs, etc.
- There are no dedicated cycle facilities. Cyclist must dismount to share the pedestrian paths or must share traffic lanes.

Sumary of issues for general traffic:

- The bridge over the Royal Canal is narrow;
- Due to the overbridge high crest the required forward visibility is not provided;
- No car parking / drop off area for accessing the Train Station.

Severance of community through closure:

- Following the road closure, the only pedestrian/cyclist connection both sides of the railway line will be the existing footbridges within the Irish Rail land ownership. As indicated previously the footbridge beside the train station doesn't have universal access, and the one situated on the eastern side which provides universal access is off the desire line by 185m.

Barberstown Level Crossing

Description

Barberstown level crossing is located approximately 1.2 kilometres east from Clonsilla train station, and adjacent to the Royal Canal. The Maynooth rail line crosses Milestown Road, which is a local road linking the R121 and R149.

The lands around the level crossing are predominantly rural. There was not observed pedestrian/cyclist activity along this area for different reasons, one being the remote location of the crossing and other the no provision of pedestrian and cyclist facilities.

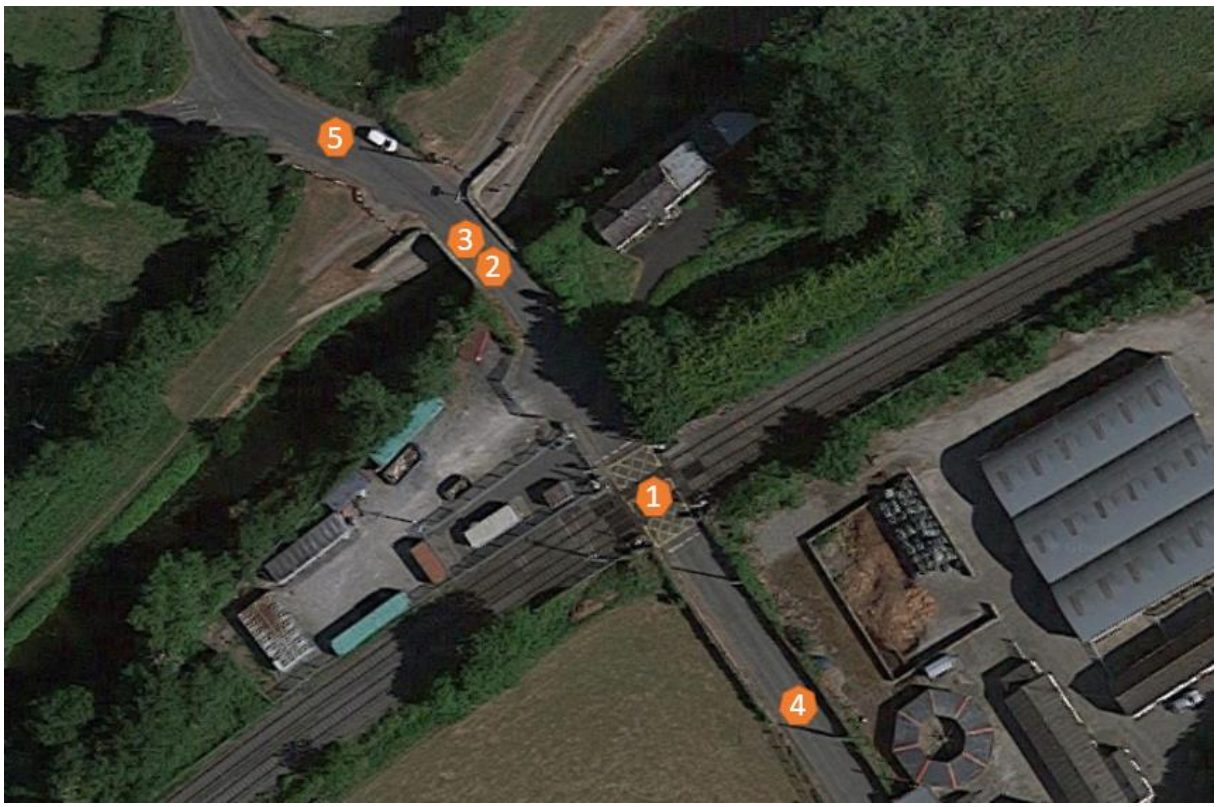


Figure 5. Barberstown Level Crossing

BARBERSTOWN LEVEL CROSSING

PHOTO 1 - Road markings for level crossing

PHOTO 2 – Bridge Royal Canal

PHOTO 3 – Road approaching the level crossing from the south

PHOTO 4 – Road approaching the level crossing from the south

PHOTO 5 – Norther junction approach

PHOTO 6 – Access to Royal Canal

Sumary of issues identified for pedestrian / cylists:

- To cross the level crossings, pedestrian and cyclist have to share the road space with the general traffic. There is no dedicated pedestrian path on the level crossing;
- The Royal Canal overbridge is very narrow, the existing pedestrian facilities are sub-standard, i.e. narrow, no dropped kerbs, etc;
- No pedestrian facilities along Milestown Road, neither approaching from the north or the south;
- No pedestrian facilities approaching from the south
- There are no dedicated cycle facilities.

Sumary of issues for general traffic:

- Inappropriate vertical visibility across the overbridge due to the high crest;

Severance of community through closure:

- Following the road closure, the nearest pedestrian connection is along Westmanstown overbridge, situated approximately 2 kilometres of Barberstown level crossing. Westmanstown overbridge is narrow and no footpaths are provided.

Blakestown Level Crossing

Description

Blakestown level crossing is located approximately 800m east from M4 Celbridge Junction, and adjacent to the Royal Canal. The crossing serves a small community to the south of the railway as the main traffic uses the Celbridge link road.

The lands around the level crossing are predominantly rural. There was not observed pedestrian/cyclist activity along this area for different reasons, one being the remote location of the crossing and other the no provision of pedestrian and cyclist facilities.

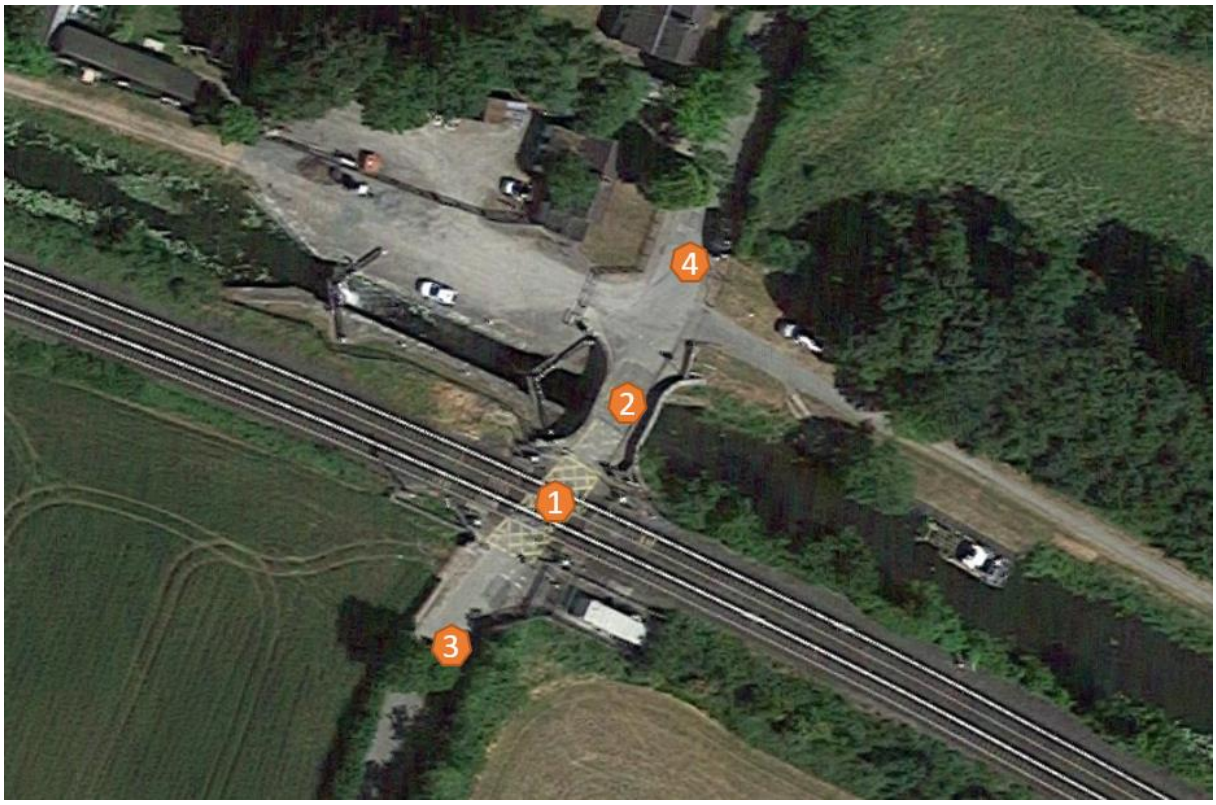


Figure 6. Blakestown Level Crossing

BLAKESTOWN LEVEL CROSSING

PHOTO 1 - Road markings for level crossing

PHOTO 2 – Bridge Royal Canal

PHOTO 3 – Road approching from the south

PHOTO 4 – Road approaching from the north

Sumary of issues identified for pedestrian / cylists:

- To cross the level crossings, pedestrian and cyclist have to share the road space with the general traffic. There is no dedicated pedestrian path on the level crossing;
- The Royal Canal overbridge is very narrow, the existing pedestrian facilities are sub-standard, i.e. narrow, no dropped kerbs, etc;
- No pedestrian facilities along the L81206 road, neither approaching from the north or the south;
- There are no dedicated cycle facilities.

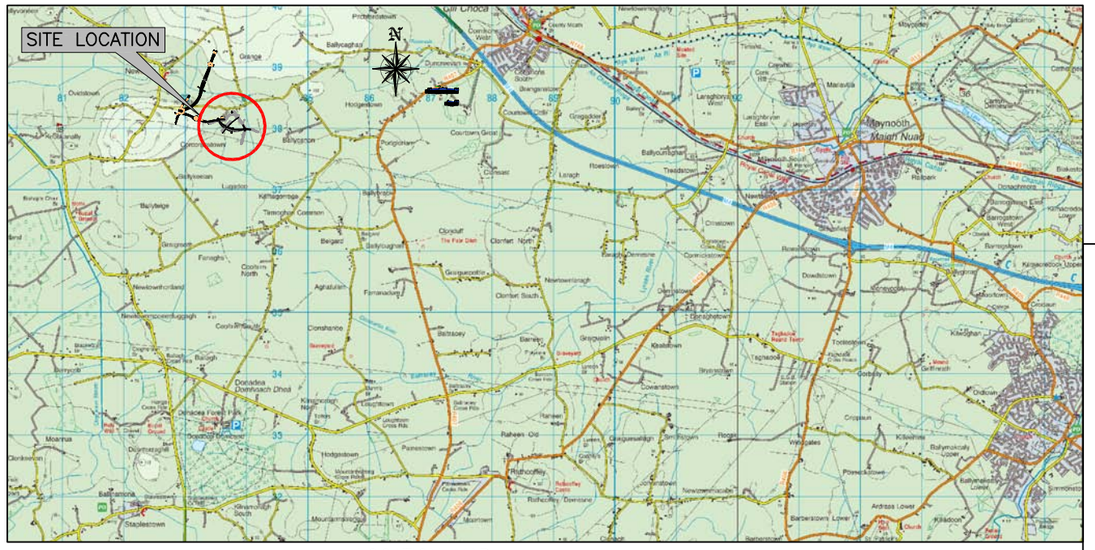
Sumary of issues for general traffic:

- Existing road surface in bad conditions;
- Road approaching from the south is very narrow.

Severance of community through closure:

- Following the road closure, the nearest pedestrian connection is along the R449 overbridge, situated less than 1km east of Blakestown level crossing. This overbridge provides pedestrian and cyclist facilities.

Appendix C – Potential Replacement Infrastructure Preliminary Design Drawings



LOCATION MAP
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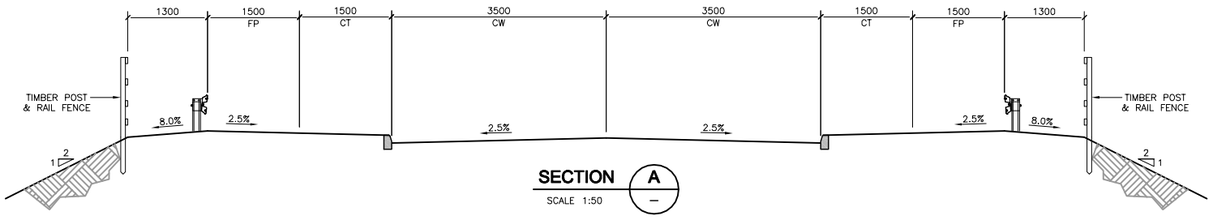
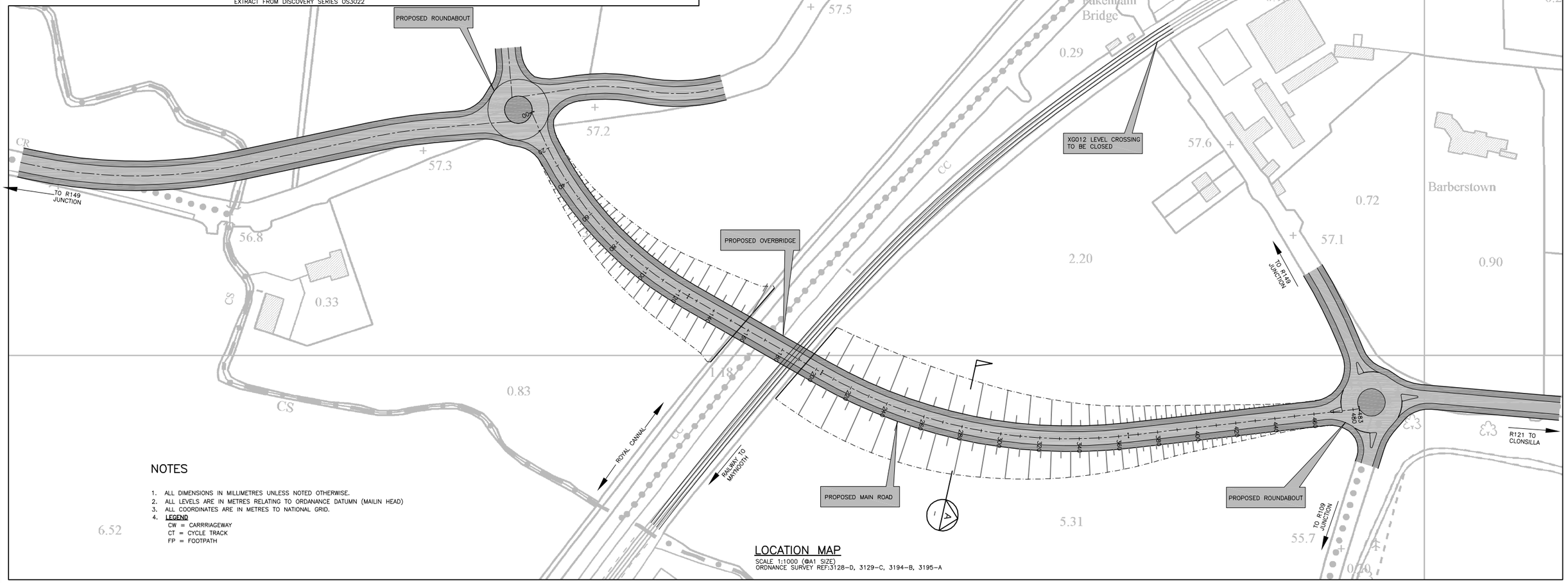
EXTRACT FROM DISCOVERY SERIES OS3022



SECTION A
SCALE 1:50



LOCATION MAP
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NOTES

1. ALL DIMENSIONS IN MILLIMETRES UNLESS NOTED OTHERWISE.
2. ALL LEVELS ARE IN METRES RELATING TO ORDANANCE DATUMN (MAILIN HEAD)
3. ALL COORDINATES ARE IN METRES TO NATIONAL GRID.
4. LEGEND
   CW = CARRRIAGEWAY
   CT = CYCLE TRACK
   FP = FOOTPATH

No.	Revision	Date	By	Chk'd	App'd
	Stage		Date		App'd
	PRELIMINARY				
	APPROVAL				
	TENDER				
	CONSTRUCTION				

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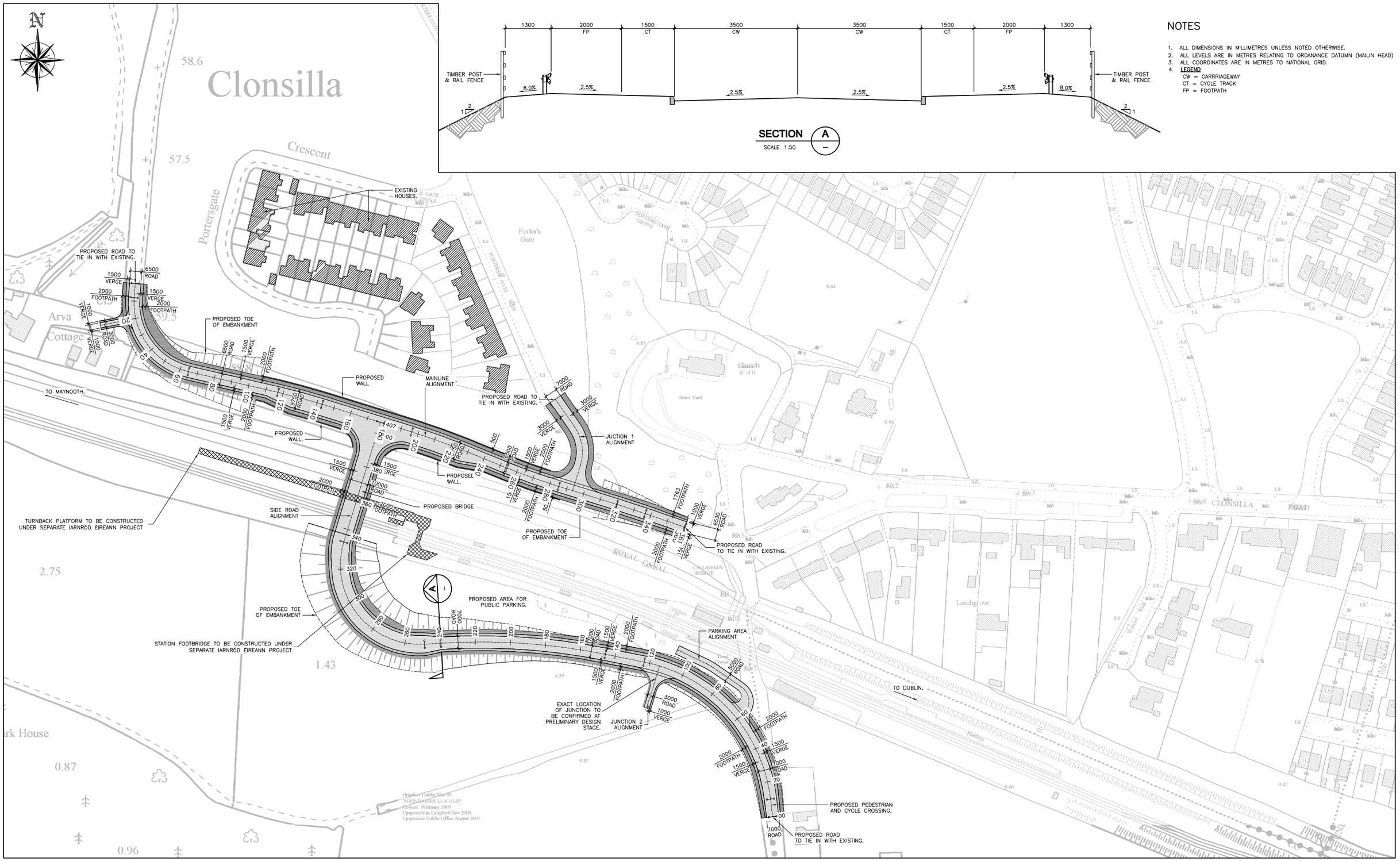
Designed: TK	Checked: AOK	Approved: M.K	Status: OPTION SELECTION		

Project Title: MAYNOOTH LINE RAILWAY ORDER
CLOSURE OF XG012
BARBERSTOWN, CO. DUBLIN

Drawing Title: ALIGNMENT OPTION 4
PLAN ALIGNMENT SHEET 1 OF 2

Drawn:	Job No:	Drawing No:	Rev:
TK	10.216	XG012-OP-401	A
Scale: (A1) AS SHOWN	Date: FEB. 2011		

DO NOT SCALE USE FIGURED DIMENSIONS ONLY



SECTION A
SCALE 1:50

NOTES

1. ALL DIMENSIONS IN MILLIMETRES UNLESS NOTED OTHERWISE.
2. ALL LEVELS ARE IN METRES RELATING TO ORDANANCE DATUMN (MAILIN HEAD)
3. ALL COORDINATES ARE IN METRES TO NATIONAL GRID.
4. **LEGEND**
   CW = CARRRIAGEWAY
   CT = CYCLE TRACK
   FP = FOOTPATH

No.	Revision	Date	By	Chk'd	App'd
A	UPDATE PROPOSED ALIGNMENT ON SURVEY LEVELS	DEC '11	S.B	AOK	M.K

Stage	Date	App'd
PRELIMINARY		
APPROVAL		
TENDER		
CONSTRUCTION		

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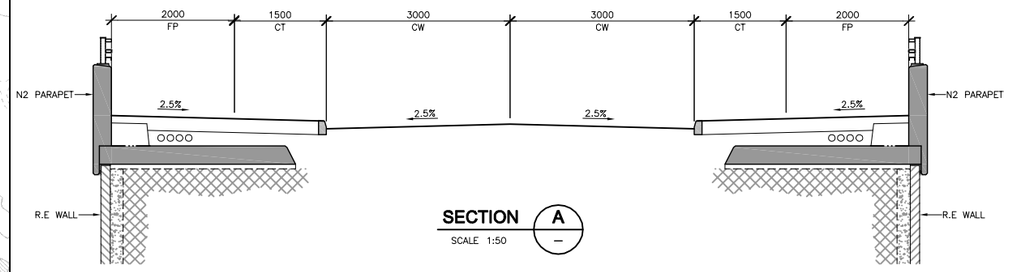
Designed: M.H	Checked: AOK	Approved: M.K	Status: OPTION SELECTION	

Project Title	MAYNOOTH RAILWAY ORDER CLOSURE OF XG010 CLONSILLA, CO. DUBLIN		
Drawing Title	ALIGNMENT OPTION 4 PLAN ALIGNMENT		
Drawn: S.B	Job No: 10.216	Drawing No: XG010-OP-401	Rev: A
Scale: (A1) 1:1000	Date: OCT. '11		



SECTION A
SCALE 1:50

NOTES

1. ALL DIMENSIONS IN MILLIMETRES UNLESS NOTED OTHERWISE.
2. ALL LEVELS ARE IN METRES RELATING TO ORDANANCE DATUMN (MAILIN HEAD)
3. ALL COORDINATES ARE IN METRES TO NATIONAL GRID.
4. **LEGEND**
   CW = CARRRIAGEWAY
   CT = CYCLE TRACK
   FP = FOOTPATH

PROPOSED ALTERNATIVE ACCESS
TIE–IN TO EXISTING ROAD
TIE–IN TO EXISTING ROAD
7200 ROAD
TIE–IN TO EXISTING ROAD
PROPOSED ALTERNATIVE ACCESS
PROPOSED ROUDABOUT
PROPOSED OVERBRIDGE
TIE–IN TO EXISTING ROAD
9000 ROAD
PROPOSED ACCESS TO APPARTMENTS
PROPOSED ALTERNATIVE ACCESS
FOOTBRIDGE TO BE PROVIDED AS PART OF SCHEME
PROPOSED MAIN ROAD
TIE–IN TO EXISTING ROAD
PROPOSED ACCESS ROAD
PROPOSED ACCESS ROAD
7000 ROAD
Riverwood Hall
St Mochta's Green
Rockfield Court

NDP National Development Plan 2007 - 2013

Iarnród Éireann

Údarás Náisiúnta Iompair National Transport Authority

An Roinn Iompair Turasóireachta agus Spóirt Department of Transport, Tourism and Sport

No.	Revision	Date	By	Chk'd	App'd
	Stage		Date		App'd
	PRELIMINARY				
	APPROVAL				
	TENDER				
	CONSTRUCTION				

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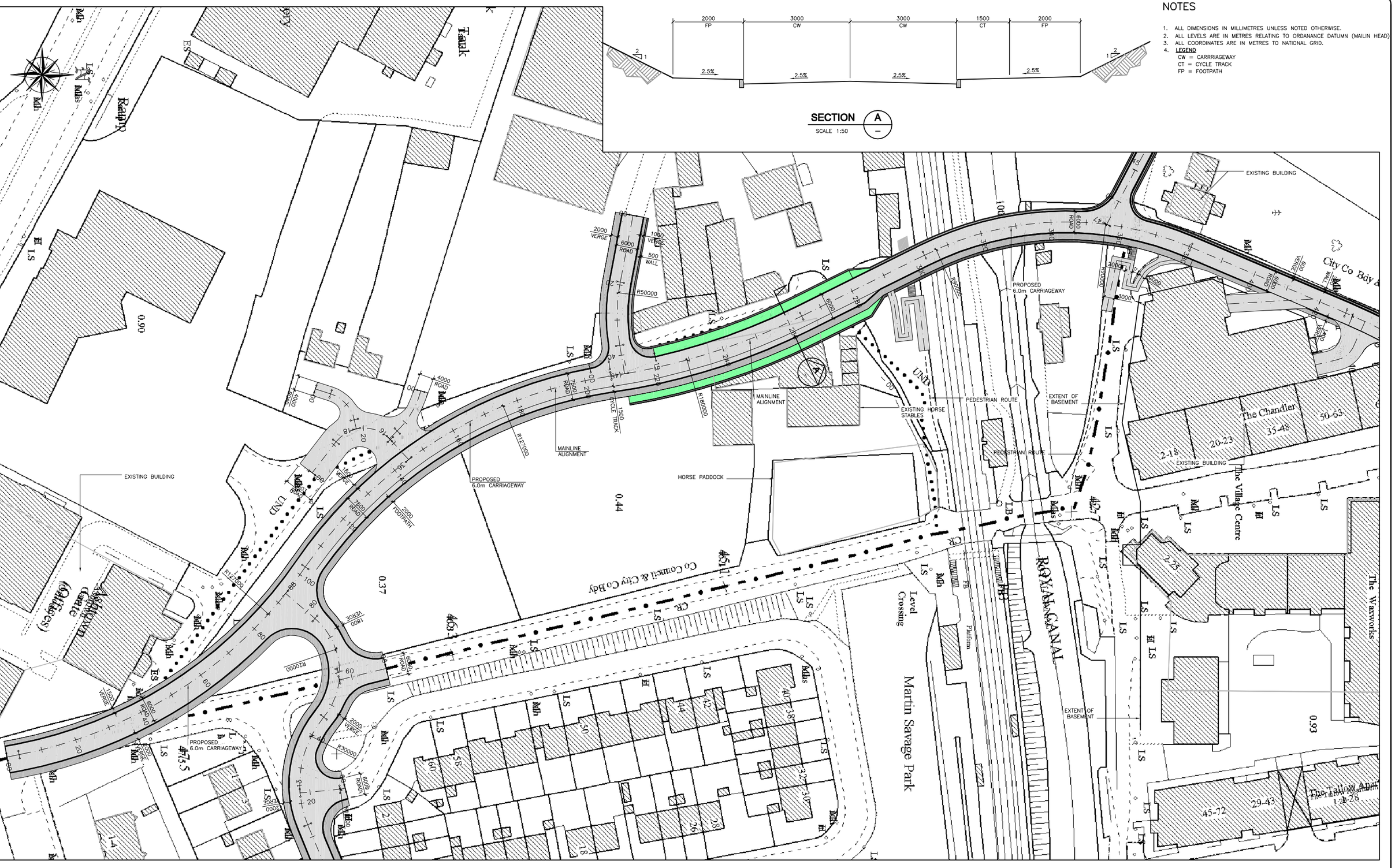
Designed: TK | Checked: AOK | Approved: M.K | Status: OPTIONS SELECTION

Project Title: MAYNOOTH LINE RAILWAY ORDER
CLOSURE OF XG006
COOLMINE, Co. DUBLIN

Drawing Title: ALIGNMENT OPTION 3
PLAN ALIGNMENT

Drawn: TK | Job No: 10.216 | Drawing No: XG006-OP-301 | Rev: B
Scale: (A1) 1:1000 | Date: OCT. '11

DO NOT SCALE USE FIGURED DIMENSIONS ONLY



National Development Plan 2007 - 2013
Iarnród Éireann
Údarás Náisiúnta Iompair National Transport Authority
An Roinn Iompair Turasóireachta agus Spóirt Department of Transport, Tourism and Sport

No.	Revision	Date	By	Chk'd	App'd
Stage		Date			App'd
PRELIMINARY					
APPROVAL					
TENDER					
CONSTRUCTION					

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Designed: S.B | Checked: AOK | Approved: M.K | Status: OPTION SELECTION

Project Title: MAYNOOTH LINE RAILWAY ORDER
CLOSURE OF XG004
ASHTOWN , CO. DUBLIN

Drawing Title: ALIGNEMENT OPTION 2
PLAN ALIGNMENT

Drawn:	Job No:	Drawing No:	Rev:
S.B	10.216	XG004-OP-201	B
Scale: (A1) 1:500	Date: OCT '11		

DO NOT SCALE USE FIGURED DIMENSIONS ONLY

Appendix D – V/C Results

Introduction

Table 2 and Table 3 below outline the demand weighted average, and maximum, volume over capacity for each of the junctions illustrated in Figure 7.

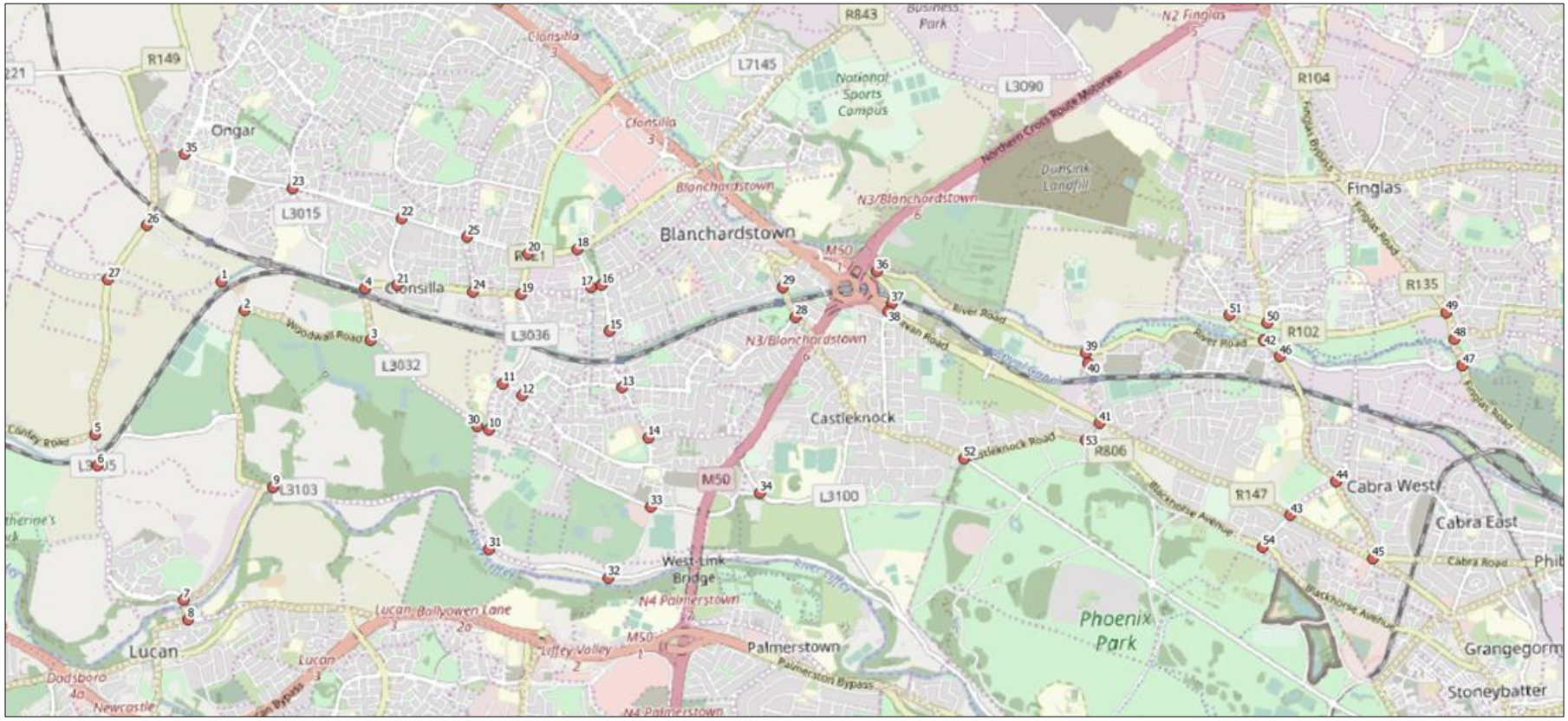

Figure 7. Volume Over Capacity Junctions

AM Peak V/C results by junctions

Table 2. AM Peak V/C results by junctions (%)

Junction	Do Min Avg. V/C	Do Min Max V/C	Scenario 1 Avg. V/C	Scenario 1 Max V/C	Scenario 2 Avg. V/C	Scenario 2 Max V/C	Scenario 3 Avg. V/C	Scenario 3 Max V/C	Scenario 4 Avg. V/C	Scenario 4 Max V/C	Scenario 5 Avg. V/C	Scenario 5 Max V/C	Scenario 6 Avg. V/C	Scenario 6 Max V/C	Scenario 7 Avg. V/C	Scenario 7 Max V/C
1	0	0	26	46	0	0	0	0	26	46	26	46	0	0	26	46
2	31	35	54	103	35	37	35	36	52	101	54	100	39	39	52	100
3	24	38	56	85	45	105	32	46	58	103	65	96	45	101	64	101
4	72	77	66	68	63	90	72	74	58	85	65	69	62	90	55	79
5	76	134	59	127	63	130	64	131	56	124	56	124	60	128	55	124
6	63	89	40	56	56	96	61	105	41	71	45	86	58	103	46	90
7	118	125	115	118	117	121	118	123	116	119	116	118	117	122	116	119
8	93	106	94	106	93	106	93	106	92	106	93	106	93	106	92	106

Junction	Do Min Avg. V/C	Do Min Max V/C	Scenario 1 Avg. V/C	Scenario 1 Max V/C	Scenario 2 Avg. V/C	Scenario 2 Max V/C	Scenario 3 Avg. V/C	Scenario 3 Max V/C	Scenario 4 Avg. V/C	Scenario 4 Max V/C	Scenario 5 Avg. V/C	Scenario 5 Max V/C	Scenario 6 Avg. V/C	Scenario 6 Max V/C	Scenario 7 Avg. V/C	Scenario 7 Max V/C
9	27	46	23	39	26	45	31	57	25	40	25	44	28	51	25	41
10	43	64	79	99	46	68	49	62	68	95	74	97	43	63	75	98
11	96	117	93	107	90	105	68	95	91	106	78	98	66	97	77	98
12	34	51	38	58	40	60	20	28	41	63	19	27	19	26	18	27
13	42	60	43	63	43	61	56	72	43	62	58	75	56	72	56	73
14	13	24	12	23	12	23	18	28	12	22	17	28	17	28	16	28
15	22	24	23	26	21	23	22	27	23	26	25	31	23	28	25	31
16	41	55	42	57	41	54	46	58	42	56	48	61	45	57	49	61
17	32	48	33	46	28	36	61	94	31	41	62	95	58	91	63	96
18	54	72	54	73	56	73	74	92	56	74	71	88	72	90	71	89

Junction	Do Min Avg. V/C	Do Min Max V/C	Scenario 1 Avg. V/C	Scenario 1 Max V/C	Scenario 2 Avg. V/C	Scenario 2 Max V/C	Scenario 3 Avg. V/C	Scenario 3 Max V/C	Scenario 4 Avg. V/C	Scenario 4 Max V/C	Scenario 5 Avg. V/C	Scenario 5 Max V/C	Scenario 6 Avg. V/C	Scenario 6 Max V/C	Scenario 7 Avg. V/C	Scenario 7 Max V/C
19	64	93	63	93	57	87	58	90	60	90	55	87	49	77	52	83
20	44	101	43	100	43	100	43	100	44	100	43	99	42	97	43	98
21	47	73	43	59	40	78	49	87	41	51	44	65	44	90	43	67
22	69	94	68	92	65	89	65	91	66	88	64	87	60	86	60	84
23	82	95	77	93	86	105	83	97	76	90	75	89	85	104	75	88
24	73	96	68	90	60	78	74	98	68	89	69	91	61	82	69	90
25	24	38	24	37	24	44	24	34	25	46	23	35	22	35	22	39
26	14	17	25	34	13	15	12	16	21	29	23	34	13	15	20	28
27	41	106	41	104	40	104	40	104	41	102	41	103	40	104	41	102
28	77	125	78	114	76	113	61	103	76	111	61	103	61	103	61	105

Junction	Do Min Avg. V/C	Do Min Max V/C	Scenario 1 Avg. V/C	Scenario 1 Max V/C	Scenario 2 Avg. V/C	Scenario 2 Max V/C	Scenario 3 Avg. V/C	Scenario 3 Max V/C	Scenario 4 Avg. V/C	Scenario 4 Max V/C	Scenario 5 Avg. V/C	Scenario 5 Max V/C	Scenario 6 Avg. V/C	Scenario 6 Max V/C	Scenario 7 Avg. V/C	Scenario 7 Max V/C
29	49	65	51	67	51	65	42	55	51	67	43	57	43	56	41	54
30	20	25	31	40	22	28	23	28	30	38	30	39	23	30	32	41
31	30	37	27	32	25	32	28	35	27	36	25	32	24	31	25	37
32	36	53	43	59	36	45	38	59	39	48	40	54	37	47	40	52
33	16	21	13	20	15	19	18	28	15	18	14	23	14	22	14	22
34	62	97	55	89	57	91	46	73	56	90	48	77	47	75	47	77
35	29	53	29	54	24	45	25	49	22	40	26	51	23	46	20	38
36	43	53	33	47	32	47	34	49	31	46	34	48	33	47	56	68
37	90	110	68	99	71	100	70	99	74	103	71	99	71	99	68	96
38	74	107	65	104	64	103	61	96	63	101	60	96	60	95	65	105

Junction	Do Min Avg. V/C	Do Min Max V/C	Scenario 1 Avg. V/C	Scenario 1 Max V/C	Scenario 2 Avg. V/C	Scenario 2 Max V/C	Scenario 3 Avg. V/C	Scenario 3 Max V/C	Scenario 4 Avg. V/C	Scenario 4 Max V/C	Scenario 5 Avg. V/C	Scenario 5 Max V/C	Scenario 6 Avg. V/C	Scenario 6 Max V/C	Scenario 7 Avg. V/C	Scenario 7 Max V/C
39	16	20	12	20	12	20	13	20	12	20	13	20	13	21	21	27
40	23	26	48	62	48	63	47	61	48	64	48	64	48	64	27	30
41	60	86	66	101	65	101	64	101	66	101	64	101	64	101	59	86
42	29	72	39	90	39	88	39	90	39	89	40	90	39	89	33	80
43	86	101	78	100	78	99	78	100	78	99	78	99	78	100	86	102
44	91	103	86	102	86	102	86	102	86	102	86	102	86	102	92	102
45	33	53	28	41	27	41	27	39	27	42	27	40	27	41	32	49
46	86	101	81	100	81	100	80	100	80	100	81	100	80	99	86	100
47	69	96	67	93	68	92	68	93	67	92	67	91	68	92	69	94
48	83	99	82	99	81	98	79	98	80	98	79	98	80	98	82	97

Junction	Do Min Avg. V/C	Do Min Max V/C	Scenario 1 Avg. V/C	Scenario 1 Max V/C	Scenario 2 Avg. V/C	Scenario 2 Max V/C	Scenario 3 Avg. V/C	Scenario 3 Max V/C	Scenario 4 Avg. V/C	Scenario 4 Max V/C	Scenario 5 Avg. V/C	Scenario 5 Max V/C	Scenario 6 Avg. V/C	Scenario 6 Max V/C	Scenario 7 Avg. V/C	Scenario 7 Max V/C
49	78	94	77	92	77	92	77	91	77	92	76	92	76	92	76	95
50	25	40	28	42	28	42	28	42	28	42	28	42	28	42	27	43
51	71	102	74	110	74	108	74	108	74	109	74	108	74	108	71	102
52	77	100	72	98	67	96	57	91	65	95	58	89	58	90	55	89
53	79	101	88	100	87	100	86	98	88	100	87	97	85	97	75	100
54	67	77	66	75	66	75	66	76	66	76	66	76	66	76	68	79

PM PEAK V/C RESULTS BY JUNCTIONS

Table 3. PM Peak V/C results by junctions (%)

Junction	Do Min Avg. V/C	Do Min Max V/C	Scenario 1 Avg. V/C	Scenario 1 Max V/C	Scenario 2 Avg. V/C	Scenario 2 Max V/C	Scenario 3 Avg. V/C	Scenario 3 Max V/C	Scenario 4 Avg. V/C	Scenario 4 Max V/C	Scenario 5 Avg. V/C	Scenario 5 Max V/C	Scenario 6 Avg. V/C	Scenario 6 Max V/C	Scenario 7 Avg. V/C	Scenario 7 Max V/C
1	0	0	29	37	0	0	0	0	24	32	30	43	0	0	27	39
2	36	39	51	74	38	38	38	40	47	65	57	85	40	41	52	78
3	27	38	45	59	31	64	31	37	46	83	53	68	31	55	50	89
4	74	102	65	91	78	103	70	99	74	100	59	84	72	101	68	93
5	74	111	60	107	68	110	68	110	57	106	59	107	63	110	57	107
6	50	108	38	79	48	107	52	113	38	85	46	101	50	112	45	101
7	86	101	81	101	85	102	86	107	83	98	87	102	86	106	88	103
8	102	111	98	107	102	111	101	110	99	109	99	107	101	110	98	106
9	33	68	30	60	39	77	42	82	33	64	27	53	42	81	31	64

Junction	Do Min Avg. V/C	Do Min Max V/C	Scenario 1 Avg. V/C	Scenario 1 Max V/C	Scenario 2 Avg. V/C	Scenario 2 Max V/C	Scenario 3 Avg. V/C	Scenario 3 Max V/C	Scenario 4 Avg. V/C	Scenario 4 Max V/C	Scenario 5 Avg. V/C	Scenario 5 Max V/C	Scenario 6 Avg. V/C	Scenario 6 Max V/C	Scenario 7 Avg. V/C	Scenario 7 Max V/C
10	39	59	38	58	35	52	36	48	35	53	32	44	28	38	30	40
11	87	112	86	108	84	108	68	98	85	107	78	97	60	94	78	98
12	30	47	32	49	31	49	13	22	33	50	18	31	12	18	16	27
13	27	36	28	37	28	36	43	55	28	36	43	55	41	53	43	57
14	9	17	8	17	9	17	18	28	8	16	17	27	17	28	17	28
15	23	27	23	28	21	25	29	34	21	24	31	36	27	32	28	33
16	41	47	43	49	41	47	51	63	42	49	54	65	51	62	53	66
17	43	75	46	79	43	74	60	93	43	75	61	94	58	92	59	93
18	63	90	63	90	63	90	74	97	61	88	71	97	71	96	71	97
19	52	84	49	76	47	72	42	64	47	69	39	58	39	60	37	61

Junction	Do Min Avg. V/C	Do Min Max V/C	Scenario 1 Avg. V/C	Scenario 1 Max V/C	Scenario 2 Avg. V/C	Scenario 2 Max V/C	Scenario 3 Avg. V/C	Scenario 3 Max V/C	Scenario 4 Avg. V/C	Scenario 4 Max V/C	Scenario 5 Avg. V/C	Scenario 5 Max V/C	Scenario 6 Avg. V/C	Scenario 6 Max V/C	Scenario 7 Avg. V/C	Scenario 7 Max V/C
20	43	66	43	67	43	66	43	69	42	66	40	61	42	65	40	61
21	34	44	28	36	24	32	30	38	23	32	21	25	22	30	17	22
22	69	102	68	102	67	100	69	100	68	101	67	99	67	100	67	99
23	72	107	70	100	75	106	72	105	70	100	65	94	74	101	64	91
24	49	71	38	57	33	49	46	67	33	49	34	50	32	48	26	38
25	27	37	27	38	27	37	27	37	27	39	25	36	27	37	25	38
26	10	13	31	51	11	13	10	14	26	46	34	58	10	13	29	51
27	39	78	35	54	35	66	36	68	31	48	33	50	33	62	30	46
28	92	123	99	121	96	120	81	106	98	120	82	106	78	105	76	106
29	44	66	46	73	46	74	47	79	45	72	48	81	46	77	44	70

Junction	Do Min Avg. V/C	Do Min Max V/C	Scenario 1 Avg. V/C	Scenario 1 Max V/C	Scenario 2 Avg. V/C	Scenario 2 Max V/C	Scenario 3 Avg. V/C	Scenario 3 Max V/C	Scenario 4 Avg. V/C	Scenario 4 Max V/C	Scenario 5 Avg. V/C	Scenario 5 Max V/C	Scenario 6 Avg. V/C	Scenario 6 Max V/C	Scenario 7 Avg. V/C	Scenario 7 Max V/C
30	18	22	18	22	16	21	14	18	17	25	16	23	14	19	15	20
31	22	27	14	19	17	22	15	19	16	21	14	19	14	17	17	24
32	17	24	20	26	19	26	15	19	21	28	18	25	18	23	20	26
33	13	16	15	21	13	18	10	18	17	24	12	15	10	15	13	18
34	40	61	43	62	40	60	39	57	45	62	43	64	39	59	48	68
35	29	59	33	68	27	55	27	56	26	54	30	64	26	52	25	52
36	35	50	22	35	21	33	21	31	19	31	20	32	20	31	38	52
37	89	110	45	57	44	56	43	52	42	54	42	51	42	51	74	103
38	69	107	67	106	67	107	66	102	66	106	66	102	66	101	67	104
39	15	24	14	32	14	31	13	30	14	34	13	31	13	30	16	24

Junction	Do Min Avg. V/C	Do Min Max V/C	Scenario 1 Avg. V/C	Scenario 1 Max V/C	Scenario 2 Avg. V/C	Scenario 2 Max V/C	Scenario 3 Avg. V/C	Scenario 3 Max V/C	Scenario 4 Avg. V/C	Scenario 4 Max V/C	Scenario 5 Avg. V/C	Scenario 5 Max V/C	Scenario 6 Avg. V/C	Scenario 6 Max V/C	Scenario 7 Avg. V/C	Scenario 7 Max V/C
40	21	23	60	91	61	91	58	89	60	92	61	90	59	89	22	23
41	60	119	73	132	73	133	70	135	73	133	66	127	69	132	56	113
42	22	25	27	52	27	54	26	49	27	52	25	48	26	50	21	24
43	99	110	96	100	96	100	96	102	96	100	96	101	97	102	98	113
44	76	102	71	90	73	96	70	92	73	95	72	95	73	100	76	102
45	49	95	48	93	49	93	49	92	46	93	49	93	49	93	48	94
46	86	104	89	105	88	104	88	104	88	103	87	104	86	105	85	103
47	72	100	77	98	72	97	74	99	74	98	71	96	73	99	73	99
48	44	59	45	67	45	65	45	66	45	68	45	66	45	65	45	59
49	70	90	71	94	73	95	72	94	70	92	72	94	72	94	70	90

Junction	Do Min Avg. V/C	Do Min Max V/C	Scenario 1 Avg. V/C	Scenario 1 Max V/C	Scenario 2 Avg. V/C	Scenario 2 Max V/C	Scenario 3 Avg. V/C	Scenario 3 Max V/C	Scenario 4 Avg. V/C	Scenario 4 Max V/C	Scenario 5 Avg. V/C	Scenario 5 Max V/C	Scenario 6 Avg. V/C	Scenario 6 Max V/C	Scenario 7 Avg. V/C	Scenario 7 Max V/C
50	21	37	22	40	23	43	23	43	23	42	23	42	23	42	21	36
51	50	66	54	74	55	78	53	75	53	71	52	71	53	75	51	66
52	73	97	77	98	74	97	68	94	79	99	74	98	69	95	71	97
53	32	59	25	49	23	42	19	30	26	52	21	36	19	32	31	65
54	25	31	26	32	26	33	26	33	26	32	25	32	26	32	25	32