



## **APPENDIX 3-1**

### **TRAFFIC AND TRANSPORT ASSESSMENT**





# Knocknacarra District Centre

## Traffic and Transport Assessment

### Glenveagh Living

30th October 2019



# Notice

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This document has 80 pages including the cover.

## Document history

Revision	Purpose description	Originated	Checked	Reviewed	Authorised	Date
WIP	Work in Progress	MF / SC	<initials>	<initials>	<initials>	<date>
Rev 1.0	Draft issue to GCC	MF/ SC				31/01/19
Rev 2.0	Client Updates	SC				04/02/19
Rev 3.0	Client Updates	SC				06/02/19
Rev 4.0	Client Updates	SC				07/02/19
Rev 5.0	Table 21 updated	MA	SW			25/03/19
Rev 6.0	Appendix D added	MA	SW			25/03/19
Rev 7.0	Issue for Review. Appendix E, F and G	KG	SC	SC	SC	17/04/19
Rev 8.0	Issue for Stage 2 SHD Submission	KG	SC	SC	SC	13/05/19
Final	Issue for Stage 2 SHD Submission	-	SC	SC	SC	20/05/19
9.0	Issue for Review.	KG	SC	SC	SC	16/10/19
Rev 10	Issue for Stage 3 Submission	KG	SC	SC	SC	30/10/19

## Client signoff

Client	Glenveagh Living
Project	Knocknacarra District Centre
Job number	5168265
Client signature / date	

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# Executive Summary

This Traffic and Transport Assessment was undertaken for the proposed development in Knocknacarra District Centre, Rahoon, Galway which is being proposed by Glenveagh Living. The proposed development is situated in a prime setting to enhance the neighbourhood and its environs, while ensuring existing and proposed residents have an accessible and permeable sense of place.

There are two national primary schools in close proximity to the development, Gaelscoil Mhic Amhlaigh which is adjacent to the development, and St. John the Apostle which is within a 5 minute walk. The prestigious secondary schools Coláiste na Coiribe, Coláiste Éinde College and Solerna are also easily accessible by walking or cycling. Along the southern boundary of the site runs the Western Distributor Road. The Galway Transport Strategy sets out to upgrade the existing public transport link along this road by developing a high quality and high frequency bus corridor. In turn this will increase uptake of public transport and reduce commuting time to National University of Ireland Galway, UC Hospital and the city centre to minutes.

Atkins undertook traffic analysis of the junctions adjacent to the site, this found that the additional traffic from the proposed development will have a negligible impact on the surrounding road network. The proposed development also allows for improved connectivity with cycle routes, footpaths ensuring permeability within the neighbourhood and the local schools. With permeability an important focus, the development will provide links in and around the urban village to public transport links while also retaining the bus stop on the link road to ensure easy access to public transport.

# 1. Introduction

Atkins were appointed by Glenveagh Living to provide a Traffic and Transport Assessment for a proposed development in Knocknacarra District Centre, Rahoon, Galway.

This is a mixed use development and the following approximates what it will include

- 332 new residential units
- commercial floor space of 2,667 sqm.
- 266 no. car parking spaces and provision of realigned road between Gort na Bró and Gateway Retail Park
- Community space, shared communal and private open space, site landscaping and all associated development works.



Figure 1-1 - Location of proposed development

## 1.1. Purpose

Purpose of this report is to assess the impact of the development on the surrounding infrastructure. It also takes into consideration

- existing and proposed transportation links (inclusive of walking, cycling, public transport),
- car parking requirements inclusive of existing and proposed demand
- the impact of the traffic on proposed road link and junction capacity.

This document is developed following “Traffic and Transport Assessment Guidelines” May 2014 of Transport Infrastructure Ireland (TII).

## 1.2. Scoping Study Consultation with Galway City Council (GCC)

Atkins and Galway City Council engaged in an initial scoping exercise in December 2018. The minutes of scoping meeting are included in Appendix A.



The Design Report and a draft of the Atkins Traffic and Transport Assessment formed the basis for this scoping exercise. The following key criteria were discussed:

- Location, Size and Nature of Development;
- Car Parking;
- Mobility Management Plan for the three Phases of the Development;
- Road Safety Audit;

The extent of what would be included within the Traffic and Transport Assessment was agreed between Atkins and Galway City Council on that date.

Subsequent to this Atkins have had ongoing consultation with Galway City Council. For details of this refer to Section 6 of this TTA.

All issues raised by GCC during the scoping exercise have been addressed within this TTA.

### 1.3. Traffic and Transportation (TTA) Methodology

This TTA has been undertaken in accordance with current best practice guidance and planning policies. As such, in preparation of this TTA reference has been made to the following documents:

- NRA Traffic and Transport Assessment Guidelines (May 2014)
- Galway Transport Strategy (GTS)
- Galway City Development Plan 2017-2023
- National Development Plan 2018-2027
- National Spatial Strategy and the Regional Planning Guidelines for the West Region 2010-2022

The proposed methodology for the TTA is based on completing for the following tasks:

- Obtain Scoping Study agreement with Galway City Council;
- Management of traffic data provided by the client and undertake the traffic counts;
- Conduct a site visit to inspect the existing traffic and road conditions;
- Review of information obtained from the client with regards to development;
- Review of information obtained from the design team with regards to proposed development;
- Assessment of traffic impact on the local road network.



## 2. Planning Policy

### 2.1. National Planning Documents

National, regional and local planning policy has been considered to ascertain compliance. Relevant policies and objectives which the proposed development will aim to fulfil are outlined below.

### 2.2. Galway Transport Strategy

Smarter mobility is a key of the Galway Transport Strategy (GTS). With regards to the proposed development site the following are some of the Smarter Mobility policies and Projects of interest:

- SM Policy 1: Ensure that Galway City's transport network shall be safe, usable and equitable to all road users
- SM Policy 5: maximise the efficiency of the existing transport infrastructure in Galway
- SM Policy 7: increase the capacity of Galway's transportation network
- SM Policy 8: Remove unnecessary trips to Galway City Centre
- SM Policy 9: Increase the mode share of sustainable transport across the network
- SM Project 1: Creation of bus network with high level of service. This is to be done by prioritising the bus routes and upgrading the network to allow ITS systems to shorten journey times, expanding the current real time passenger information facilities and providing wi-fi facilities at bus stops.
- SM Project 6: Creation and operation of a smart parking system for motorised vehicles in Galway. This project aims to achieve
  - a reduction in on-street parking provision
  - provision of off-road residential parking
  - reduced parking requirements/maximum permitted levels of parking for new developments;
  - encouraging high turnover of parking in commercial developments.
- SM Project 10: Creation of smart priority routes for pedestrians and cyclists
- SM Project 11: Provision of smart parking facilities for cyclists.
- SM Project 16: Encouragement of and provision for electric vehicle usage

The following are GTS proposals for the area of interest:

- Pedestrians Network – Increasing permeability within suburban residential areas, improving and updating pedestrian networks
- Cycle Network will be extended and improved to the plan shown in GTS Figure 3.5 below.

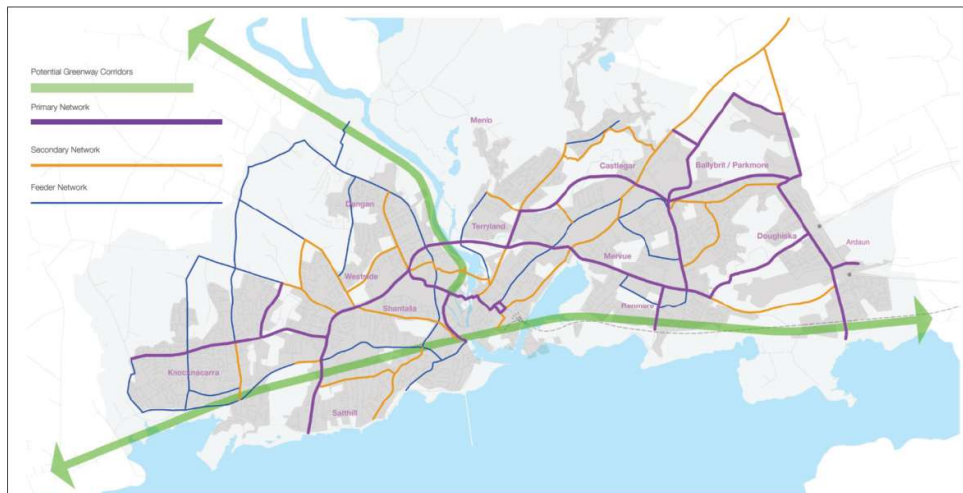


Fig 3.5 GTS – Proposed Cycle Network. Source: Galway Transport Strategy 2016

**Figure 2-1 - GTS Proposed Cycle Network**

- Public transport – The GTS proposes improvements to the existing bus network by expanding ITS systems, by improving the frequency of service and improving connectivity across Galway city.



Fig 3.3 GTS – Proposed Core Bus Routes. Source: Galway Transport Strategy 2016

**Figure 2-2 - Proposed Core Bus Routes**

- Permeability and Wayfinding – Permeability is a key constraint for cyclists and pedestrians in Galway. Links between the residential areas and workplaces alike will be continuously improved for use by active modes by providing more direct routes. In addition a route signage programme is proposed to aid wayfinding in parallel to the cycle network and pedestrian improvements.
- The mode share for walking in Galway City is higher than the national average. From the GTS Public Consultation Boards based on the Census data 2011 the modal share is shown in Figure 2-3 below

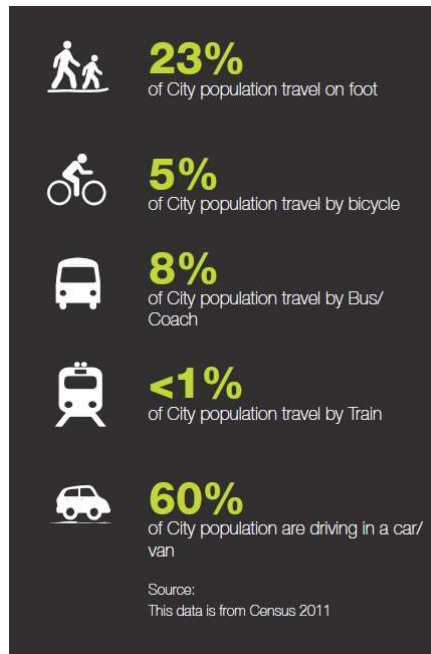


Figure 2-3 - Travel Mode Share in Galway City

The major origins and destinations map developed as part of GTS is shown in Figure 2-4 below. From this it is clear that Knocknacarra is already a major origin for trips with Salthill, NUIG and the City Centre being major destinations.



Figure 2-4 - GTS - Galway City Major Origin and Destination Map

### 2.3. Galway City Development Plan 2017-2023

The following are the Galway City Development Plan objectives in relation to the area of interest:

- 4.7 Specific objectives. Medium/Long term. Plan assumes to develop pedestrian and cycle ways at Knocknacarra and linking residential areas with existing and future services and amenities.
- Policy 2.4 Neighbourhood Concept. It is the policy of the Council to promote the neighbourhood concept in existing residential areas and in new developments, Knocknacarra area is included in this framework. Ensure the design of residential developments have regard to the *Guidelines for Planning Authorities on Sustainable Residential Development in Urban*

*Areas (2009) and the accompanying Urban Design Manual – A Best Practice Guide and the Design Manual for Urban Roads and Streets (2013).*

- Policy 3.5 Public Transport. Support the GTS proposals for implementation of a local city bus network which will include for a high frequency cross-city network and all associated infrastructure requirements, traffic management and priority arrangements.
- Policy 3.6 Cycling and Walking. Support GTS proposals for expansion and upgrade to existing cycle network. Improve bicycle parking at key locations. Expand Public Bike Share Scheme.
- Policy 3.6 Cycling and Walking. Improve the city pedestrian network. Promote, facilitate and maintain maximum connectivity and permeability for pedestrians and cyclists in the design of new developments in accordance with the *Design Manual for Urban Road and Streets (2013)* and *Permeability a Best Practice Guide, NTA (2015)*.
- Policy 3.8 Mobility Management and Smart Technologies. Support and promote the use of smarter mobility and Intelligent Transport Solutions (ITS) to increase efficiency, safety and co-ordination across all transport networks. Promote the implementation of Travel Plans with employers and schools.

The following policies are set out as part of Galway City Council Development Plan 2017-2023 in the Land Use Zoning Objectives and Development Standards and Guidelines:

- 11.10.2 - Travel Plans, also known as Mobility Management Plans are required for proposed development with the potential to employ over 100 people
- 11.10.3 - Cycle parking requirements for developments are 1No. cycle stand per 20 car spaces provided. For every additional 50 car parking spaces, an additional cycle stand should be provided. Each cycle stand should accommodate a minimum of five bicycles. Cycle parking must be sheltered where appropriate.

## 3. Existing Scenario

### 3.1. Project Location

The proposed development will form part of the Knocknacarra District Centre, Ragoon, Galway as shown in Figure 3-1 below. The proposed development site is located in Knocknacarra on the Western Distributor Road, approximately a 10 minutes' drive from Galway City Centre. It is surrounded by a mix of different uses, although it is located largely in a residential area. To the north it is bounded by Aviva, RSA and Gaelscoil Mhic Amhlaigh School. A family activity centre and Aldi store are located to the south of the development. In vicinity of the site there are many open spaces, such as the two soccer pitches east of the Gaelscoil Mhic Amhlaigh school.

For the purpose of this TTA and to allow for all scenarios to be assessed, we have split the area into 4 Phases as follows:

- Phase 1 – operational. This phase consists of the existing Gateway Retail Park.
- Phase 2 – under construction. This phase consists of development of Retail Park, Gym and Creche. (Total ground floor area (GFA) 11,794 m<sup>2</sup>).
- Phase 3 –the Proposed Development including:
  - Construction of 332 no. new residential units (137 units per HA) comprising of
    - 93 no. One bed apartments,
    - 219 two bed apartments
    - 20 no. three-bed apartments
  - Provision of ground floor commercial floorspace of 2,667 sq.m including 16 no. retail/food and beverage units
  - Provision of 174 sq.m creche
  - Provision of community use facility
  - Provision of shared communal and private open space, site landscaping, site services and all associated site development works.
  - Provision of 85 no. car parking spaces and provision of realigned road between Gort na mBro and Gateway Retail Park Road.
  - Change of use of underground void within Phase 2 to 181 bay underground car park.
- Phase 4 – Future District Centre Use Site.

Phase 3 – the proposed development is a main subject of this traffic assessment report; however, Phase 4 is taken into consideration when assessing the requirement for car parking and junction capacity.



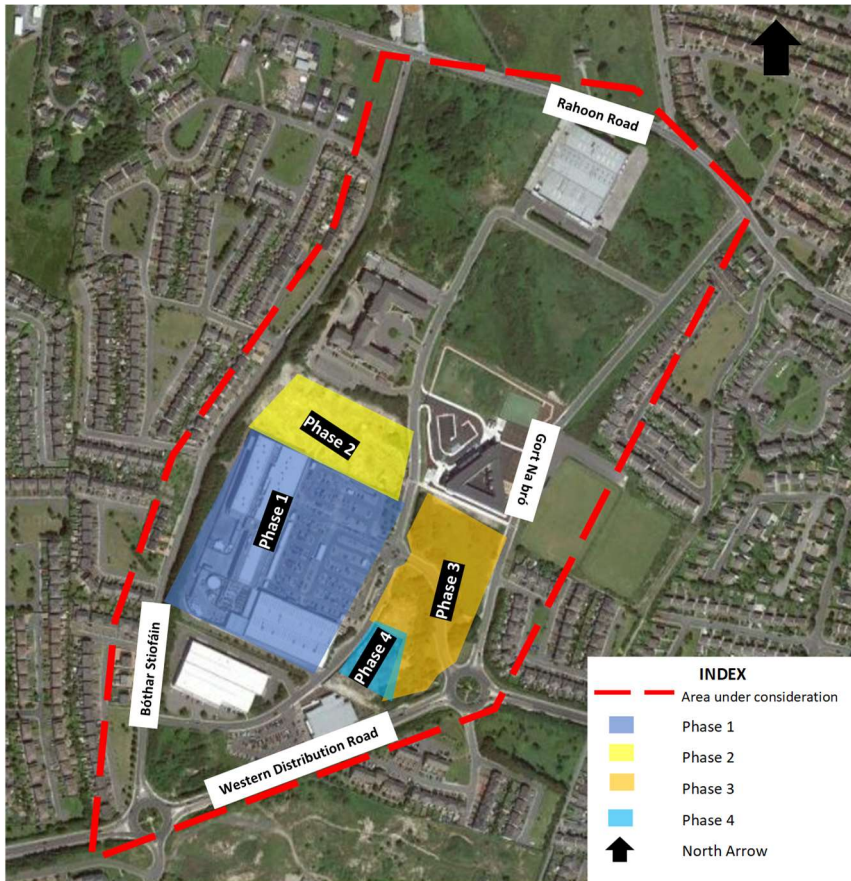


Figure 3-1 - Phases of Knocknacarra District Centre

### 3.2. Local Road Network

The local road network in vicinity of the existing and proposed development site is made up of single carriageway local and connector roads. The Western Distributor Road is a major link through the Gort na Bró to Bishop O'Donnell Road connecting Knocknacarra North and South with Galway City Centre. The junctions in vicinity of the site are uncontrolled with roundabout junctions along the Western Distributor Road and Gort na Bró.

There is a 50km/h speed limit on the roads adjacent to the site.

### 3.3. Existing Access Arrangement

The existing Gateway Retail Park can be accessed from the Western Distributor Road to the south and the Ragoon Road to the north. From the Western Distributor Road, there are two access points. The main access point is at the Roundabout with Gort Na Bró, which is a 5-arm roundabout, of which one arm leads through a private access road directly to a mini roundabout that provides access to the existing Gateway Retail Park. The second access point is from the roundabout with Bóthair Stiofáin, via an uncontrolled T Junction that leads onto a private local road that links to the mini roundabout at the access to the existing Gateway Retail Park.

Access from the north is via an uncontrolled T Junction with the Ragoon Road and L-5000/Millers Lane (local name), which leads to another uncontrolled T junction with a private local road which links to the mini roundabout at the access to the existing Gateway Retail Park. Access routes are shown in Figure 3-2 below.



Figure 3-2 - Existing Access Routes

### 3.4. Existing Public Transport Provision

The proposed site is adjacent to several bus routes with one of the bus stops currently located in the middle of the proposed site.

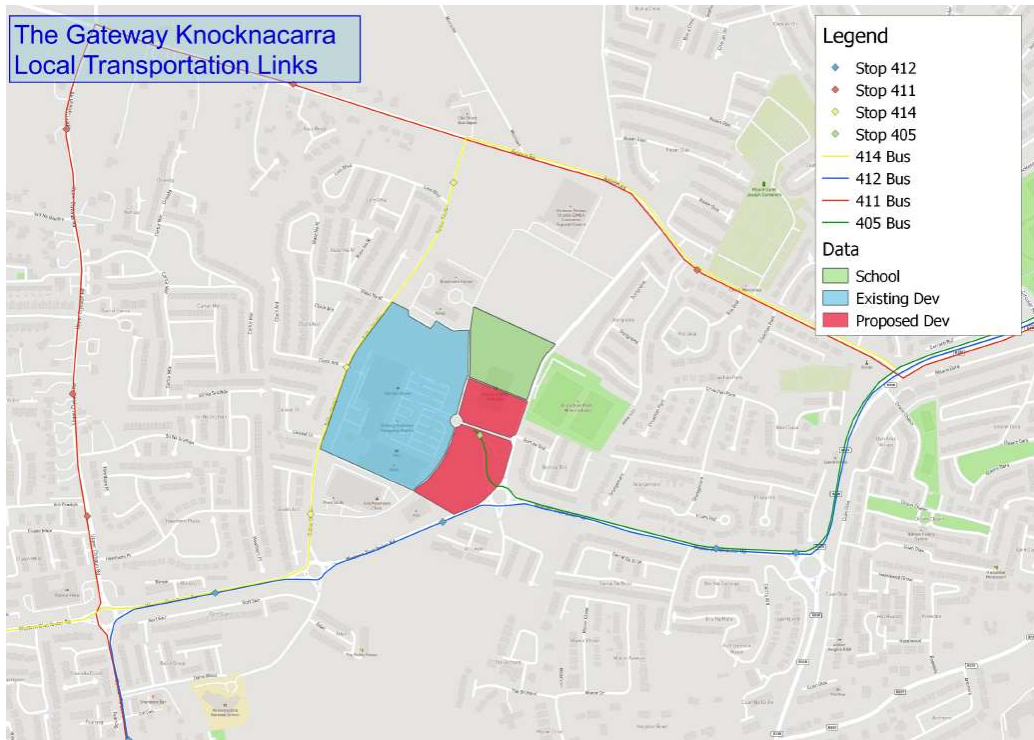


Figure 3-3 - Existing Bus Routes and Stops Adjacent to Proposed Development

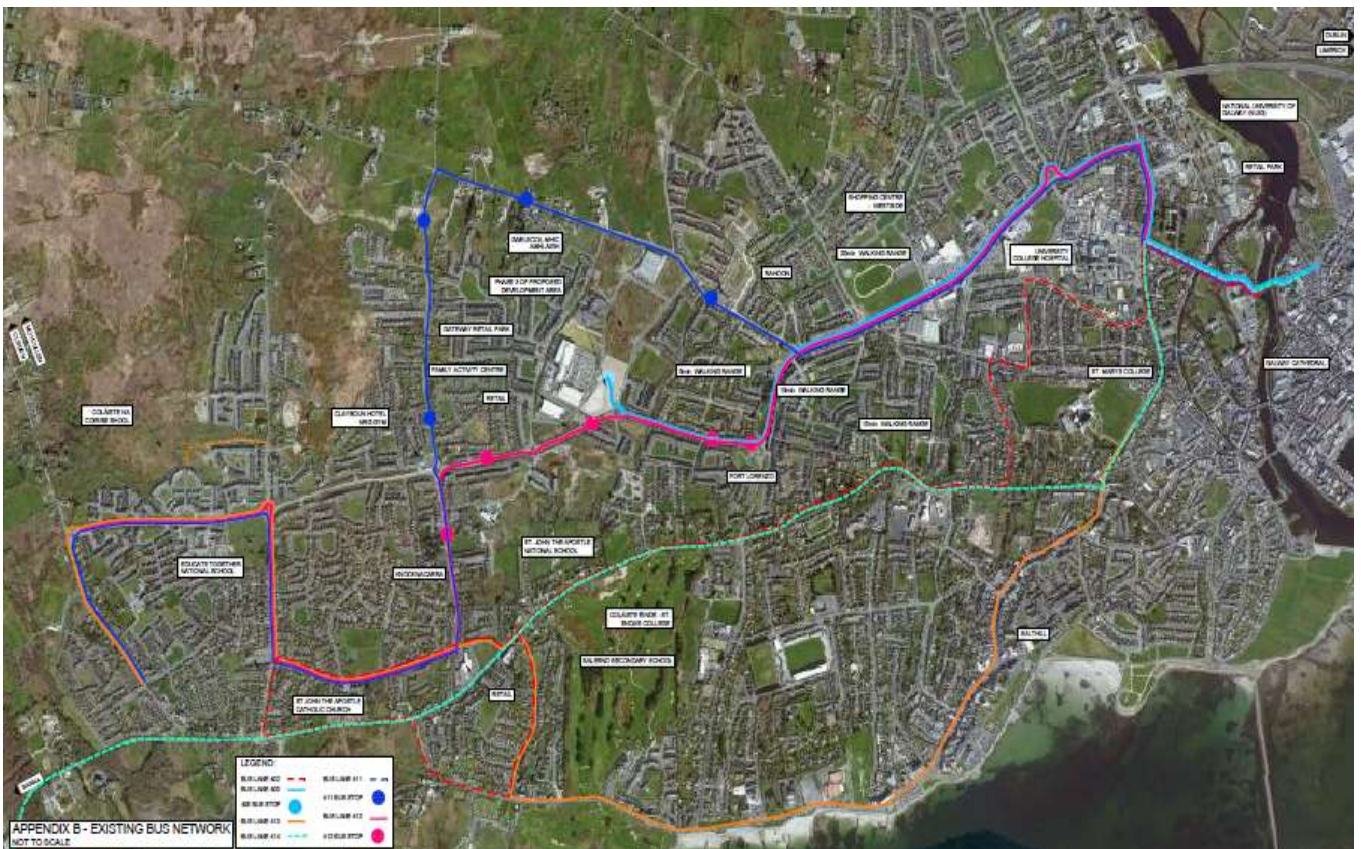
The current public transport provision includes number of routes that service the general area. The key routes for the site are the 402, 405, 410, 411, 412, 414 services. Of these routes 405, 412 and 411 are within a 10-minute walk of the development. These services combined provide 7 No. of buses every hour during peak times. The table below summarises the bus routes, with relevant information



on the route they take, the nearest bus stop to the development and how long it approximately takes to walk to the bus stop.

Bus	Route	Nearest Bus Stop	Walking Distance Mins	Frequency
405	Between Eyre Square and the Gateway Retail Park	Existing Gateway Link Road	1	20 to 25 mins weekday
412	From the Cathedral through University and Hospital to Knocknacarra	Western Distributor Road	5	30 mins Mon – Sat. 60 mins night time and Sun.
411	From Henry St to Knocknacarra	Rahoon Road	8	30 mins Mon – Sat. 60 mins night time and Sun.
414	Between Cathedral, Knocknacarra and Barna	Bothar Stiofain	5	3 services daily
410	Connects lower and upper Knocknacarra with university and hospital and finishes at Eyre Square	Western Distributor Road	20	60 mins Mon to Fri
402	From Merlin Park Hospital through GMIT to Knocknacarra	Kingston Road (via Millers Lane /L-5000)	20	30 mins Mon – Sat. 60 mins night time and Sun.

It should be noted that there are ongoing changes to the bus routes within this area as the NTA rationalise routes. We have liaised with them and most up to date information that was made available to us prior to submission of this report has been included in the assessment and reflected in this report.



Refer to Appendix B for greater detail of extents of the Existing Bus Network.



## 3.5. Existing Walking and Cycling Provision

### 3.5.1. Existing facilities

There are footpaths and on-road cycle lanes both sides of the Western Distributor Road.

At the four-arm roundabout with Bóthair Stiofáin raised zebra crossings are provided on three arms, Western Distributor Road east and west and Bóthair Stiofáin. Uncontrolled at grade crossing with drop kerbs is provided on the southern arm.

On the five-arm roundabout at Gort Na Bró raised zebra crossings are provided on three arms, the Western Distributor south and west and Gort Na Bró. Uncontrolled at grade crossings with drop kerbs are provided on the link road to Gateway Retail Park and on the southern arm.

On Bóthair Stiofáin, there are no dedicated cycle facilities; there is a footpath on the east side of the road only.

On the Link Road access to the Gateway Retail Park, there is no dedicated cycle facilities, but footpaths are provided on both sides of the road.

Gort Na Bró, has no dedicated cycle facilities; however, there are footpaths both sides of the road. There are two raised zebra crossings provided at Gaelscoil Mhic Amhlaigh, the southern one connects to a combined footway/cycleway that runs to the south of the school.

On the internal road network in the Gateway Retail Park, there are footpaths provided throughout adjacent to the roads. Dedicated cycle facilities are provided along the road that links Bóthair Stiofáin to the mini roundabout at the access to the main retail car park. A raised zebra crossing is provided on the internal road north of the mini roundabout. It provides access to the school and is aligned with the combined footway/cycleway.

Pedestrian access to the Gateway Retail Park can also be gained

- from Bóthair Stiofáin through the Aviva car park
- from Western Distributor Road through the existing steps and across Aldi retail site.

Other pedestrian links within the area include

- Millers Lane is a pedestrian link connecting the Kingston Road through the Manor Drive, across the Gort na Bró, along the side of the soccer pitches, between Gort Gréine and Ros Geal estate through to Ragoon Road.
- An unnamed pedestrian link connecting the Clybaun Rd south of the Western Distributor Road roundabout via John Apostle's School to Western Distributor Road.

### 3.5.2. Existing catchment

There are quite a few facilities that are currently within walking and cycling distance of development. The main ones and the approximate time it would take to either walk or cycle to these is given below. Maps showing the existing and proposed cycle routes are shown in the Appendix B of this document.

#### Existing Walking Catchment

Within 5 min walk:

- Gaelscoil Mhic Amhlaigh School,
- Gateway Retail Park (B&Q, Dunnes etc.),
- Aldi and leisure facilities & Skill zone.
- No. 412 bus stops on Western Distributor Road are also within that area.

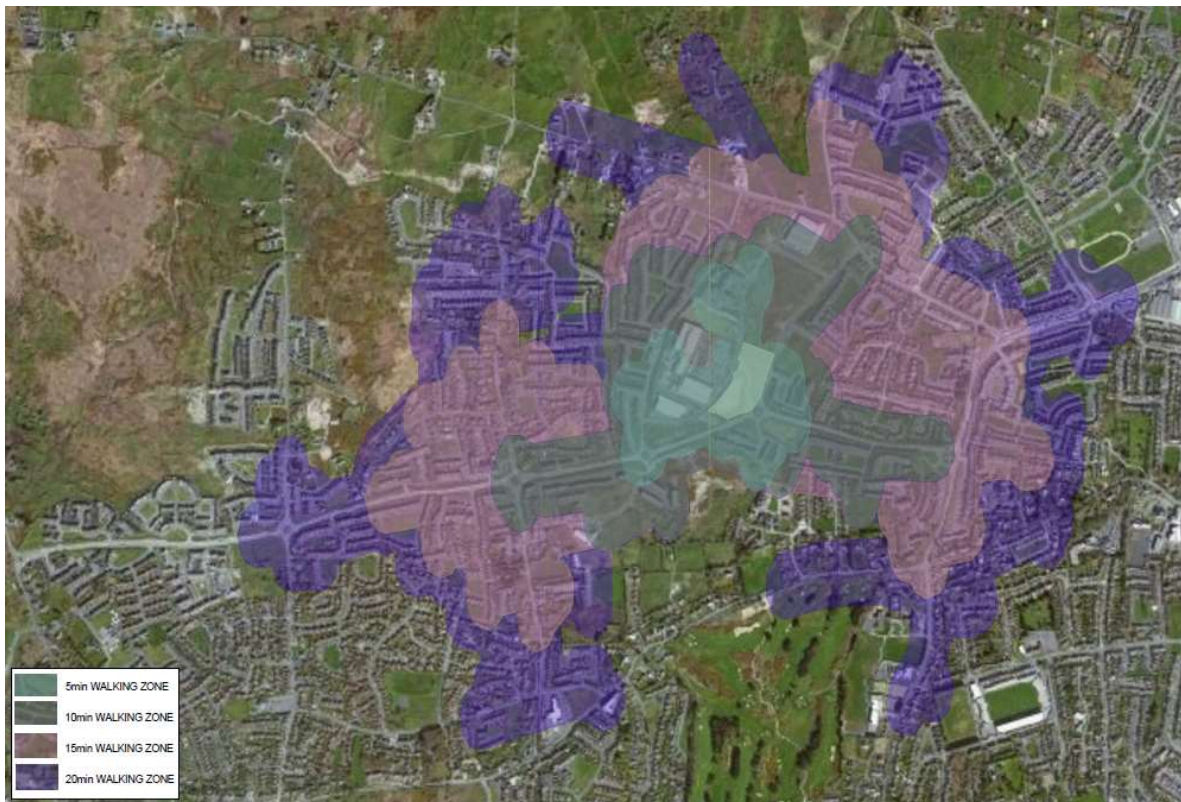
Within 10 min walk:

- St. John the Apostle National School,
- Sheridans Restaurant and Bar,
- Bus stop for Route 411 on Ragoon Road.

Within 15 min and 20 min walk:

- Joyce's Supermarket,
- Ground & Co, Coffee Shop
- Swimming Pool facilities at Clybaun Hotel,
- Coláiste Éinde College,
- Salerno Secondary school.
- Salthill, Knocknacarra GAA Club
- Galway Lawn Tennis Club
- Capones, family Restaurant
- Educogym
- Kingston Medical Centre
- Bus stop for Route 402, 410 on Shangort Road.
- Bus stop for Route 411, 412 on Clybaun Road

It should be noted that above distance estimates are generated using official walking routes, however there are existing laneways known by local people that shorten the distances.



**Figure 3-4 - Existing Walking Catchment**

**Existing Cycling Catchment**

When considering the cycleway catchment areas, we have divided them in 10 min, 30 min & 40 min ranges.

Within 10 min cycle (routes are mainly cyclist friendly with dedicated cycle lanes);

- Salerno Secondary School,

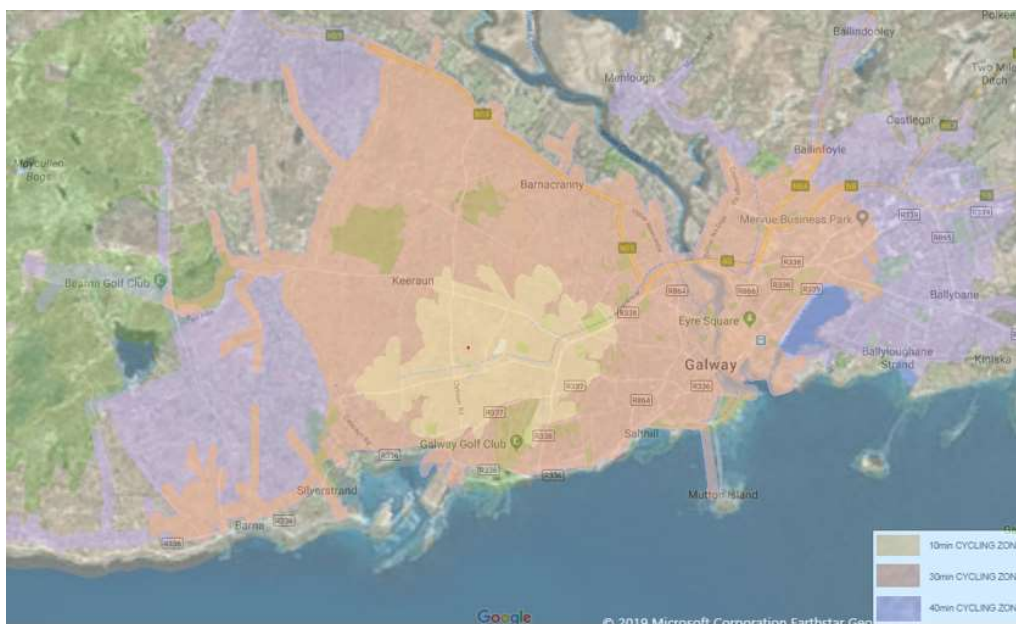
- Coláiste Éinde College,
- Coláiste Na Coiribe (Gaelscoil)
- St. John the Apostle National School,
- St John the Apostle Church,
- Swimming Pool at Clybaun Hotel
- Cappagh Park.

Within 30 min cycle;

- University Hospital,
- National University of Galway,
- Salthill area with Leisureland Swimming complex,
- City Centre,
- Terryland Retail area.

The 40 min cycle;

- Whole area of Galway City
- Parkmore,
- Ballybrit,
- Ballybane
- Mervue
- Galway-Mayo Institute of Technology (GMIT),
- Retail /Business Parks / leisure amenities.
- Silver Strand Beach
- Salthill Devon Soccer Pitches
- Bearna Golf Club



**Figure 3-5 - Existing Cycling Catchment**

It is noted that there is a cycle bus route run by local parents of children attending St Johns Apostle School and Gaelscoil Mhic Amhlaigh. They have a schedule of pick up point and times (extract below) that is widely available on their own web page, Facebook, and updates are given via these pages and twitter.



### 3.6. Other developments planned in this area

The Knocknacarra neighbourhood park is proposed to the west of St. John the Apostle, Knocknacarra National School. This project is currently going through the planning process with Part 8 due for completion.

There was an application by Lidl for a new retail facility in the north-east corner of the land between the Western Distributor Road and Bothar Stiofain. Current status for this application is refusal by ABP on the 29<sup>th</sup> of May 2019. We are aware that a new planning application has been lodged for a mixed use development in this same location with decision due Q4 2019.

### 3.7. Parking Provision

#### 3.7.1. Phase 1 Existing

There are currently 315 No. ground floor parking spaces and 409 No. basement parking spaces serving the existing Gateway Retail Park. The ground floor parking has one access point through the mini roundabout at the entrance to the Gateway Retail Park. Access to basement parking is located to the north of the ground floor carpark. See below for location:





Figure 3-6 - Existing Parking Access Phase 1

### 3.7.2. Phase 2 Under Construction

Phase 2 of the Gateway Retail Park is under construction. On completion of Phase 2, there will be a total of 333 No. parking spaces at ground floor and 563 No. parking spaces in the basement area.

Phase 2 ground floor carpark will join onto the Phase 1 carpark along the northern edge, and it will be accessed via the mini roundabout at the existing entrance to Gateway Retail Park. There will be a second access point to the basement carpark via a new ramp located off the Local Road across from the Gaelscoil Mhic Amhlaigh. There is a ramp in the basement connecting Phase 1 and Phase 2 basement carparks.

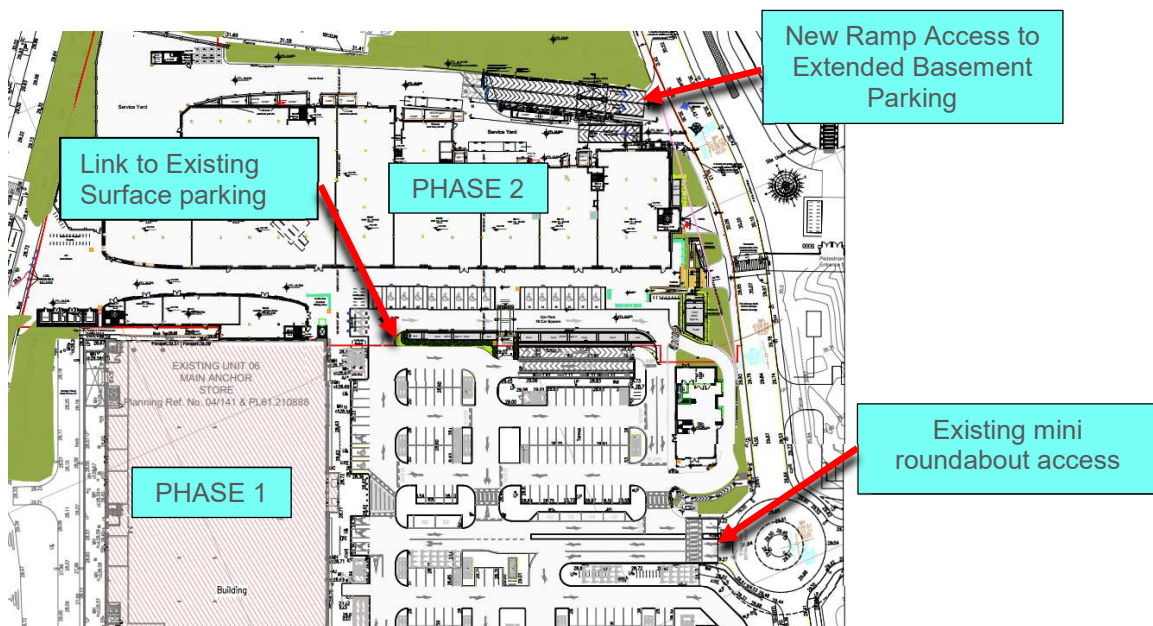


Figure 3-7 - Parking Access Phase 2

### 3.8. Service Access Provision

#### 3.8.1. Phase 1 Existing

A service access road runs along the back of the existing Gateway Retail Park Phase 1 units. The access to this area is provided by priority controlled junction off the Local Road as shown in Figure 3-8 below.

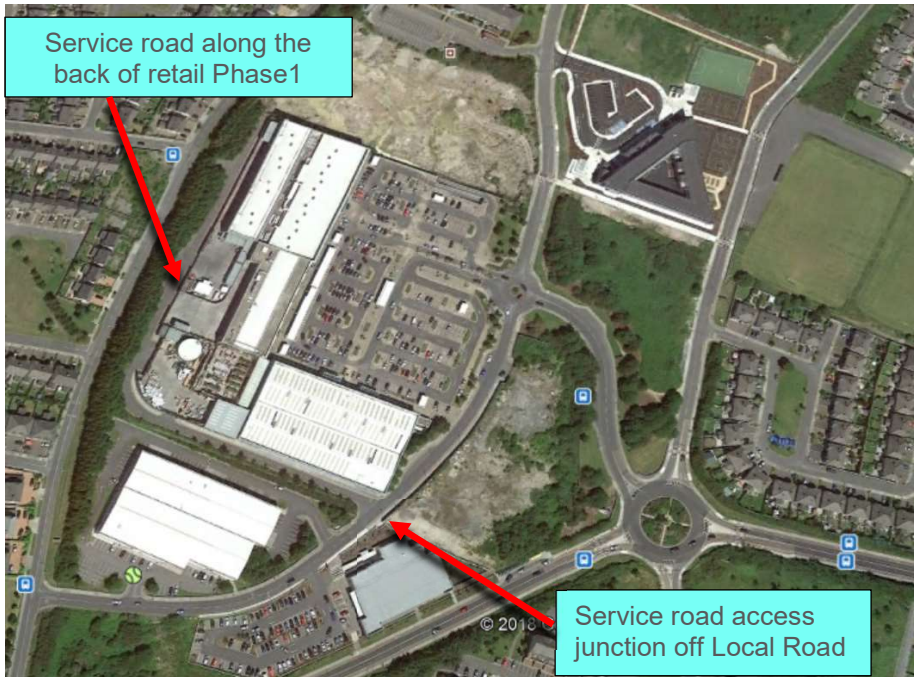


Figure 3-8 – Service Access Phase 1

#### 3.8.2. Phase 2 Under Construction

Service Area for Phase 2 development is located to the back of the Phase 2 units, north of the site. Service Yard access point is provided adjacent to the vehicular access ramp to the basement carpark. This access is gated. See below for location details.

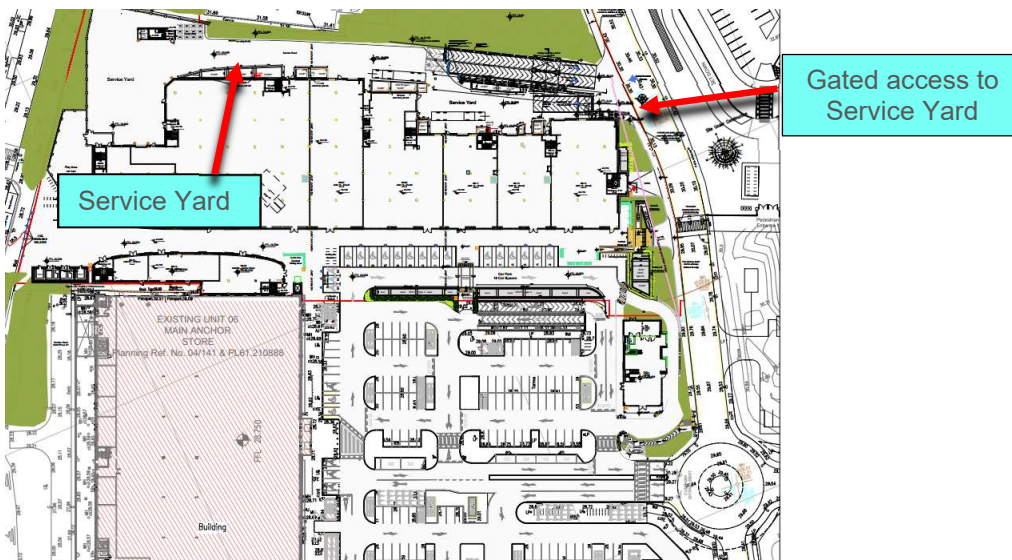


Figure 3-7 - Service Access Phase 2



## 4. Proposed Transport Provision

### 4.1. Galway Transport Strategy (GTS)

Based on the information provided in the GTS Atkins have shown the Proposed Transport routes on a map of the surrounding area – see Appendix B.

The Galway Transport Strategy report encompasses all modes of transport within the environs of Galway City. It sets out the short, medium and long-term strategy for the implementation of an integrated transport system which includes walking, cycling and public transport. The Knocknacarra area is recognised as a major trip generator. The Western Distributor Road is highlighted for bus priority measures with the road being widened for the provision of priority bus lanes. One of them is delineated along the Western Distributor Road/ Gort na Bro/ Gort Siar link. These will tie into the existing bus lanes on Seamus Quirke Road.

The GTS assumes that there is a need for future provision, improvement and provision of safer facilities for both pedestrians and cyclists. This includes a proposal for conversion of the Gort na Bró roundabout to a signalised junction to make it more pedestrian/cyclists friendly. Additionally, the Western Distributor Road is marked as a primary cycle route in the Knocknacarra area and there are proposals for change to local/ internal paths to improve availability of options for pedestrians and cyclists. GTS cycle network improvements are listed below and shown in Figure 4-1

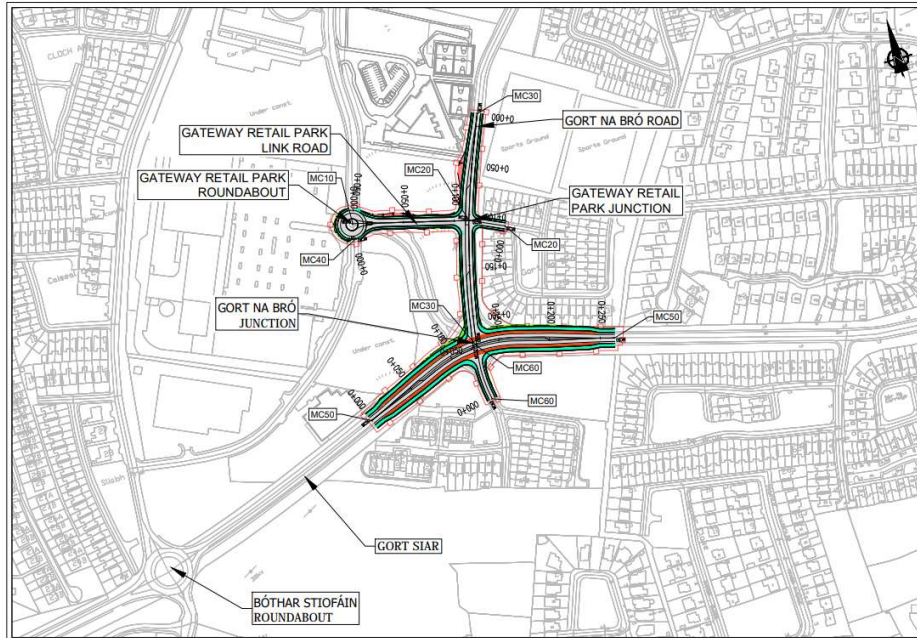
- Western Distributor Road – proposal to upgrade the existing on-road cycle lanes to off-road and install raised adjacent cycle lanes.
- Bothar Stiofain – proposal to install on-road cycle lanes on both sides of Bothar Stiofain
- Ragoon Road south of the junction with Bothar Stiofain – proposal to install raised adjacent cycle lanes along both sides of residential road if and when it is developed
- Ragoon Road north of the junction with Bothar Stiofain – Provide traffic calming measures and signage to reduce motorised traffic speeds and advertise presence of cyclists.



Figure 4-1 - Proposed GTS Cycle Network Improvements

## 4.2. N6 Galway City Ring Road

N6 Galway City Ring Road design was Published 25<sup>th</sup> October 2018. Figure 4-2 below is an extract from the drawings published. This shows the proposals that impact on the Development. There is a proposed signalised junction identified as 'Gateway Retail Park Junction' on Gort Na Bró Road which provides access to the development via a proposed Link Road. The main junction with the Western Distributor will be a four-arm signalised junction; the original link road will be closed.



**Figure 4-2 - Published N6GCCR**

It is predicted that the construction of the bypass will result in a 20% decrease of vehicular traffic within Galway city centre. The impact of the N6 GCCR is considered within this TTA.

To ensure that the proposed development did not adversely impact on the N6 GCCR, the development includes the proposed signalised junction and Link Road. Refer to Section 6 for N6 GCRR consultation details.



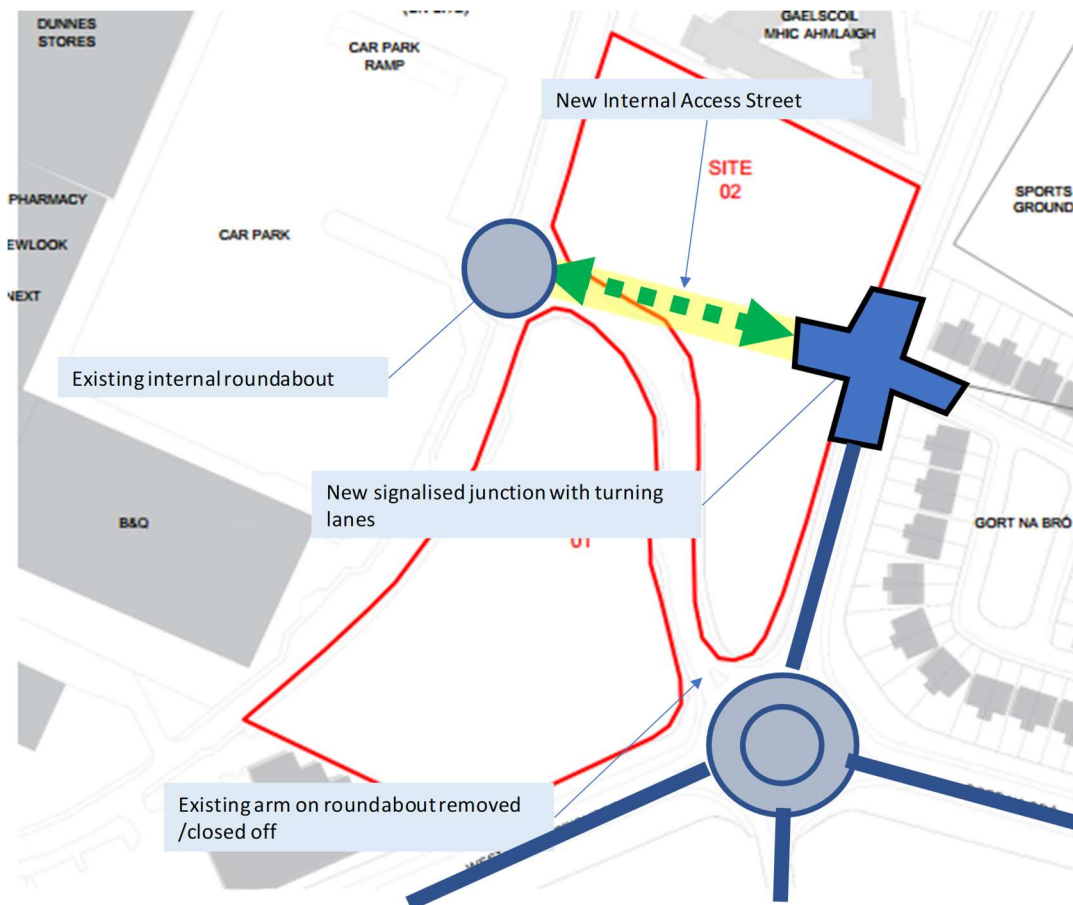
# 5. Proposed Scenario

## 5.1. New Junction Layout

The access arrangements for the new Knocknacarra District Centre will involve the following new features:

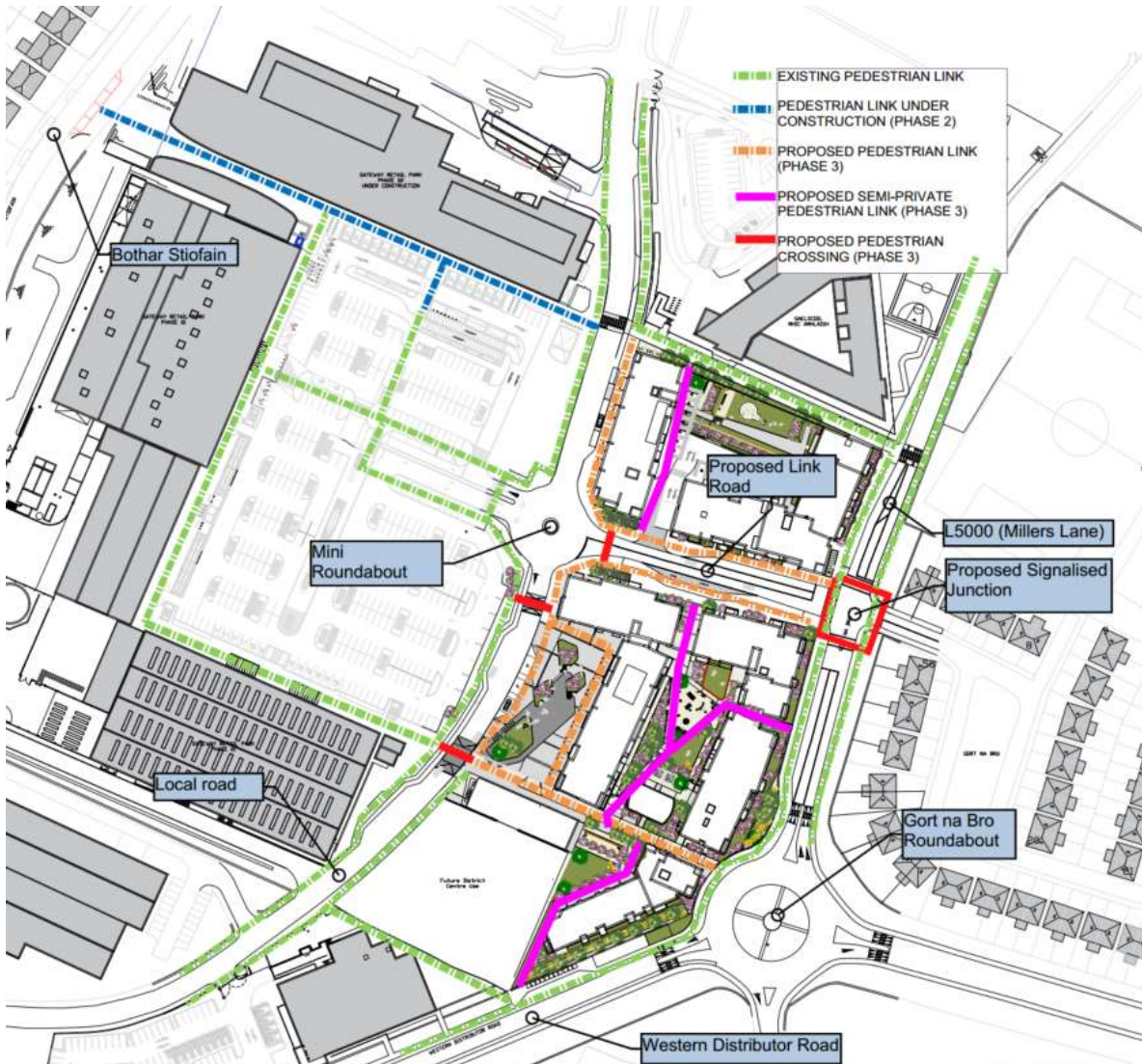
- Closure of the existing entry arm on the Western Distributor Road/ Gort Na Bró roundabout
- Provision of the new signalised junction on Gort Na Bró to provide access to the Gateway Retail Park.
- New link road from the signalised junction to the mini roundabout.
- The new car parking area on the podium will be accessed via simple priority junction from the internal street junction.
- Pedestrian crossings at key locations to provide permeability throughout the site.
- New dedicated and segregated cycle provision will be provided on the new link road connecting the new signalised junction to existing internal mini roundabout.

Figure 5-1 below provides an overview of the proposed main access arrangement, Figure 5-2 shows the pedestrian links, Figure 5-3 shows cycle lanes and shared facilities and Figure 5-4 shows the proposed signalised junction layout.



**Figure 5-1 - Overview of Proposed Main Access Arrangement**

Figure 5-2 below shows the main pedestrian routes through the development. Links will be provided through the development that will allow both pedestrians and cyclists to access from the Western Distributor Road, Gort Na Bró Roundabout and from proposed link road.



**Figure 5-2 - Overview of Proposed Main Pedestrian Routes**



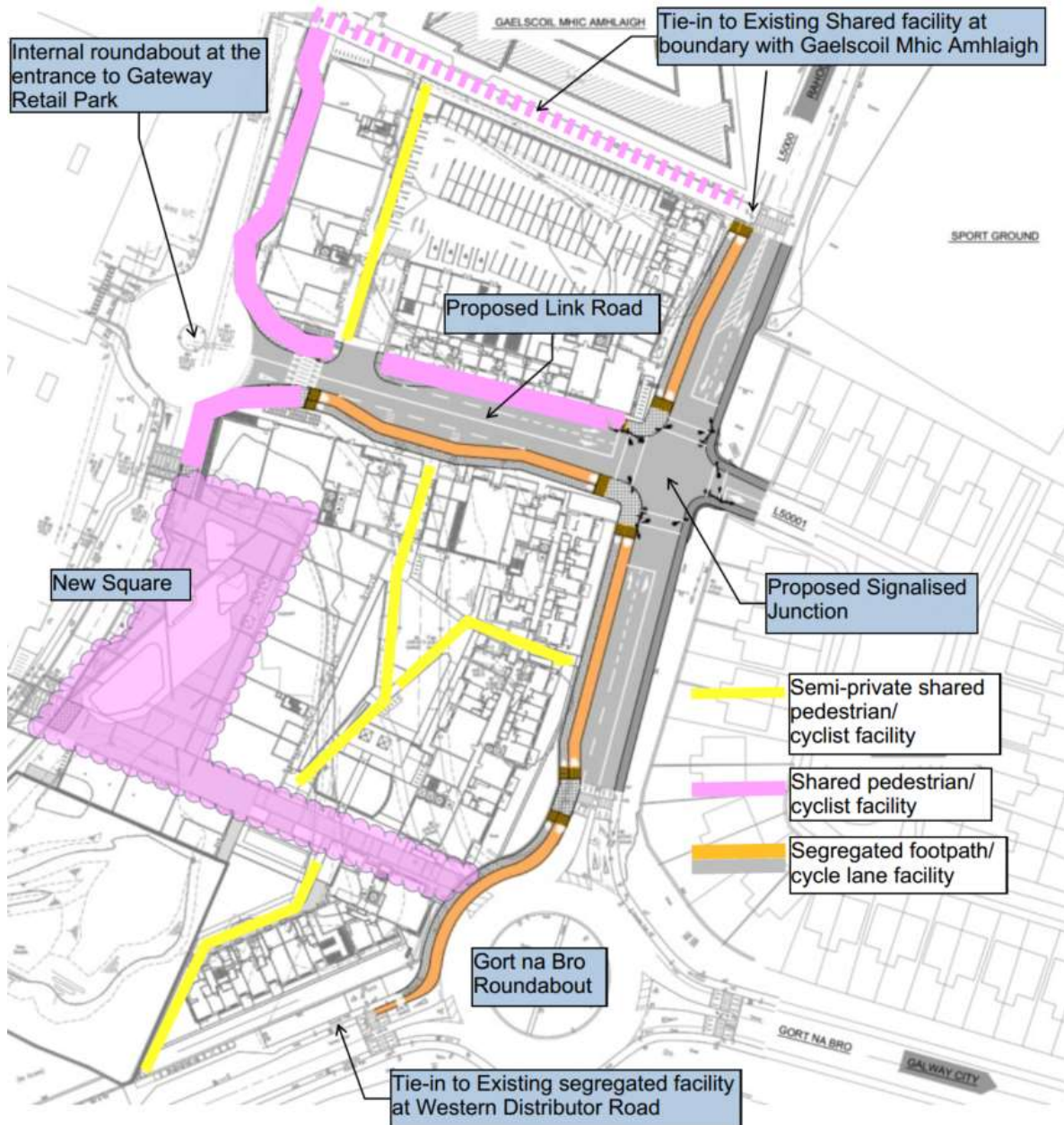


Figure 5-3 - Overview of Proposed cycle lanes and shared facilities.

The provision of high quality pedestrian and cyclist facilities within the development is central to the design principles adopted in relation to the development proposals. Cycle facilities will be a mix of off-line provision and shared facilities with the principles set out in the National Cycle Manual and reinforced within DMURS. The design of the corridor to the south of the plaza (New Square) area as a self-regulating 20kmh design speed is central to the safe provision of the shared street cycle regime.

A two-way cycle lane will be provided along the L5000 and the Link Road. It will start at the pedestrian crossing on the Western Distributor Road (west arm of roundabout at Gort Na Bró) and will continue along L5000 onto the southern side of the link road up to the internal roundabout at the entrance to Gateway Retail Park. At the proposed signalled junction, a TOUCAN crossing is proposed to continue the two-way cycle lane along L5000 to join with the existing shared facility at the southern boundary of Gaelscoil Mhic Amhlaigh. This approach provides continuation of connection into the development and to Gaelscoil Mhic Amhlaigh.

The 2.75m wide two-way cycle lane has been designed in accordance with the Galway Transport Strategy Appendix F, in line with National Cycle Manual and the NTA.

The cycle facilities forming part of the proposed development are an enhancement to the existing cycle network within this area. The segregated cycle links and dedicated crossings improve safety and level of service for cyclists. The proposed expanded cycle network is a betterment in terms of connectivity for the wider area, adjacent schools and the proposed development.

For pedestrians, a segregated footpath is provided directly adjacent to the two-way cycle lane. At junctions this becomes a combined facility. At the signalised junction, all arms will have signalised pedestrian crossing with the exception of the crossing on the link road which as stated above will be TOUCAN to allow for the cyclists to cross at this location without dismounting.

Raised crossings will be provided for the remaining crossing points extant of the Signalised Junction, ie on the Link Road near the mini roundabout and at Local Road along the New Square. These crossings with signage are designed as a traffic calming measure in this area. The crossings along the Local Road are in line with pedestrians' desire lines linking the New Square and the existing Gateway Retail Park carpark. They will provide at grade crossing opportunity to pedestrians and will make them more visible to oncoming traffic.

The pedestrian facilities forming part of the proposed development have been considered in the context of desire lines, particularly in the context of connections to the overall masterplan layout for the area and onwards towards existing and proposed amenity lands. The proposed network of segregated and shared facilities is an improvement to existing. It enhances level of service for pedestrians, connectivity and permeability within the general area. This expanded network will improve the public realm and is a community gain for the wider area, adjacent schools and proposed development.

Figure 5-4 below shows the proposed signalised junction layout. The proposals for this junction layout and link into the Knocknacarra District Centre are in line with the published N6 GCCR.

The signalised junction capacity was assessed using Linsig and results are shown in Section 10.5.6 of the report. The lane lengths provided are sufficient for capacity in the worst-case scenario which is weekend peak +15 year with all development. Lane A has a right turning length of approximately 15m, Lane B has a left turning lane of approximately 40m length and Lane C exiting the Development has a Left turning lane of approximately 38m. With these lanes the junction will still have 18% spare capacity at this stage.



**Figure 5-4 – Overview of Proposed Signalled Junction Layout.**

The approach to the two-way cycle lane will ensure that in particular the school cycling bus is accommodated on an off-road cycle lane from the roundabout at Gort Na Bró all the way to the School. Where they cross the link road into the development a TOUCAN crossing is provided so that cyclist do not have to dismount.

The footpaths that are provided adjacent to the cycle lanes, provide connectivity around the site.

Residents will be provided with secure cycle parking. There will be a total of 386 spaces provided within enclosed areas in the residential blocks. A further 291 stands will be provided within the surface stand spaces in the courtyards which can be utilised by both residents and visitors. The total number of spaces provided is 677. This is well in excess of the requirements within Galway City Development Plan, which only requires one cycle stand (five bikes per stand) per 20 parking spaces and for every 50 additional parking space and additional parking stand. Utilising this calculation would equate to approximately 70 spaces being provided.

The proposed cycle parking has been designed in such a manner as to be convenient, accessible, safe and close to core entrances and exits. The parking locations are distributed through the site as shown in Figure 5-5 below. All proposed cycle parking is located at ground floor of the proposed development for ease of access so that the cyclists do not have to navigate steps or ramps or share ramps with cars at entrance/exit. This design is intended to promote and facilitate cycling.

Cycle parking for those utilising the community and commercial aspects of this site are provided throughout and are a mix of covered and uncovered stands. Refer to Fig 5-5 below for location of Cycle parking provision.





Figure 5-5 – Location of Cycle Parking Provision.

## 5.2. Public Transport Provision

A waiting bus area with a bus lay-by, shelter and RTP1 will be provided within the new street layout. This bus bay will serve as a pick-up and drop-off facility and also as per existing arrangement it will facilitate in-between stopping for buses ending their route here. The buses will U-turn on the existing roundabout to service both directions, as per the existing arrangement.

Detailed Autotrack analysis are shown on the drawings included in Appendix B.

The records of consultation with NTA are discussed in Section 6 below.

## 6. Consultation with authorities

### 6.1. Galway City Council

#### 6.1.1. TTA

The scope of the TTA has been agreed between Atkins and Galway City Council during a scoping study meeting in December 2018. The details of this meeting are discussed in Section 1.2 above.

Subsequent to this Atkins have had ongoing consultation with Galway City Council to close out all issues raised by them. In particular the residential parking demand which is discussed in detail in section 10.2 of this TTA.

This consultation process culminated with a close out meeting held in April 2019. At this meeting all outstanding issues were dealt with and a copy of the meeting minutes are included in Appendix A to this report.

All issues raised by GCC during the consultation process have been addressed within this TTA.

#### 6.1.2. N6 GCCR

As part of the consultation process Atkins liaised with TII through their NRDO and Arup (designers for N6 GCCR) to ensure that all considerations were taken into account and that there were no adverse impacts on the CPO.

Both parties have reviewed both schemes. The proposed development is designed to avoid conflict with the N6 GCCR, the planning application which is currently under assessment by ABP.

The minutes of the final meeting are included in Appendix H.

### 6.2. NTA

Atkins have liaised with the NTA on the proposals including the location of the bus stop and pedestrian and cycle facilities. The NTA have reviewed the proposed layout and they were in agreement with the proposals.

Atkins has carried out the consultation with NTA at early stages of the development of this project in order to meet their transport requirements. The development proposal has slightly changed in terms of no. of residential units or use of the District Centre use Site, however as these are considered minor changes with regards to NTA requirements, no further consultation was considered to be required with NTA.

We have consulted with the NTA regarding the use of the proposed Bus Bay for refuse vehicle to collect residential waste from Block D. NTA have no issues with this as this occurrence is not unusual in urban areas and will be an intermittent activity outside of peak hours.

The records of email consultation with NTA are included in Appendix I.

# 7. Servicing Approach

## 7.1. Servicing Access

Proposed uses within the Proposed Development are as follows:

- The retail units are located in Block C and at the ground floor of Blocks D and E.
- The Residential Amenity unit is located in the courtyard between Blocks A and D. Residential Amenity spaces are also included in Blocks B and F.
- The creche is located in Block D
- The residential units are located within Blocks A, B, D, E and F.

See Figure 7.1 below illustrating the designated building uses and associated proposed routes for servicing and refuse removal. Refer to 'Operational Waster Management Plan' by AWN Consulting for details of proposed waste removal strategy. Refer to 'Estate Management Strategy Report' by JAK Consulting Engineers for management of retail uses, including the servicing strategy.



Figure 7-1 – Designated building uses and servicing routes

The main access point for deliveries to retail units in Block E will be from the link road. Pull in area is provided to the back of Block E where vehicles can park safely to off load.

The main access point for service access to retail units in Blocks C and D are off the Local Road to the south of the New Square. It is envisaged that the servicing vehicles will enter the New Square near Block C and park to the front of the serviced units. Service access to the back of the units in Block D are envisaged on foot, the service crew will walk around Block D for access. To exit the new square area the service vehicles will use an exit point located north of the New Square onto the Local Road. Separate entry and exit points onto the New Square have been introduced as a safety measure to facilitate one-way operation around the square and eliminate need for reversing in this area due to



likely presence of pedestrians, including children. Service vehicles are usually operated only by the driver who would have limited visibility when reversing,

Bollards have been introduced to control access/egress to the New Square. Additionally bollards are proposed between Block D and C to prevent service vehicles reversing around the corner of Block D due to limited visibility and likely presence of pedestrians.

Due to presence of pedestrians within the New Square it is required that management company coordinates the deliveries and provides a supervisor to assist with vehicles reversing within the New Square.

As part of the traffic management deliveries will take place outside the traffic peak hours identified within the Traffic Assessment Section 8.2.2. These peak hours are:

Weekday AM Peak (08:00 to 09:00 hours),  
Weekday PM Peak (17:00 to 18:00 hours),  
Weekend Peak (12:00 to 13:00 hours).

No deliveries will be allowed during school drop-off pick-up times, when pedestrian traffic, including children within the Development will most likely be at its peak. These peak hours are estimated at:

Weekday AM Peak 7:30-9:00 hours  
Weekday PM Peak 12:00-15:00 hours

The development management company will be responsible for coordination of delivery times not to coincide with the main vehicular and pedestrian peak hours. This will be monitored on ongoing basis, any changes to school drop-off/pick-up times by Gaelscoil Mhic Amhlaigh will be considered as they will impact on pedestrian peak hours.

## 7.2. Refuse Removal Access

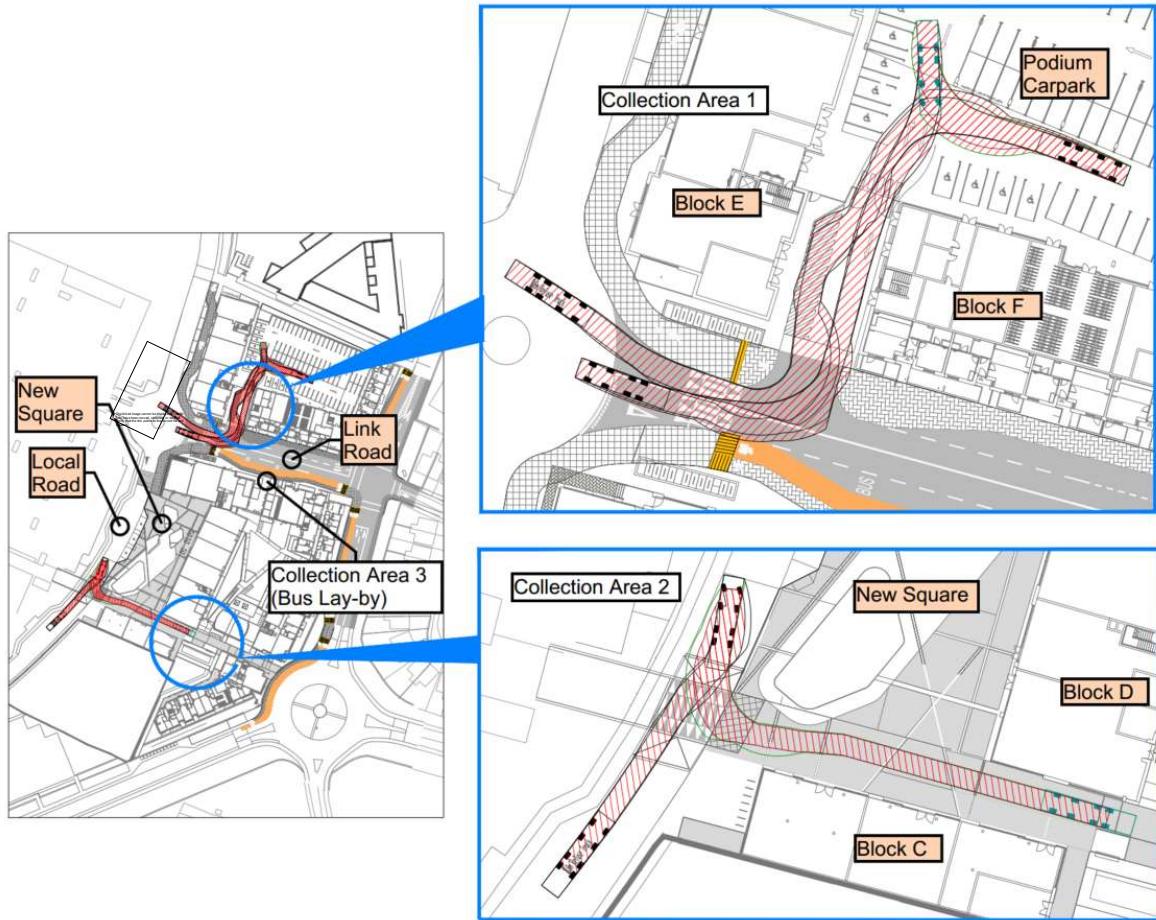
The weekly collection for refuse for the residential will be 'staged'. Separate collection days and times will be designated to each bin type (green, brown and black).

There are three main areas located for bin storage and these are identified in the figure below. Autotrack runs have been carried out for bin trucks to ensure that they can access and exit within the areas provided. See Figure 7-2 below.

Collection area 1 located between Block E and F is accessible from the Link Road. Bin lorry will turn around in podium carpark.

Collection area 2 located to the back of Block C and D. Bin lorry will reverse from the development local road to the collection point. It is envisaged that this operation will be carried out at low speeds with one of the bin lorry crew manning the reversing manoeuvre for pedestrian safety.

Collection area 3 located near the bus bay. There will be a drop kerb provided in the nosing of the bus bay to facilitate wheeling of the bins. The bin lorry will use the bus bay area for temporary set-down during the refuse collection. The bin collection is envisaged to be infrequent, once a week outside of main peak hours. Autotrack run for the bin lorry in this location was not required as the bus bay facilitates access by Rigid Bus with more onerous turning parameters to a bin lorry, and therefore has been considered satisfactory.



**Figure 7-2 – Bin Collection Areas and Autotrack Runs**

Detailed Autotrack analysis are shown on the drawings included in Appendix B.

## 8. Travel Plan and Sustainable Transport Provision

### 8.1. Travel Plan

A Travel Plan (Mobility Management Plan) has been prepared for the development, as requested by Galway City Council and incorporates Phase 1 and 2 of the development. See Appendix E of this Report.

### 8.2. Car Club

Car Club spaces will be provided for the development, in general one car club space can replace 10 – 15 residential parking spaces.

Car club spaces will be provided within the development, exact number to be agreed. All residents in the development will have access to this car club and the car club will also be open to other users and locals within the area.

### 8.3. Cycle Parking

A total of 71 bicycle parking spaces are available within the existing Gateway Retail Park at ground floor level. This bicycle parking is provided for retail users and employees of the Gateway Retail Park.

The feasibility of further secure and covered cycle parking will be considered within the basement for workers at the development. Consideration will be given to the feasibility of providing showers and lockers where appropriate.

A mix of secure, sheltered and surface level cycle parking will be provided for the residents and visitors within the proposed development as stated in Section 5. The total number provided is 677.

This is significantly in excess of the rate required within the Galway City Development Plan, which is based on car parking spaces. This would only require the provision of approximately 70 cycle spaces. The number being provided ties in with the ethos of sustainable development and encouragement of the use of other forms of transport.

### 8.4. Taxi Access

A total of 6 No. Taxi parking spaces are located conveniently within the ground floor carpark outside the main entrance to Dunness Stores. This facility is provided as part of the existing development and is one of the measures that may encourage people to use alternative modes of transport.

### 8.5. Other Measures

New waymarking will be provided throughout the development with measures provided to improve access and information for taxis/public transport/ walking and cycling.

# 9. Traffic Assessment

## 9.1. Overview

A Traffic and Transport Assessment in accordance with TII's Traffic and Transport Assessment Guidelines has been undertaken.

## 9.2. Current Baseline Traffic Flows

### 9.2.1. Traffic Count Surveys

Traffic count surveys were taken at different locations within the Study Area to gain an understanding of the current traffic conditions and current traffic flows. The traffic counts undertaken By NDC to included Automatic Traffic Counts (ATC) and Junction Traffic Counts (JTC), the location of these surveys is shown on the Figure 9-1.

ATC data was collected for a one-week period from Monday October 15, 2018 to Sunday October 21. The JTC surveys were carried out on Tuesday October 16, 2018 and Saturday October 20, 2018.

In addition, car parking occupancy surveys were undertaken within the existing car park of the Gateway Retail Park on Tuesday October 16, 2018 and Saturday October 20, 2018.

### 9.2.2. Peak Hour Traffic Flows

Based on the JTC survey data following time periods were identified as the peak hour periods:

- Weekday AM Peak (08:00 to 09:00 hours),
- Weekday PM Peak (17:00 to 18:00 hours),
- Weekend Peak (12:00 to 13:00 hours).

The network diagrams showing the peak baseline condition traffic flow condition has been shown in the Appendix C.

The peak flow traffic flows at various junctions for baseline scenario are given within Table 1.



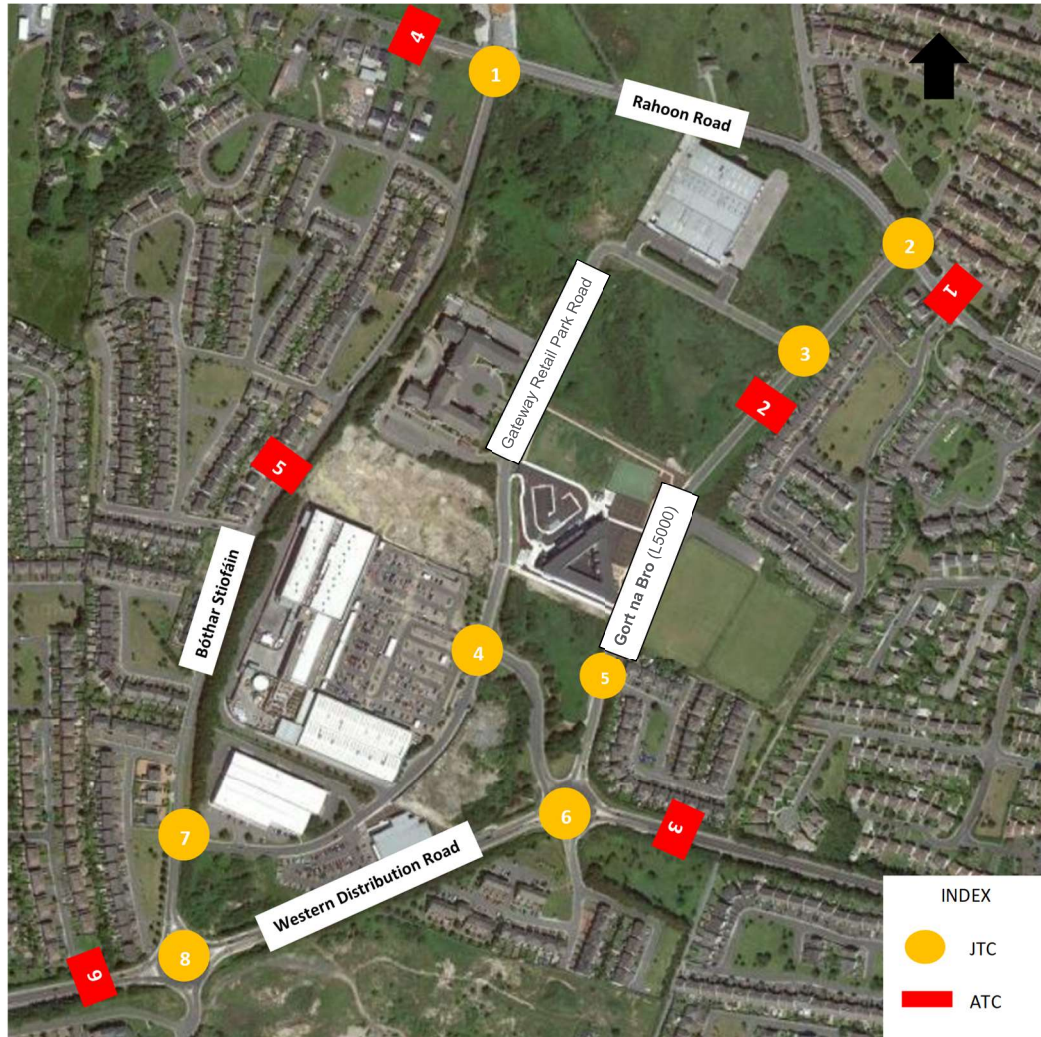


Figure 9-1 - Locations of the Traffic Counts

Table 1 - Baseline Peak Traffic flow (in PCU) at various junctions

JUNCTION	LOCATION	TYPE	Weekday AM peak	Weekday PM Peak	Weekend peak
Junction 1	Ragoon Road/ Bothar Stiofain	3-arm T-Junction	746	471	480
Junction 2	Ragoon Road/ Gort Na Bro	3-arm T-Junction	765	700	635
Junction 3	Gort Na Bro/ Gateway Retail Park Road (Internal)	4-arm roundabout	419	337	244
Junction 4	Retail Park Internal Roundabout	4-arm roundabout	663	770	1,006
Junction 5	Gort Na Bro (L5000) at the entrance to Gort na Bro estate	3-arm T-Junction	235	186	164

Junction 6	Gort Na Bro/ Western Distribution Rd	5-arm roundabout	1,108	1,194	1,428
Junction 7	Bothar Stiofain / Gateway Retail Park Road	3-arm T- Junction	807	728	737
Junction 8	Western Distribution Rd/ Bothar Stiofain	4-arm roundabout	1542	1,438	1,492

### 9.2.3. Baseline network Traffic Flow Conditions

To determine the existing baseline traffic flow conditions Atkins undertook a number of site visits and reviewed online traffic flow data (Google maps). Based on these site visits and from the online data the following points are noted:

- The busiest junctions are junctions 4,6 and 8.
- Analysis of online traffic flow data indicates that all the junctions within the study area operate without significant delays.

### 9.3. Committed Development

Committed development in the area consists of the Phase 2 of Gateway Retail Park, this project was granted planning permission under planning ref 06/399 and is currently under construction (Figure 1-1).

The proposed development in this Phase 2 consists of the following development types:

- Retail Park including coffee shop (Total GFA 9,885 m2 including 197 m2 coffee shop),
- Office (Total GFA 786 m2),
- Gym (Total GFA 678 m2),
- Creche (Total GFA 444 m2).

A Traffic and Transport Assessment (TTA) and Mobility Management Plan was prepared for the planning application. This report has been reviewed by Atkins to identify the additional traffic forecast to be generated by the Phase 2 development.

The TTA report utilised TRICS to determine the traffic flows associated with each land use within the proposed development, and it assumed that 25% of the trips between the Gym, Creche and Café development are internal trips and necessary reductions in the Trips were done. The report only presented traffic flows for the weekday AM and PM peaks.

The Trips arising from various developments are detailed within Table 2.

**Table 2 - Weekday Trips Phase 2 (Source TTA Report for Planning Ref 06/399.)**

Development	Weekday AM Peak		Weekday PM Peak	
	Trips IN	Trips OUT	Trips IN	Trips OUT
Retail	99	66	111	137
Office	11	2	1	10
Gym	8	3	10	6
Creche	19	16	13	16
Café	0	0	7	4
<b>TOTAL</b>	<b>137</b>	<b>87</b>	<b>142</b>	<b>173</b>

<b>MODIFIED for Linked Traffic</b>	<b>130</b>	<b>82</b>	<b>135</b>	<b>167</b>
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Trips generation for the development during Weekend was not present in the TTA report.

Atkins have utilised the TRCIS database to determine trips for Weekend period for the retail element (9,688 sq.m GFA).

For Office, Gym, Creche and Café development the following assumptions were made to the modify the Trips obtained for the Weekday period. The trips generated for the Weekend period are shown in Table 3.

- A. Office - 25% of the weekday traffic.
- B. Gym - 50% weekday traffic.
- C. No Trips were assumed on Weekend for Creche development.
- D. Café, 25% **more** traffic for Weekend was assumed as compared to Weekday Trips.
- E. In this case a 25% reduction was made for the Linked traffic (Internal Trips).

**Table 3 - Weekend Trips Phase 2.**

Development	Weekend Peak	
	Trips IN	Trips OUT
Retail	165	154
Office	3	3
Gym	5	5
Creche	0	0
Café	9	9
<b>TOTAL</b>	<b>181</b>	<b>170</b>
<b>MODIFIED for Linked Traffic</b>	<b>178</b>	<b>167</b>

### 9.3.1. Combined Baseline and Committed Development Traffic Flows

The trips generated by Phase II of the development were distributed at various junctions (Figure 1-2) in the similar proportion to the baseline traffic flow situation.

The network diagram showing the traffic flow (baseline +committed development) arising from the new developments are contained within Appendix C.

**Table 4 – Traffic flow at various junctions (Baseline + Committed Development)**

	Weekday AM Peak	Weekday PM Peak	Weekend Peak
Junction 1	783	510	524
Junction 2	812	759	690
Junction 3	461	387	286
Junction 4	859	1,051	1,333
Junction 5	236	189	169
Junction 6	1,165	1,285	1,559
Junction 7	937	907	942
Junction 8	1,647	1,607	1,685





### 9.3.2. N6 Galway City Ring Road (N6 GCRR)

The N6 Galway City Ring Road scheme it is proposes to change Junction 6 from the 5-arm roundabout to a 4-arm junction and to change junction 5 from a 3-arm T-junction to a 4-arm signalised junction.

Junction 6 will be modified to a 4-arm roundabout and Junction 5 will be modified from 3-arm T-junction to 4-arm signalised junction.

## 9.4. Trip Generation for Phase 3 and Phase 4

The planned element of Phase 3 and future Phase 4 of the Knocknacarra District Centre consist of the following elements

**Table 5 - Land Use Pattern for Phase 3 and Phase 4**

Phase	Land use	Specification
Phase 3	Retail Park	2,667 square metres GFA
	Residential Unit	332 residential units
	Community Use Building	92 square metres GFA
Phase 4	Zoned Industrial/Commercial	3,398 square metres plan area

There is also a tenant amenity accommodation and creche facility proposed as part of Phase 3. These will not create additional trips as these facilities are predominantly aimed at tenants. It is envisaged that any spare capacity that may be available within the creche it will be utilised by those already using the Knocknacarra District Centre

## 9.5. Trip Generation: Phase 3

The TRICS database has been utilised to determine the trip generation for the Retail and Residential elements of Phase 3. For the community building we have assumed a trip of 20 arrivals and 20 departures in all peaks.

### 9.5.1. Trip Generation: Retail Park

Trip generation for the retail park development is based on data from TRICs databases for both weekday and weekend.

Following parameters were selected for generation Trips Rate from the database:

- A. Land Use: 01 - Retail
- B. Category: K - Retail Park – Excluding Food
- C. Gross Floor Area – 2,667 square metres

Trip Rate and Trip Generation for retail park is detailed within Table 6 below.

**Table 6 - Trip rate and Trip generation for Retail Park (Phase 3)**

Peak Hour	Gross Floor Area	Arrival rate (Per 100 sq. m.)	Departure rate (Per 100 sq. m.)	Arrivals	Departures
Weekday AM Peak (08:00 – 09:00)	2,667	0.504	0.295	13	8
Weekday PM Peak (17:00 – 18:00)	2,667	1.134	1.202	30	32
Weekend peak (12:00 – 13:00)	2,667	1.703	1.588	45	42

**9.5.1.1. Linked Trips/Cross-Visitation**

Some of the trips to the new retail units will come from people already travelling to the existing retail units within the park.

The TRICS Research Report 05/01 “Trip Attraction Rates of Development with Multiple retail and leisure Uses” shows that the more individual units are located on any site, the greater the number of linked trips. The linked trips can be in the order of 50% of sites with 10 or more units.

For the purposes of this TTA a linked trip rate of 20% has been assumed for this retail traffic.

**9.5.1.2. Bypass Trips**

No bypass traffics were considered for the analysis.

**9.5.2. Trip Generation: Residential**

Trip generation for the residential development based on data from TRICs databases for both weekday and weekend.

Following parameters were selected for generation Trips Rate from the database:

- D. Land Use: 03 - Residential
- E. Category: C – Flats Rented
- F. Number of residential units – 332 units

**9.5.2.1. Internal Trips**

Some of the trips from residential units will be internal trips, i.e. trips between retail park and residential may be linked to each other. The National Travel Survey 2016 undertaken by CSO shows that approximately 40-50 % of residential trips are for these purposes.

For the purposes of this development, these trips would be internal trips between residential and adjacent retail and as such would not create additional vehicle trips. Hence, for the analysis purpose it was assumed that 40% of the trips for residential development will be internal trips.

Note: Departure rates are devised from TRICs using developments with similar local infrastructure and public transport links. When considering current trends relating to car ownership and car sharing schemes TRICs estimates could be excessive.

**Table 7 – TRICS Trip rate and Trip generation for residential development (Phase 3)**

Peak Hour	Number of residential units	Arrival rate (Per unit)	Departure rate (Per unit)	Arrivals	Departures	Modified Arrivals	Modified departures
Weekday AM Peak (08:00 – 09:00)	332	0.045	0.221	15	73	9	44
Weekday PM Peak (17:00 – 18:00)	332	0.186	0.064	62	21	37	13
Weekend peak (12:00 – 13:00)	332	0.089	0.11	30	37	18	22

### 9.5.3. Trip Generation for Phase 3

The combined total trip generation for Phase 3 is summarised within Table 8

**Table 8 - Total Trip generation for phase 3 combined**

Peak Hour	Retail		Residential		Community		Total	
	Arrivals	Departures	Arrivals	Departures	Arrivals	Departures	Arrivals	Departures
Weekday AM Peak (08:00 – 09:00)	13	8	9	44	20	20	42	72
Weekday PM Peak (17:00 – 18:00)	30	32	37	13	20	20	87	65
Weekend peak (12:00 – 13:00)	45	42	18	22	20	20	83	84

### 9.6. Trip generation: District Centre Use Site (Phase 4)

The Future District Centre Use Site (Phase 4) is located between the proposed development and existing Gateway Retail Park in the heart of the Knocknacarra District Centre. The approximate site area is 3,398 sq m. The site is currently zoned as industrial/commercial zone as per Galway City Development Plan.

The TRICS database has been utilised to determine the trip generation for the Industrial/Commercial zones for Phase 4. The TRICS database have been utilised for both AM and PM weekday peak. No trips have been assumed for weekend.

**Table 9 - Trip rate and generation for future district centre use (Phase 4)**

Peak Hour	Trip rate		Trip Generation	
	Arrivals	Departures	Arrivals	Departures
Weekday AM Peak (08:00 – 09:00)	0.260	0.069	9	2
Weekday PM Peak (17:00 – 18:00)	0.063	0.240	2	8
Weekend peak (12:00 – 13:00)	0	0	0	0

## 9.7. Combined trips generated from Phase 3 and Phase 4

The combined arrivals and departures from developments of both Phase 3 (Retail park and residential development) and Phase 4 (Future District Centre) were combined for the analysis of the traffic flow at different junctions.

**Table 10 - Combined trips generated from Phase 3 and Phase 4 developments**

Peak Hour	Phase 3		Phase 4 (Future District Centre)		Total	
	Arrivals	Departures	Arrivals	Departures	Arrivals	Departures
Weekday AM Peak (08:00 – 09:00)	42	72	9	2	51	74
Weekday PM Peak (17:00 – 18:00)	87	65	2	8	89	73
Weekend peak (12:00 – 13:00)	83	84	0	0	83	84

## 9.8. Trip Distribution and Assignment

As mentioned previously, the 5-arm roundabout at Junction 6 will be modified to a 4-arm roundabout and Junction 5 will be modified from 3-arm T-junction to 4-arm signalised junction.

In the No Development Scenario Junction 6 remains as a roundabout junction and Junction 5 is a priority junction.

In committed development scenario, another exit north of the current mini roundabout will be provided for the gateway retail park. It has been assumed that half of the trips from the retail park will be using this exit.

In the With Development Scenario, the baseline was modified as per the new configuration of Junction 5 and Junction 6. The modified network flow diagram has been given in Appendix C.

The additional trips generated from combined Phase 3 and Phase 4 were distributed proportionally at different junctions based on the modified baseline traffic flow data.

The new network diagram showing the With Development is shown within the Appendix C.

The total flow comprises at different junctions for the baseline, baseline + committed, and for the With Development scenarios are summarised within Table 11

**Table 11 - Traffic flow at different junctions for each scenario**

Junction	Baseline			Baseline + Committed			With Development with Jn 5 and Jn 6 modification		
	Weekday AM Peak	Weekday PM Peak	Weekend Peak	Weekday AM Peak	Weekday PM Peak	Weekend Peak	Weekday AM Peak	Weekday PM Peak	Weekend Peak
1	746	471	480	783	510	524	818	542	546
2	765	700	635	812	759	690	833	800	708
3	419	337	244	461	387	286	490	417	309
4	663	770	1,006	859	1,051	1,333	976	1,202	1,491
5	235	186	164	236	189	169	581	622	864
6	1,108	1,194	1,428	1,165	1,285	1,559	1,197	1,313	1,592
7	807	728	737	937	907	942	1022	1018	1048
8	1,542	1,438	1,492	1,647	1,607	1,685	1,729	1,710	1,788



# 10. Car Parking

## 10.1. Car Parking Strategy

The Car Parking Strategy for the commercial element of the development is based on providing sufficient parking to meet with the existing and the proposed demand that will be generated by the retail development at Gateway Retail Park. The current parking provision within Phase 1 is 724 No. carparking spaces. On the completion of Phase 2 there will be a total of 896 commercial parking spaces available, which is 323 No. parking spaces above the total car parking demand for all the phases combined. The demand was confirmed by analysis undertaken to date (see Section 9.3 to 9.5 below) and it also aligns with target occupancy levels for the whole of the development Phases 1 through to 4.

Parking management will be in place to prevent unsustainable parking and abuse of the parking controls by nearby office units or residents.

The residential parking provision will be provided in accordance with latest guidance from the Department of Housing, Planning and Local government's "Sustainable Urban Housing: Design Standards for New Apartments Guidelines for urban Planning Authorities". The proposal is to provide a ratio of 0.8 per apartment which equates to a provision of 266 spaces. This approach is validated by assessing the census data for car ownership and is covered in detail in Section 10.5.2.

## 10.2. Parking Demand

The parking demand for the existing condition was determined by conducting the surveys on 15 October 2018 for Weekdays and on 21 October 2018 for Weekend.

The likely parking demand for the committed development (Phase 2) was determined using information from the Traffic and Transport Assessment and Mobility Management Plan prepared by Barrett Mahony Consulting Engineers.

The parking demand for Phase 3 (Retail Park) and Phase 4 (Leisure type Development) car parking demand was determined using TRICS data base Trip rate analysis.

Utilising this data, a dynamic parking demand exercise was undertaken for the commercial elements of the development.

## 10.3. Existing Demand (Phase 1 – Base Condition)

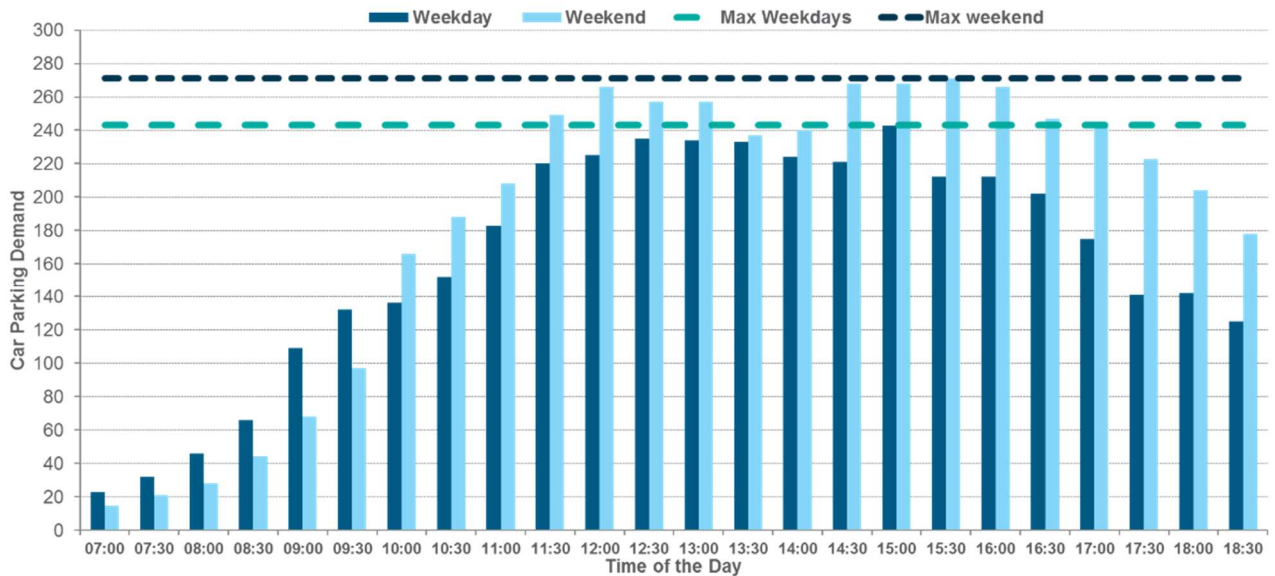
Car Parking Demand for the existing condition was determined by conducting parking beat surveys.

The surveys recorded the number of cars parked at the existing car parking at Gateway Retail Park.

The survey recorded the number of cars parked for each 30-minute ranging from 07:00 to 19:00 hours (Total 12 hours) on a weekday and on a weekend. The surveys were undertaken by a specialist traffic survey company, Nationwide Data Collection (NDC). The survey results indicated the following:

- The maximum demand on the weekday was 257 spaces.
- The maximum demand on the weekend was 274 spaces.

The graph below shows the variation in car parking demand over a weekday and a weekend.



**Figure 10-1 - Variation of car parking demand over a day for Weekday and Weekend**

### 10.4. Future Demand for committed development (Phase 2)

The total trips for the Phase 2 were determined from Traffic and Transport Assessment and Mobility Management Plan prepared by Barrett Mahony Consulting Engineers. Based on an average duration of stay and the maximum trips the parking demand from Phase 2 was calculated.

From the survey data, the average duration of stay for vehicles in the car park was found out to be 45 minutes.

Based on these two factors the parking demand for Phase 2 was estimated at 125 spaces. The combined parking demand for Phase 1 and Phase 2 is summarised within the table below.

**Table 12 - Total Car Parking Demand for Phase 1 and Phase 2**

Deration	Phase 1 car park demand	Phase 2 car park demand	Total Car Park Demand (Phase 1 + Phase 2)
Weekday	257	125	382
Weekend	274	125	399

### 10.5. Future demand for Phase 3 and Phase 4

Phase 3 and Phase 4 demands can be categorised into:

- A. Commercial Demand – Consisting of Local Retail, Community use and future District Centre Use.
- B. Residential Demand/Provision for 332 apartment units.

The demand for the commercial units were determined using the Trip rate obtained from the TRICS database.

The residential parking provision is based on the requirements of the Sustainable Urban Housing: Design Standards for New Apartments Guidelines for urban Planning Authorities”.

### 10.5.1. Commercial Units

A dynamic parking assessment has been undertaken using arrival and departure data from TRICs. The following assumptions were also made in this assessment:

- Parking demand for community use was assumed to be 20 units.
- The local retail units will be used by residents and workers in the area and have no parking demand
- It was assumed that 20% of the trips to the new district centre retail will be linked trips.

**Table 13 - Car Park Demand for Phase 3 and Phase 4**

Duration	Phase 3			Phase 4	Total
	Local Retail	Community Use	District retail centre (Modified for the linked traffic)	Future District Centre Use	
Weekday	0	20	0.8*26 = 21	37	78
Weekend	0	20	0.8*53 = 43	59	122

The total demand resulting from addition of all the parking demands for all phases were increased by 10% to allow for fluctuations in survey results (Table 14). Based on the below, the maximum parking demand for the commercial element of the development was calculated as 573 spaces.

**Table 14 - Total Car Parking Demand for all the phases combined**

Duration	Phase 1	Phase 2	Phase 3 + Phase 4	Total Car Parking Demand	Higher Demand (1.1 X Total)
Weekday	257	125	78	460	506
Weekend	274	125	122	521	573

### 10.5.2. Residential Car Parking Provision

An appropriate and sustainable number of parking spaces have been provided for the residential units within the development.

The level of parking provided is in accordance with the Department of Housing, Planning and Local Government’s “Sustainable Urban Housing: Design Standards for New Apartments Guidelines for Planning Authorities”.

This guidance recommends that the parking provision for apartments in similar locations to this proposed development are less than 1.0 per a unit. The guidance doesn’t say how much less the parking ratio should be. Therefore, we have provided evidence to determine what the appropriate reduction from 1.0 per unit should be.

The analysis of Census data indicates that close to **20% of households** within the **similar developments** in Galway **do not own** a car. Within the proposed development the level of car parking consists of 0.8 spaces per a residential unit, mobility solutions including car club, storage and cycle parking is provided within the proposed development. Total residential parking provision is 266 parking spaces, for location and details refer to Parking Report included in Appendix G.

The parking provision within the overall district centre will allow for drop off and visitor parking and care has been taken to ensure that adequate disabled parking is provided in the podium parking area.

As noted within Guidelines “*Car free’ development is permissible and if developed, must be fully communicated as part of subsequent apartment sales and marketing processes.*” This principle will be adopted for this proposed development, with an appropriate cost associated with the purchase of the parking spaces and a maximum of one space per an apartment unit.

Promoting the alternative modes of transport, walking, cycling and use of public transport is integral part of national and international policies and initiatives as it has been in the approach to this development. This is driven by need for change and departures from traditional use of car for all transport. National Framework Policies and Local Authority Policies also support this need for a behavioural change and understand that well developed public transport network supported with diversified modes of transport will help to achieve this. Galway Transport Strategy Policies 8, 9 and Projects 1 (proposed bus network), and Project 6 in particular, which states **reducing parking requirements / maximum permitted levels of parking for new developments** are in line with this approach.

The above has been recently further highlighted by Irish Government in light of Climate Emergency, *By the end of 2019, a study would look at the potential for congestion charges, low emission zones and changes to car-parking policies in urban areas. The study, which would be published in the first quarter of 2020, would “recommend most appropriate responses for Dublin/Cork/Galway/Limerick”.*

National Planning Framework published in 2018 includes plans for compact and sustainable growth for Ireland’s five cities to grow by 50% by 2040. Galway is one of them. The NPF has clearly defined National Strategic Outcomes supporting the objectives of this Plan, including transition to a Low-Carbon and Climate Resilient Society, Compact Growth and Sustainable Mobility.

#### 10.5.2.1. Department of Housing, Planning and Local government’s “Sustainable Urban Housing: Design Standards for New Apartments Guidelines for urban Planning Authorities”

The 2018 Guidance update the Sustainable Urban Housing: Design Standards for New Apartments The 2018 Guidance updates the Sustainable Urban Housing: Design Standards for New Apartments guidelines, published in 2015. The new guidance, “**remove requirements for car-parking in certain circumstances where there are better mobility solutions and to reduce cost**”.

The Guidelines apply to all housing developments that include apartments that may be made available for sale, whether for owner occupation or for individual lease.

Section 4 of the Guidelines sets new requirements for the provision of car parking within apartment developments. It sets out these requirements based on the location of the apartments. It notes:

*“The quantum of car parking or the requirement for any such provision for apartment developments will vary, having regard to the types of location in cities and towns that may be suitable for apartment development, broadly based on **proximity and accessibility** criteria.”*

Proximity refers to how close the residential units are to shops, leisure, retail services and employment centres whilst accessibility refers to how far people can travel by different modes in a certain amount of time.

The guidelines note the following

##### 1. **Peripheral and/or Less Accessible Urban Locations:**

*As a benchmark guideline for apartments in relatively peripheral or less accessible urban locations, **one car parking space per unit, together with an element of visitor parking, such as one space for every 3-4 apartments, should generally be required.***

##### 2. **Intermediate Urban Locations:**

*In suburban/urban locations served by public transport or close to town centres or employment areas and particularly for housing schemes with more than 45 dwellings per hectare net (18 per acre), planning authorities **must consider a reduced overall car parking standard and apply an appropriate maximum car parking standard.***

##### 3. **Central and/or Accessible Urban Locations:**



*In larger scale and higher density developments, comprising wholly of apartments in more central locations that are well served by public transport, the default policy is for car parking provision to be minimised, substantially reduced or wholly eliminated in certain circumstances. The policies above would be particularly applicable in highly accessible areas such as in or adjoining city cores or at a confluence of public transport systems such rail and bus stations located in close proximity.*

*These locations are most likely to be in cities, especially in or adjacent to (i.e. within 15 minutes walking distance of) city centres or centrally located employment locations. This includes 10 minutes walking distance of DART; commuter rail or Luas stops or within 5 minutes walking distance of high frequency (min 10 minute peak hour frequency) bus services.”*

These requirements have been summarised within the following Table, along with our interpretation of what these standards with the appropriate level of parking, taking into account Census data for car ownership within similar locations and the understanding that the guidelines effectively mean that each apartment cannot have more than 1.0 car parking space and therefore car ownership per a household cannot exceed 1.0. The Knocknacarra area is an accessible urban location, it is served with a good public transport system and is within 3.5km of the city centre. Furthermore, the proposed development will be providing 152 dwellings per hectare.

**Table 15 - Summary of "Sustainable Urban Housing: Design Standards for New Apartments Guidelines for Planning authorities"**

Location	Parking for Households	Visitor parking
<b>Less Accessible Urban Locations</b>	One space per unit	1 for 3-4 apartments
<b>Intermediate Urban Locations</b>	Must considered reduce standard. ie. <1 per unit <i>(Must be less than the Less Accessible Urban Location. range of 0.8 – 1.0 per a unit)</i>	<i>Should be less than the Less Accessible Urban Location</i> 1 for 4 – 6 apartments
<b>Central and/or Accessible Urban Locations</b>	Default policy is for car parking provision to be minimised, substantially reduced or wholly eliminated in certain circumstances <i>(Should be less than Intermediate Urban Location. Accessible Urban Location: 0.5 - 0.8 per a unit, but reductions allowed Central - &lt;0.5 per a unit )</i>	1 per 6-10 apartments. Zero in certain circumstances

**10.5.2.2. Car Ownership Level – Census 2016**

The census data, Small Area Population, of other apartments buildings within Galway was reviewed to determine the level of car ownership and number of households that don't own a car.

The Small Area Populations that were utilised within this review were:

- SAP Reference (Sa2017\_068003055) – Altan Apartment
- SAP Reference (Sa2017\_068003028) – Arun Bun Caise
- SAP Reference (Sa2017\_068001037) – Boireann Bheag
- SAP Reference (Sa2017\_068001018, Sa2017\_068001033, Sa2017\_068001017) – Fionnisce
- SAP Reference (Sa2017\_068008003) – Ocean Towers

These have been summarised in the following table:

**Table 16 – Car parking from similar Small Areas in Galway**

Location	No. of Households	Car Ownership				
		0 car	1 car	2 cars	3 cars	>=4 Cars
Altan Apartments, Galway	103	19 (18%)	67 (65%)	16 (16%)	1	0
Árus Bun Caise, Bun Caise, Bishop O'Donnell Rd, Galway	79	24 (30%)	31 (39%)	19 (24%)	1 (1%)	4 (5%)
Boireann Bheag, Roscam, County Galway	64	2 (3%)	29 (45%)	23 (36%)	8 (13%)	2 (3%)
Fionnuisce, Doughiska, County Galway	222	40 (18%)	114 (51%)	55 (25%)	12 (5%)	1
Ocean Towers, Blackrock, Salthill, Galway City Suburbs	90	14 (16%)	41 (46%)	28 (31%)	7 (8%)	0
<b>AGGREGATE</b>	<b>558</b>	<b>99 (18%)</b>	<b>282 (51%)</b>	<b>141 (25%)</b>	<b>29 (5%)</b>	<b>7 (1%)</b>

Based on the above information, the number of households **without a car** varies from 3% to 30%, with an aggregate of 18% of households not owing a car.

Based on the above, it would be reasonable to target that 20% of the household units within the proposed development will not own a car and that the reduction from 1.0 should be 0.2, therefore the parking ratio for residential units will be 0.8 per a unit. Given the strong proximity to local services

and employment and the good accessibility of the proposed site, this is an appropriate and sustainable parking ratio.

### 10.5.2.3. Parking report

A parking report detailing the residential parking provision and parking management has been prepared as part of this report. It is included in the Appendix G.

### 10.5.2.4. Measures to support mobility

As part of the proposed development and overall Mobility Management Plan has been prepared and will be implemented. It is included in Appendix E of this report.

As part of this Plan consideration will be given to a car club scheme which would look at providing parking spaces for the car club. The location of these parking spaces would be then agreed.

High quality bicycle parking spaces and storage areas will be provided for the residents within the development.

## 11. Traffic Impact Statement

### 11.1. Traffic forecasting

Traffic forecasting was done in accordance with TII’s zone-based growth factor for Light vehicle (LV) included in Project Appraisal Guidelines (Unit 5.3).

The NTpM Zone number for the Gateway retail Park is 1891 for which following growth rates were taken for the analysis purpose:

Table 17 - Growth Factors

NTpM Zone	2013-30		2013-30		2013-30		2030-50		2030-50		2030-50	
	AM Origin	AM Destination	IP Origin	IP Destination	PM Origin	PM Destination	AM Origin	AM Destination	IP Origin	IP Destination	PM Origin	PM Destination
1891	1.011	1.0173	1.008	1.0085	1.017	1.0114	1.002	1.0027	1.001	1.0017	1.0027	1.0020

### 11.2. Assumptions

The following assumptions were made to simplify the analysis:

- A. For Weekdays average growth rate of AM origin and AM destination was taken for AM peak and the similar was done for PM Peak.
- B. For weekend peak, growth factor was taken as the average of IP (Interpeak) origin and IP destination. This was done as the weekend peak hour lie between 12:00 to 13:00 hours.

### 11.3. Assessment Approach

The purpose of the traffic impact assessment is to determine the impact on the surrounding road network, due to localised traffic movements and patterns.

As junctions 5 and 6 are directly impacted by the proposed works, it is necessary to analyse them immaterial of percentage increase of traffic at these junctions. Junction 5 will be changed from a 3-arm priority junction to a 4-arm signalised junction, and junction 6 changes from 5-armed roundabout to a 4-arm roundabout.

For all other junctions we have assessed the percentage increase of traffic at these junctions due to development of Phase 3 and Phase 4 in comparison to the baseline network.

Table 18 - Percentage increase in the number of vehicles at different junctions due to development of Phase 3 and Phase 4

Junction	Weekday AM peak			Weekday PM peak			Weekend peak		
	Phase 1	Phase 1+3+4	Increase	Phase 1	Phase 1+3+4	Increase	Phase 1	Phase 1+3+4	Increase
Junction 1	746	773	4%	471	498	6%	480	501	4%
Junction 2	765	789	3%	700	735	5%	635	659	4%
Junction 3	419	446	6%	337	365	8%	244	266	9%
Junction 4	663	780	18%	770	921	20%	1006	1,164	16%
Junction 7	807	887	10%	728	831	14%	737	837	14%
Junction 8	1542	1,611	4%	1438	1,533	7%	1492	1,588	6%

In line with TII’s Traffic and Transport Assessment Guidelines, junctions were subject to detailed junction analysis if the following thresholds were exceeded:

1. Development traffic exceeds 10% of turning movements at junctions
2. Development traffic exceed 5% of turning traffic movements at junctions if location has potential to become congested or it is sensitive.

As per Table 18, the proposed development traffic flow at Junction 4, and 7 exceeds 10% on the baseline flow. Hence these junctions were analysed further for future growth purpose.

Junction 3 is considered as sensitive junctions, therefore the threshold for this junction was considered as 5%. As this threshold was exceeded this junction was analysed.

Following the above assessments, these junctions were analysed for the following scenarios:

1. Baseline traffic – Opening year (2020)
2. Baseline traffic – Opening year + 5 (2025)
3. Baseline traffic – Opening year + 15 (2035)
4. Traffic flow with committed development – Opening year (2020)
5. Traffic flow with committed development – Opening year + 5 (2025)
6. Traffic flow with committed development – Opening year + 15 (2035)
7. Traffic flow with all development – Opening year (2020)
8. Traffic flow with all development – Opening year + 5 (2025)
9. Traffic flow with all development – Opening year + 15 (2035)

The ‘committed development’ scenario includes for the permitted Phase 2 Gateway Retail development.

The ‘all development’ scenario includes the committed development and Phase 3 and Phase 4 of the Knocknacarra District Centre.

## 11.4. N6 Galway City Ring Road Impact

### 11.4.1. Gort na Bro/Western Distributor Road

Galway County Council’s consultants for the N6 Galway City Ring Road provided information on the impact of the N6 Galway City Ring Road on the Gort na Bro / Western Distributor Road (email 11 Jan 2019). This data contained predicted traffic flows from the strategic traffic model for Galway for a Do Minimum and a Do Something scenarios. The Do Something scenario includes the N6 Galway City Ring Road.

From a review of the data provided, the following points are noted:

- The N6 Galway City Ring Road will not result in an increase in traffic flows at the Gort na Bro / Western Distributor Road



- The N6 Galway City Ring Road will result in approximately 30% reduction in traffic flows at the Gort na Bro / Western Distributor Road.
- The N6 Galway City Ring Road will have no impact on the proposed access junction, i.e. the new signalised junction.

Accordingly, no junction analysis is required for a with N6 Galway City Ring Road scenario.

#### 11.4.2. Private Local Road adjacent to the New Square

Based on the analysis of N6 GCRR traffic figures and the Sensitivity Testing of local road network it is not anticipated that the proposed traffic volumes on the Gateway Retail Park Road adjacent to the New Square will attract high traffic flows.

Incoming traffic from N6 GCRR will use N59 Letteragh Junction exit and follow through Ragoon Road Junction to enter L5000, Gort na Bro Roundabout and Western Distributor Road. Traffic figures received from N6 GCRR suggest that the N6 GCRR will result in approximately 30% reduction of traffic flow in this area. (See Chapter 11.4.1 above).

To understand the impact of the additional traffic generated by the proposed development on the road network Atkins has carried out a sensitivity testing considering local residential trip distribution. The results have identified that eastbound traffic from the development will use the Link Road and Traffic Signalised Junction, similarly the traffic travelling to the development will use Gort na Bro roundabout, enter through traffic signalised junction and the Link Road (the sensitivity testing is discussed in Section 11.7 below and details are included in Appendix D of this TTA).

Accordingly, no junction analysis is required for a with N6 Galway City Ring Road scenario.

### 11.5. Traffic Models

The Junctions were analysed individually in different transport modelling software as follows:

- Junction 5 was analysed using JCT LinSig
- Junction 3,4,6,7 and 8 were analysed using TRL Junction 9.

The following terminology should be referenced when interpreting the assessment results:

#### JCT LinSig

- **Mean Maximum Queue:** The sum of the maximum queue on a link (including uniform, random and oversaturation queues) averaged over all the cycles in the modelled time period;
- **Practical Reserve Capacity (PRC):** A measure of how much additional traffic would pass through the junction while maintaining a maximum degree of saturation of 90% on all lanes.

#### TRL Junction 9:

- **RFC:** This is the ratio of demand flow to capacity. The practical capacity threshold is normally 0.85. An RFC below 0.85 represents a junction which is operating in an efficient and stable condition. An RFC of between 0.85 and 1 represents variable operation, and may be said to be operating adequately, if the queueing and delay are deemed acceptable. RFC values more than 1 represent an oversaturated condition;
- **Maximum Queue Length:** This represents the maximum queue length of vehicles waiting to enter the junction on each arm;
- **Average delay:** This shows the average amount of traffic delay at the junction per vehicle over the peak hour period.

## 11.6. Junction Analysis

Junction analysis was undertaken for all the junctions mentioned above for all the scenarios.

### 11.6.1. Junction 3

Junction 3 is a priority junction located at the intersection of Gort Na Bró Road and Unnamed Road connecting to the Gateway Retail Park.

The junction provide access to the Gateway Retail park for commuters coming from Ragoon Road.

The junction was analysed using TRL software package Junction 9 for all the scenarios of Base condition, Committed Development and All the phases developed. The junction diagram and results are shown below:

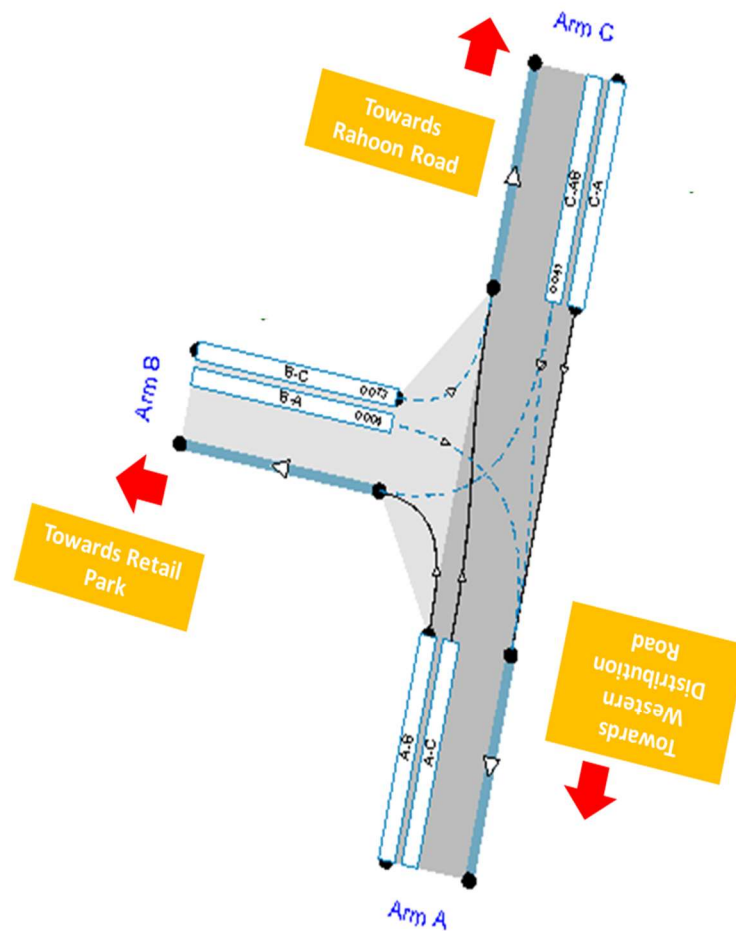


Figure 11-1 – Layout of Junction 3

Table 19 - Junction 3 Results (TRL Junctions 9)

	Weekday AM Peak				Weekday PM Peak				Weekend Peak			
	Queue (PCU)	Delay (s)	RFC	LOS	Queue (PCU)	Delay (s)	RFC	LOS	Queue (PCU)	Delay (s)	RFC	LOS
Opening year – Base Condition												
<b>B – C</b>	0.1	5.66	0.09	A	0.3	6.45	0.23	A	0.1	5.50	0.11	A
<b>B – A</b>	0.0	11.14	0.04	B	0.0	10.35	0.03	B	0.0	10.24	0.01	B
<b>C - AB</b>	0.5	6.82	0.30	A	0.1	5.43	0.07	A	0.1	5.49	0.06	A
Opening year – Committed Development												
<b>B – C</b>	0.1	5.82	0.12	A	0.4	6.82	0.27	A	0.2	5.72	0.14	A
<b>B – A</b>	0.0	11.53	0.04	B	0.0	10.59	0.03	B	0.0	10.41	0.01	B
<b>C - AB</b>	0.6	7.22	0.33	A	0.1	5.64	0.11	A	0.1	5.63	0.08	A
Opening year – All development												
<b>B – C</b>	0.2	5.98	0.14	A	0.4	7.02	0.29	A	0.2	5.87	0.16	A
<b>B – A</b>	0.1	11.76	0.05	B	0.0	10.76	0.03	B	0.0	10.50	0.01	B
<b>C - AB</b>	0.6	7.40	0.35	A	0.2	5.78	0.13	A	0.1	5.70	0.10	A
Opening year + 5 – Base Condition												
<b>B – C</b>	0.1	5.71	0.09	A	0.3	6.57	0.24	A	0.1	5.53	0.11	A
<b>B – A</b>	0.0	11.28	0.04	B	0.0	10.40	0.03	B	0.0	10.27	0.01	B
<b>C - AB</b>	0.4	6.96	0.31	A	0.1	5.44	0.08	A	0.1	5.50	0.06	A
Opening year + 5 – Committed development												
<b>B – C</b>	0.1	5.87	0.12	A	0.4	6.97	0.29	A	0.2	5.77	0.14	A
<b>B – A</b>	0.0	11.69	0.05	B	0.0	10.67	0.03	B	0.0	10.43	0.01	B
<b>C - AB</b>	0.6	7.40	0.35	A	0.1	5.66	0.11	A	0.1	5.64	0.09	A
Opening year + 5 – All Development												
<b>B – C</b>	0.2	6.05	0.15	A	0.4	7.19	0.31	A	0.2	5.89	0.16	A
<b>B – A</b>	0.1	11.94	0.06	B	0.0	10.85	0.04	B	0.0	10.53	0.01	B
<b>C - AB</b>	0.7	7.60	0.37	A	0.2	5.82	0.14	A	0.1	5.72	0.10	A
Opening Year + 15 – Base Condition												
<b>B – C</b>	0.1	5.85	0.11	A	0.4	6.96	0.28	A	0.1	5.60	0.12	A
<b>B – A</b>	0.1	11.80	0.05	B	0.0	10.62	0.03	B	0.0	10.37	0.01	B
<b>C - AB</b>	0.7	7.43	0.36	A	0.1	5.48	0.09	A	0.1	5.52	0.07	A
Opening Year + 15 – Committed Development												
<b>B – C</b>	0.2	6.06	0.14	A	0.5	7.51	0.33	A	0.2	5.88	0.16	A
<b>B – A</b>	0.1	12.33	0.06	B	0.0	10.96	0.04	B	0.0	10.55	0.01	B
<b>C - AB</b>	0.8	8.07	0.41	A	0.2	5.76	0.13	A	0.1	5.69	0.10	A
Opening Year + 15 – All Development												
<b>B – C</b>	0.2	6.26	0.17	A	0.5	7.78	0.36	A	0.2	6.01	0.17	A
<b>B – A</b>	0.1	12.63	0.07	B	0.0	11.17	0.04	B	0.0	10.66	0.01	B
<b>C - AB</b>	0.9	8.34	0.43	A	0.2	5.94	0.16	A	0.1	5.77	0.11	A

The result demonstrates that the proposed development of Phase 2 to Phase 4 will have no impact on the traffic flow on the junction and will have sufficient capacity in all scenarios.

No results are provided for Arm A because Arm A always has priority and therefore does not experience any queues or delays.

### 11.6.2. Junction 4

Junction 4 is an internal four arm roundabout providing access to the Gateway Retail Park, see Figure 11-2 below. As part of Phase 2 development which is under construction an additional access is being provided to the underground car parking. The location of the access point is shown in Figure 11-3. The assumption for the traffic flows exiting the underground car park are based on the layout of this section and ease of access to the exit points. Based on this 65% of the traffic from the underground car park will exit via the internal roundabout and 35% will exit from the new access point for the Phase 2 development.

Given the layout of this junction and the imbalance in traffic flows at this junction TRL software package Junctions 9 has difficulty in modelling this junction, accordingly the junction was assessed using micro-simulation software package VISSIM. It was only assessed for the +15years with all development at the weekend (worst case scenario) and as the junction functions well within capacity for the worst-case scenario no other years were assessed.

The Table 20 below shows the outputs from the Vissim model and Figure 11-4 shows the extent of queues on all arms:

Table 20 - Junction 4 Results (VISSIM)

Arm	Average Queue (pcus)	Average Delay (s)
A	0.18	5.7
D	1.28	25.8
C	1.1	9.9
B	8.79	16.2

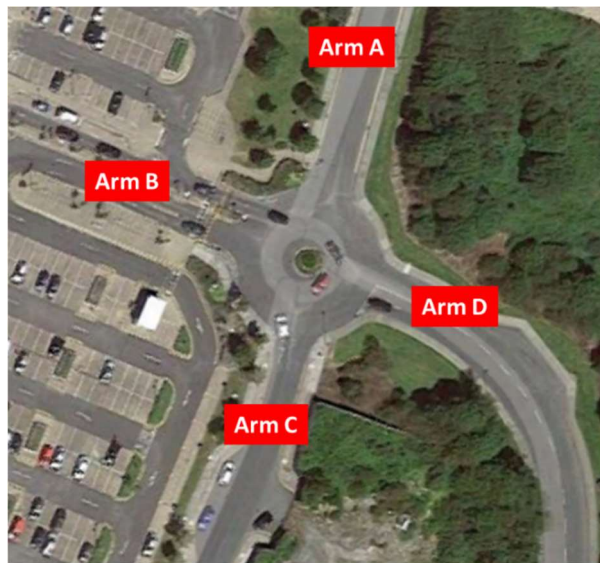


Figure 11-2 - Layout of junction 4





Figure 11-3 – Location of Access / Exit to Underground Car Parking Phase 2



Figure 11-4 – Queues at Junction 4 (Weekend +15 years)

Based on the results it can be seen that the junction will be operating satisfactorily for this scenario.

### 11.6.3. Junction 5

Junction 5 is a priority junction connecting the Gort Na Bró Road L5000 to L-50001 unnamed road leading to Gort na Bro estate. In the With Development scenario this junction will become a four-arm signalised junction providing access to the Knocknacarra District Centre. The layout of this junction is detailed in Figure 11-5 below.

The junction was assessed with a 90 second cycle time using LinSig for the With Development scenario.

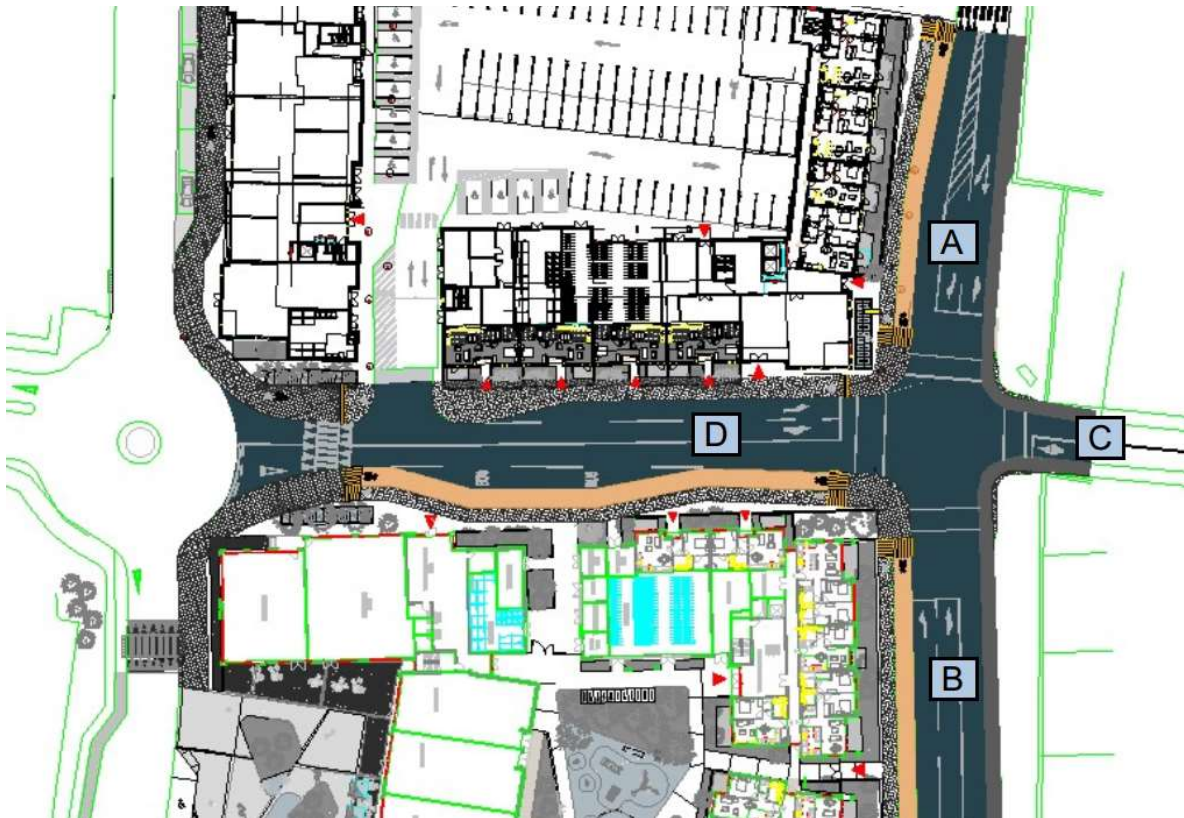


Figure 11-5 - Layout of Junction 5

Table 21 – Junction 5 Results (LINSIG)

**All Development + 15 years**

ARMS	Mean max Queue Length (in pcu)			DOS (in %)		
	Weekday AM Peak	Weekday PM Peak	Weekend Peak	Weekday AM Peak	Weekday PM Peak	Weekend Peak
Arm A	6.7	4.9	3.5	35.9	37.9	48.7
Arm B	9.1	9.2	15.4	36.2	37.6	50.8
Arm C	2.3	1.1	1.4	33.2	31.5	40.8
Arm D	7.2	10.3	14.2	35.6	37.7	50.2

The junction has been run for a double cycle time and an assumption that the pedestrian all red stage is called every second cycle.

The results indicate that the proposed junction will operate well within capacity with acceptable queues and delays. There is additional capacity for an extra 20% flow in the +15years all development for the worst-case scenario weekend peak hour.

### 11.6.4. Junction 6

Junction 6 is a five-arm roundabout located on the intersection of Gort Na Bró Road and Western Distribution Road.

In the With Development scenario this roundabout will be converted to a four-arm Roundabout by removing one arm connecting to Junction 4.

The junction was analysed with five arms for the baseline and for the baseline + committed development. While for Phases 3 and 4 it was analysed with four arms with the arm connecting the roundabout to Junction 4 removed (Arm B of Figure 11-6).

The whole junction was analysed using TRL software package Junction 9 for all the scenarios of Base condition, Committed Development and All the phases developed. The junction diagram and results are shown below.

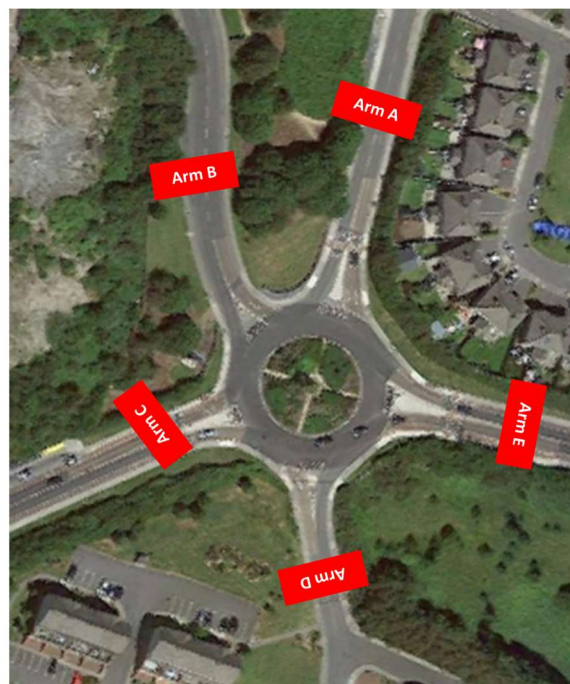


Figure 11-6 - Layout of junction 6

Table 22 – Junction 6 Results (TRL Junctions 9)

	Weekday AM Peak				Weekday PM Peak				Weekend Peak			
	Queue (PCU)	Delay (s)	RFC	LOS	Queue (PCU)	Delay (s)	RFC	LOS	Queue (PCU)	Delay (s)	RFC	LOS
Opening year – Base Condition												
<b>Arm A</b>	0.2	3.33	0.13	A	0.1	3.11	0.08	A	0.1	3.34	0.06	A
<b>Arm B</b>	0.1	3.31	0.11	A	0.2	3.39	0.16	A	0.3	3.88	0.23	A
<b>Arm C</b>	0.8	6.56	0.44	A	0.7	6.02	0.40	A	1.2	8.69	0.55	A
<b>Arm D</b>	0.0	4.02	0.04	A	0.0	4.44	0.02	A	0.0	4.72	0.02	A
<b>Arm E</b>	0.6	4.21	0.36	A	1.0	5.47	0.50	A	1.2	6.20	0.56	A
Opening year – Committed Development												
<b>Arm A</b>	0.2	3.37	0.14	A	0.1	3.21	0.08	A	0.1	3.49	0.07	A

Arm B	0.1	3.36	0.12	A	0.2	3.58	0.20	A	0.4	4.19	0.28	A
Arm C	0.8	6.91	0.46	A	0.7	6.33	0.42	A	1.4	9.79	0.59	A
Arm D	0.0	4.12	0.04	A	0.0	4.60	0.02	A	0.0	4.98	0.02	A
Arm E	0.6	4.42	0.39	A	1.1	5.87	0.53	A	1.5	7.02	0.60	A
Opening year – All development												
Arm A	0.3	3.63	0.25	A	0.3	3.54	0.25	A	0.5	4.06	0.31	A
Arm C	1.0	7.72	0.50	A	0.8	6.96	0.45	A	1.7	11.25	0.63	B
Arm D	0.0	4.14	0.04	A	0.0	4.63	0.02	A	0.0	5.05	0.03	A
Arm E	0.7	4.46	0.40	A	1.2	6.00	0.54	A	1.6	7.33	0.62	A
Opening year + 5 – Base Condition												
Arm A	0.2	3.39	0.14	A	0.1	3.16	0.08	A	0.1	3.38	0.06	A
Arm B	0.1	3.37	0.11	A	0.2	3.45	0.16	A	0.3	3.94	0.24	A
Arm C	0.9	6.85	0.46	A	0.7	6.26	0.42	A	1.3	9.07	0.57	A
Arm D	0.0	4.08	0.04	A	0.0	4.54	0.02	A	0.0	4.79	0.02	A
Arm E	0.6	4.33	0.38	A	1.1	5.75	0.52	A	1.3	6.42	0.57	A
Opening year + 5 – Committed development												
Arm A	0.2	3.43	0.14	A	0.1	3.27	0.09	A	0.1	3.53	0.07	A
Arm B	0.1	3.42	0.13	A	0.3	3.65	0.20	A	0.4	4.27	0.29	A
Arm C	0.9	7.23	0.48	A	0.8	6.60	0.44	A	1.5	10.26	0.61	B
Arm D	0.0	4.19	0.05	A	0.0	4.71	0.03	A	0.0	5.06	0.02	A
Arm E	0.7	4.56	0.41	A	1.2	6.20	0.55	A	1.6	7.33	0.62	A
Opening year + 5 – All Development												
Arm A	0.3	3.72	0.26	A	0.4	3.62	0.26	A	0.5	4.14	0.32	A
Arm C	1.1	8.16	0.52	A	0.9	7.28	0.48	A	1.9	11.98	0.65	B
Arm D	0.0	4.22	0.05	A	0.0	4.74	0.03	A	0.0	5.14	0.03	A
Arm E	0.7	4.61	0.41	A	1.3	6.34	0.56	A	1.7	7.66	0.64	A
Opening Year + 15 – Base Condition												
Arm A	0.2	3.65	0.17	A	0.1	3.35	0.10	A	0.1	3.52	0.07	A
Arm B	0.2	3.58	0.14	A	0.2	3.69	0.19	A	0.4	4.17	0.26	A
Arm C	1.2	8.20	0.54	A	0.9	7.20	0.49	A	1.7	10.71	0.63	B
Arm D	0.1	4.33	0.05	A	0.0	4.92	0.03	A	0.0	5.06	0.03	A
Arm E	0.8	4.80	0.44	A	1.5	7.01	0.60	A	1.6	7.33	0.62	A
Opening Year + 15 – Committed Development												
Arm A	0.2	3.71	0.17	A	0.1	3.49	0.10	A	0.1	3.70	0.08	A
Arm B	0.2	3.66	0.15	A	0.3	3.96	0.24	A	0.5	4.58	0.32	A
Arm C	1.3	8.89	0.57	A	1.1	7.79	0.52	A	2.0	12.56	0.68	B
Arm D	0.1	4.47	0.05	A	0.0	5.16	0.03	A	0.0	5.39	0.03	A
Arm E	0.9	5.15	0.47	A	1.8	7.83	0.64	A	2.1	8.65	0.68	A
Opening Year + 15 – All Development												
Arm A	0.4	4.10	0.31	A	0.4	3.96	0.31	A	0.6	4.44	0.36	A
Arm C	1.6	10.36	0.62	B	1.3	8.81	0.56	A	2.5	15.30	0.72	C
Arm D	0.1	4.50	0.05	A	0.0	5.22	0.03	A	0.0	5.50	0.03	A
Arm E	0.9	5.21	0.48	A	1.9	8.12	0.66	A	2.3	9.21	0.70	B



The analysis indicates that the junction has sufficient capacity to accommodate the proposed development and that all the arms of the junction will operate within capacity for all the scenarios assessed.

### 11.6.5. Junction 7

Junction 7 is a priority junction located at the intersection of Bothar Stiofáin and Unnamed Road connecting to the Gateway Retail Park.

The junction provide access to the Gateway Retail Park for from the west side of both Rahoon road and Western Distribution road.

The junction was analysed using TRL software package Junction 9 for all the scenarios of Base condition, Committed Development and All the phases developed. The junction diagram and results are shown below.

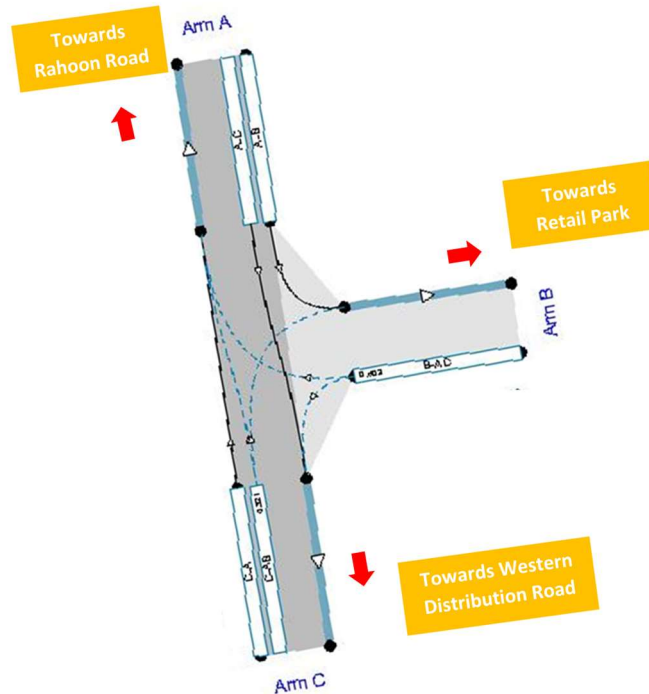


Figure 11-7 - Layout of Junction 7

Table 23 – Junction 7 Results (TRL Junctions 9)

	Weekday AM Peak				Weekday PM Peak				Weekend Peak			
	Queue (PCU)	Delay (s)	RFC	LOS	Queue (PCU)	Delay (s)	RFC	LOS	Queue (PCU)	Delay (s)	RFC	LOS
Opening year – Base Condition												
<b>B – C</b>	0.3	7.60	0.21	A	0.9	11.33	0.49	B	0.8	10.35	0.44	B
<b>B – A</b>	0.1	11.91	0.10	B	0.1	10.07	0.12	B	0.1	10.19	0.11	B
<b>C - AB</b>	2.0	14.43	0.63	B	0.6	8.30	0.36	A	0.90	9.31	0.43	A
Opening year – Committed Development												
<b>B – C</b>	0.4	8.66	0.30	A	1.8	16.84	0.65	C	1.5	14.47	0.60	B
<b>B – A</b>	0.2	13.62	0.15	B	0.2	11.24	0.15	B	0.2	11.86	0.16	B
<b>C - AB</b>	3.7	23.38	0.77	C	1.1	10.75	0.50	B	1.8	14.12	0.62	B
Opening year – All development												
<b>B – C</b>	0.6	9.90	0.38	A	2.6	22.12	0.73	C	2.1	18.53	0.68	C
<b>B – A</b>	0.2	14.86	0.19	B	0.2	12.50	0.20	B	0.2	12.99	0.19	B
<b>C - AB</b>	4.9	29.76	0.82	D	1.6	13.29	0.60	B	2.7	18.58	0.71	B
Opening year + 5 – Base Condition												
<b>B – C</b>	0.3	7.75	0.22	A	1.0	11.91	0.51	B	0.8	10.59	0.46	B
<b>B – A</b>	0.1	12.29	0.11	B	0.1	10.27	0.13	B	0.1	10.31	0.11	B
<b>C - AB</b>	2.3	15.87	0.67	C	0.7	8.51	0.38	A	0.9	9.48	0.45	A
Opening year + 5 – Committed development												
<b>B – C</b>	0.4	8.92	0.31	A	2.1	18.53	0.68	C	1.6	15.18	0.61	C
<b>B – A</b>	0.2	14.28	0.16	B	0.2	11.58	0.17	B	0.2	12.12	0.16	B
<b>C - AB</b>	4.7	28.43	0.81	D	1.2	11.30	0.53	B	2.0	14.81	0.64	B
Opening year + 5 – All Development												
<b>B – C</b>	0.7	10.32	0.40	B	3.2	25.70	0.77	D	2.3	19.80	0.70	C
<b>B – A</b>	0.3	15.76	0.21	C	0.3	12.96	0.21	B	0.2	13.27	0.20	B
<b>C - AB</b>	6.5	38.42	0.87	F	1.8	14.35	0.63	B	3.0	19.99	0.73	C
Opening Year + 15 – Base Condition												
<b>B – C</b>	0.3	8.34	0.26	A	1.5	14.70	0.60	B	1.0	11.60	0.50	B
<b>B – A</b>	0.2	14.02	0.14	B	0.2	11.08	0.15	B	0.1	10.76	0.12	B
<b>C - AB</b>	4.3	25.65	0.80	D	0.9	9.45	0.44	A	1.1	10.26	0.49	B
Opening Year + 15 – Committed Development												
<b>B – C</b>	0.9	10.02	0.37	A	3.7	29.52	0.80	D	2.0	18.13	0.67	C
<b>B – A</b>	0.3	17.61	0.22	C	0.2	12.87	0.20	B	0.2	12.96	0.18	B
<b>C - AB</b>	15.3	81.75	0.97	F	1.8	14.01	0.62	B	2.6	18.02	0.71	B
Opening Year + 15 – All Development												
<b>B – C</b>	0.9	12.29	0.47	B	7.5	54.74	0.91	F	3.2	25.99	0.77	D
<b>B – A</b>	0.4	20.78	0.29	C	0.4	14.96	0.27	B	0.3	14.47	0.22	B
<b>C - AB</b>	25.9	128.32	1.03	F	3.1	20.50	0.74	C	4.4	27.50	0.81	D

The junction has sufficient capacity to accommodate the committed and proposed development flows in the Opening Year, however in the Opening Year +5 and +15 year scenarios this junction will be operating at capacity.

The arm that will experience the worst delays will be the mainline arm (C-AB), which is the right turners into the access road. The +15 years with committed development shows delays an RFC of 0.97 which equates to a 82 second wait. With the proposed development for Phase 3 and 4 there is a minimal change in the RFC to 1.03 this is only an increase of 0.06. The maximum waiting time at this junction will be just over 2 minutes and this is not considered excessive in this area.

In the future there is potential solutions to upgrade this junction such as provide for a ghost island right turning lane and following that to signalise the junction.

There are no proposals as part of this development to upgrade this junction as the impact of Phase 3 and 4 is minimal on junction capacity.

(No results are provided for Arm A because Arm A always has priority and therefore does not experience any queues or delays.)

### 11.6.6. Junction 8

Junction 8 is a form arm roundabout connecting Western Distribution Road to Bothar Stiofain.

This junction connects to Junction 7 which leads further to Gateway Retail Park. The junction would be considered sensitive as it plays a key junction for N6 Galway City Ring Road together with Junction 6.

The junction was analysed using TRL software package Junction 9 for all the scenarios. The junction diagram and results are shown below:

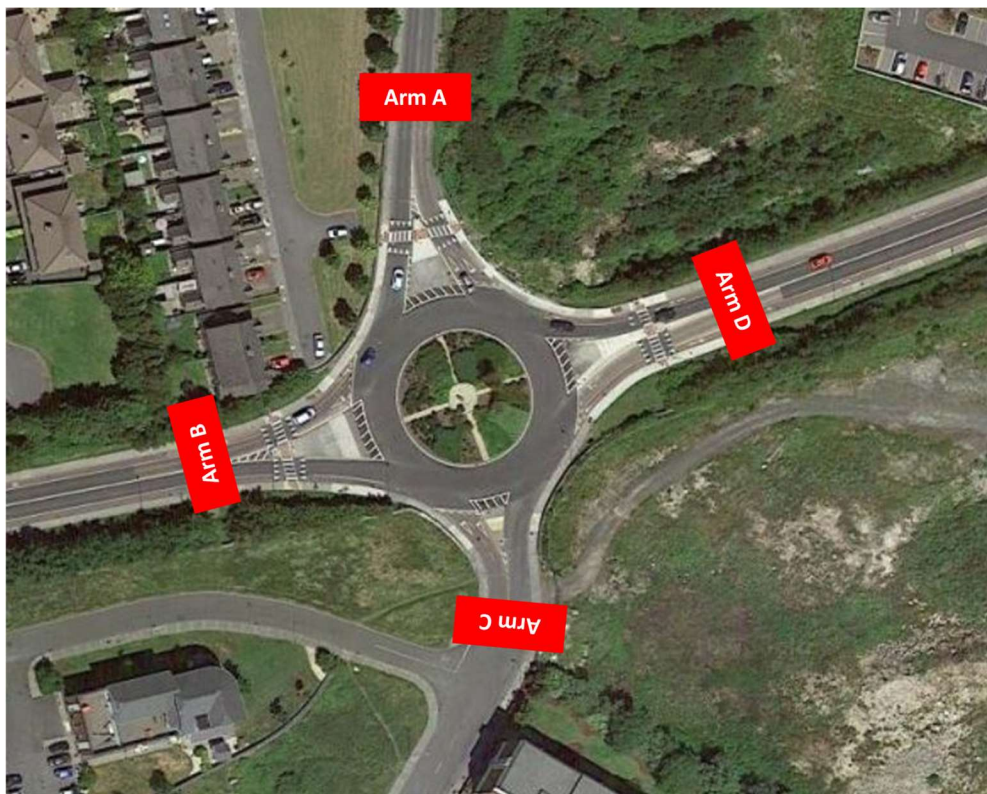


Figure 11-8 - Layout of Junction 8

Table 24 – Junction 8 Results (TRL Junctions 9)

	Weekday AM Peak				Weekday PM Peak				Weekend Peak			
	Queue (PCU)	Delay (s)	RFC	LOS	Queue (PCU)	Delay (s)	RFC	LOS	Queue (PCU)	Delay (s)	RFC	LOS
Opening year – Base Condition												
Arm A	0.3	3.83	0.25	A	0.4	3.86	0.3	A	0.4	3.95	0.28	A
Arm B	2.8	12.33	0.74	B	1.1	6.46	0.52	A	1.9	8.88	0.65	A
Arm C	0.3	4.07	0.22	A	0.1	4.17	0.07	A	0.0	3.84	0.03	A
Arm D	0.6	5.67	0.36	A	1.3	8.14	0.56	A	1.0	6.97	0.50	A
Opening year – Committed Development												
Arm A	0.4	4.05	0.29	A	0.6	4.32	0.37	A	0.6	4.42	0.36	A
Arm B	3.7	15.74	0.79	C	1.4	7.46	0.58	A	2.8	11.95	0.74	B
Arm C	0.3	4.23	0.24	A	0.1	4.50	0.08	A	0.0	4.11	0.04	A
Arm D	0.6	5.95	0.38	A	1.5	9.67	0.61	A	1.2	8.10	0.55	A
Opening year – All development												
Arm A	0.5	4.32	0.33	A	0.7	4.61	0.41	A	0.7	4.73	0.40	A
Arm B	4.5	18.49	0.83	C	1.7	8.48	0.63	A	3.5	14.47	0.79	B
Arm C	0.3	4.36	0.24	A	0.1	4.68	0.09	A	0.0	4.27	0.04	A
Arm D	0.6	6.23	0.39	A	1.7	10.66	0.64	B	1.4	8.89	0.58	A
Opening year + 5 – Base Condition												
Arm A	0.3	3.95	0.26	A	0.5	3.97	0.31	A	0.4	4.02	0.29	A
Arm B	3.3	14.33	0.78	B	1.2	6.79	0.54	A	2.0	9.38	0.67	A
Arm C	0.3	4.18	0.23	A	0.1	4.28	0.08	A	0.0	3.90	0.03	A
Arm D	0.6	5.90	0.38	A	1.4	8.78	0.59	A	1.0	7.21	0.51	A
Opening year + 5 – Committed development												
Arm A	0.4	4.20	0.30	A	0.6	4.49	0.39	A	0.6	4.52	0.37	A
Arm B	4.7	19.32	0.83	C	1.5	7.98	0.61	A	3.1	12.98	0.76	B
Arm C	0.3	4.35	0.25	A	0.1	4.65	0.09	A	0.0	4.18	0.04	A
Arm D	0.7	6.21	0.40	A	1.8	10.70	0.64	B	1.3	8.47	0.57	A
Opening year + 5 – All Development												
Arm A	0.5	4.49	0.34	A	0.7	4.81	0.43	A	0.7	4.87	0.41	A
Arm B	5.9	23.65	0.87	C	1.9	9.24	0.66	A	4.0	16.00	0.81	C
Arm C	0.4	4.51	0.26	A	0.1	7.86	0.10	A	0.0	4.35	0.04	A
Arm D	0.7	6.55	0.42	A	2.0	11.99	0.68	B	1.5	9.37	0.60	A
Opening Year + 15 – Base Condition												
Arm A	0.5	4.43	0.31	A	0.6	4.48	0.37	A	0.5	4.30	0.32	A
Arm B	8.3	31.93	0.91	D	1.7	8.53	0.63	A	2.7	11.47	0.73	B
Arm C	0.4	4.65	0.28	A	0.1	4.79	0.10	A	0.0	4.08	0.04	A
Arm D	0.8	6.97	0.46	A	2.3	12.56	0.70	B	1.3	8.21	0.57	A
Opening Year + 15 – Committed Development												
Arm A	0.6	4.76	0.36	A	0.9	5.27	0.7	A	0.07	4.93	0.41	A
Arm B	17.2	61.00	0.98	F	2.4	10.83	0.71	B	4.6	18.00	0.83	C
Arm C	0.4	4.90	0.30	A	0.1	5.33	0.11	A	0.0	4.42	0.04	A
Arm D	0.9	7.45	0.48	A	3.3	17.74	0.78	C	1.7	10.07	0.63	B
Opening Year + 15 – All Development												



Arm A	0.7	5.17	0.41	A	1.0	5.79	0.51	A	0.8	5.38	0.45	A
Arm B	27.6	89.15	1.01	F	3.2	13.64	0.77	B	6.7	25.20	0.88	D
Arm C	0.5	5.12	0.32	A	0.1	5.65	0.12	A	0.0	4.64	0.04	A
Arm D	1.0	7.98	0.50	A	4.2	22.21	0.82	C	2.0	11.47	0.67	B

The analysis shows that in the Opening Year + 15 year scenario that this junction will begin to operate close to capacity. This will occur without the proposed development (RFC 0.98) and the proposed development (RFC 1.01) will only result in a very minor increase in the RFC by 0.03. The delay at this junction will change from just over 1 minute at 61.00 sec to 89.15, a total difference approximately 30 seconds. This is not considered excessive for this area.

It is noted that within the GTS this junction is highlighted to be changed to a signalised junction with bus priority.

### 11.7. Sensitivity Testing

Further to consultation with Galway City Council Atkins were requested to assess the sensitivity of the surrounding road network with regards to residential development trips. Sensitivity testing was carried out by modifying the proposed residential trip generation and distribution based on local traffic counts and distributions observed at a nearby residential development. The Sensitivity Analysis report is included in Appendix D of this TTA,

There are some fundamental differences between the proposed development and the Altan Apartments which will account for the higher traffic flow than that given by TRICS data. For example: Number of parking spaces ratio per apartment is 1.5 compared to 0.8 for the proposed development. There are no retail or commercial units within the apartments and therefore you will have no linked trips unlike the proposed development.

All apartments have either 2 or 3 bedrooms, with 0% 1 bedroom apartments compared to 28% 1 bedroom apartments within the proposed development.

The Table 25 below illustrates the comparison between the residential trip generation details based on TRICS and Local Trip Data.

Table 25 – Trip generation for the residential development (Phase 3)

Peak Hours	TRICS Data		Local Trip Data	
	Arrivals	Departures	Arrivals	Departures
Weekday AM Peak (08:00 – 09:00)	9	44	23	95
Weekday PM Peak (17:00 – 18:00)	37	13	95	28
Weekend Peak (12:00 – 13:00)	18	22	46	48

Local Trip rate generation is greater than the values from TRICS data, as therefore it was used for sensitivity analysis as a worst-case scenario.

The residential trip distribution was based on the interpretation of existing traffic movements from residential development at An Logán at Junction 6. Based on this it was estimated that 60% of the outbound traffic will be heading east and 40% west.

The results of this sensitivity test generally show that the development will have a very minor impact on the surrounding road network and, in fact, show a reduced impact on Junctions 7 and 8 compared to the analysis discussed in Chapter 11.7 above.

## 11.8. Construction Related Traffic Impact

To mitigate the impacts of the construction works, a Design Process Traffic Management Plan will be completed by the Applicant prior to the commencement of the works.

The Design Process Traffic Management Plan will be developed in full consultation with Galway City Council and the emergency services. The plan will be completed in full compliance with the Department of Transport Document ‘Guidance for the Control and Management of Traffic at Road Works’.

The plan will focus on:

- Minimising risk and delay to commuters and road users
- Minimising impacts on surrounding businesses
- Minimising impacts on surrounding dwellings
- Minimising risks imposed on road workers

# 12. Road Safety

## Overview

### 12.1. RSA Accident database

The review of the collision history for the area in vicinity of the Development Site was carried out using the data available on [www.rsa.ie](http://www.rsa.ie). This was done to ascertain residual road safety issues with regard to all users, and especially pedestrians and cyclists. The road collision data for the latest 5 years available online was analysed, ie. 2012-2016. The collision map is shown in Figure 12-1 below.

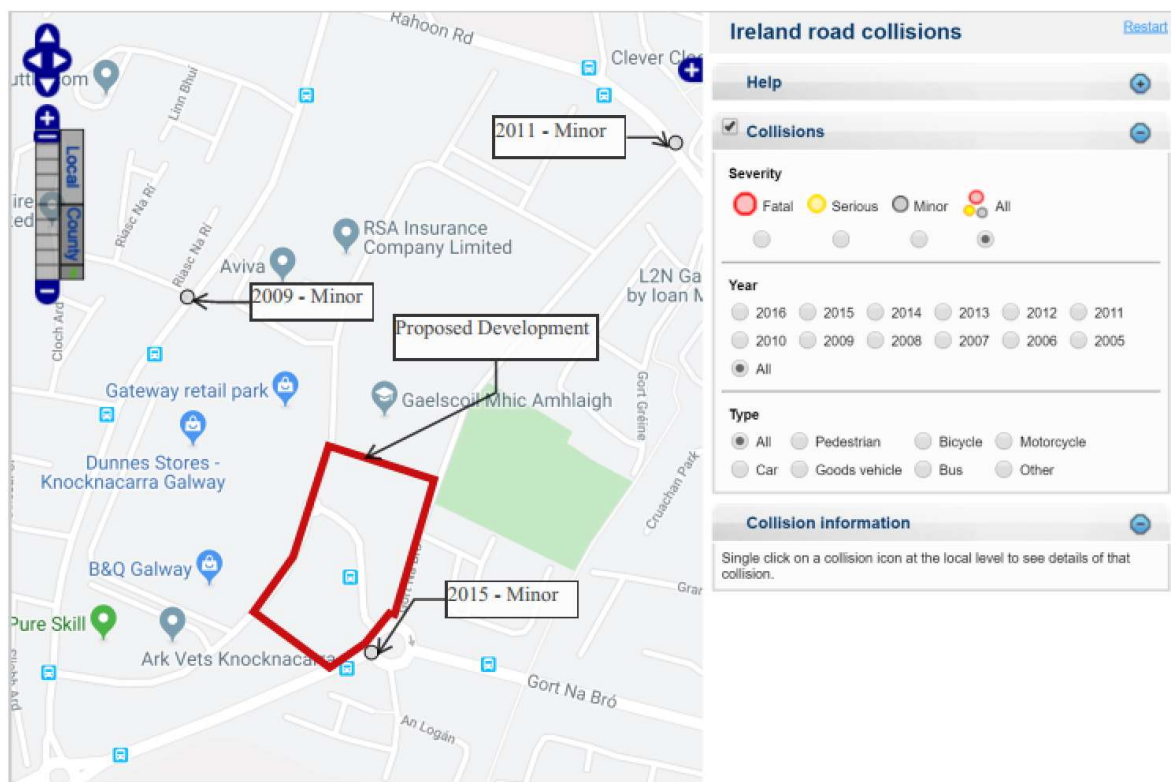


Figure 12-1 – The collision map

Only one accident highlighted in the above figure occurred within the 5 year period between 2012 to 2016. This was a minor accident in 2015 at Gort Na Bro roundabout and involved a cyclist. Although the other two accidents occurred outside the 5 year period they are summarised below: the two accidents highlighted in the above figure are :

- 2009 - located on Bothar Stiofain near the exit from the Riasc Na Ri housing estate near the pedestrian link through Aviva carpark - rear end left turn car - Minor Severity
- 2011 - located on Ragoon Road east of Gort na Bro access – car -Minor Severity.

The absence of collision clusters within proximity to the development access junctions indicates that the local road network is operating efficiently in terms of operational road safety at this location.

It is noted that the new school north of the development site has been open in recent years. Raised zebra crossings have been installed to provide access to the school on the local road to the west of the school and in two locations across the road to the east of the school. Raised zebra crossings have also been recently installed near the roundabouts and are considered an improvement with regards to pedestrian safety in these locations.

## 12.2. Stage 1 Road Safety Audit

A Stage 1 Road Safety Audit (RSA) was undertaken for the proposed development and the new access junction on the 16<sup>th</sup> January 2019 by an independent Audit Team in Atkins. The team members were as follows:

Team Leader: Martin Deegan (Hons) Msc CEng MICE

Team Member: Catherine McAndrew BA (Hons).

A copy of the Road Safety Audit Report and Designers response are included in Appendix F.

No major issues were raised in regard to the proposed junction layout and all concerns raised have been addressed within the response to the RSA.

The proposed design as shown on drawings included in Appendix B of this report has considered all issues raised by the RSA. The scheme will be subject to further RSA stages as it is developed at detailed design and post construction.

# 13. Conclusion

## 13.1. Conclusion

This Traffic and Transport Assessment was undertaken for the proposed development Knocknacarra District Centre, Ragoon, Galway.

From an analysis of the environs adjacent to the proposed development we have found there are a number of existing public transport links surrounding the area as outlined in Section 3.4. Furthermore, there are proposals as part of the GTS to upgrade public transport links to Knocknacarra further, to facilitate a high quality and high frequency bus corridor as part of the Galway Transport Strategy.

Currently there are footpaths and on-road cycle lanes both sides of the Western Distributor Road leading to the proposed site. The proposed development also allows to improve connectivity with cycle routes, footpaths ensuring permeability within the neighbourhood and the local schools.

Additional to the proposed development Glenveagh Living have undertaken to realign the internal link road and provide a signalised junction in advance of the Proposed N6 Galway City Ring Road. This design has undergone an independent Road Safety Audit with no significant issues raised.

Consultation with the TII and their NRDO on the N6 GCCR, Galway City Council and the NTA has ensured that all their concerns have been dealt with and that they are in agreement with the proposals as set out in this TTA.

Surrounding the proposed development, all junctions operate within capacity for +15year. There are two junctions that are marginally over capacity, but the impact of the development is negligible - see Section 11.1.

A sensitivity test was carried out using a larger volume of traffic generated by the residential element of the proposed development based on similar local residential traffic volumes and movements. This analysis similarly showed negligible impacts on the surrounding road network with further reduced impacts on Junctions 7 and 8 when compared with the analysis above.

Overall the proposed development will complement the Knocknacarra District Centre and it's neighbourhood adding to a sense of place while enhancing permeability and connectivity to existing and new facilities.



# Appendix A. TTA Scoping Study Meeting Minutes and Consultation with GCC



## Meeting Notes

<b>Project:</b>	Gateway Urban Village Knocknacarra		
<b>Subject:</b>	Traffic and Transport Assessment Scoping		
<b>Meeting place:</b>	Galway City Council - Control Room	<b>Meeting no:</b>	1
<b>Date and time:</b>	13 December 2018 at 15:00	<b>Minutes by:</b>	Sharon Connolly
<b>Present:</b>	Susan Loughnane Colm O Riordan Sharon Connolly	<b>Representing:</b>	Galway City Council Galway City Council Atkins

ITEM	DESCRIPTION AND ACTION	DEADLINE	RESPONSIBLE
1.	SL will request traffic data from ARUP for the do-something with the N6. She will also ask for what they assumed for developments within this area.		SL
2.	SC will use Galway Transportation Strategy and other data readily available to assess the likely numbers from the Western Distributor that will divert onto the Gort Na Bro / Millers Lane.		
3.	SC explained that car parking provision for commercial will be based on the car park usage traffic surveys and that proposed usage would take into account all phases of development inclusive of the cinema. GCC were happy with this approach. They would like though that staff car parking was identified separate and within specific areas that could be controlled. SC to look into this.		SC

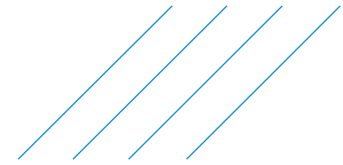
**Next meeting:**

**Distribution:**

<b>Date issued:</b>	17 December 2018	<b>File Ref:</b>	5168265MG0001
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**NOTE TO RECIPIENTS:**

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ITEM	DESCRIPTION AND ACTION	DEADLINE	RESPONSIBLE
4.	GCC want a Mobility Management Plan for the Development and they want it to include all phases – Phase 1 through to Phase 3. If there are existing MMP's then they can be tied into the overall Plan for the development and form part of the appendices. Take into consideration facilities for those cycling (showers / secure cycle parking), levying car parking for staff etc. Note that facilities can be centralised for those cycling from all phases of the development.		SC
5.	Car parking for the residential aiming for 1 per unit – 300 spaces. SL more concerned with the car parking for residents that commercial. Need to take onto consideration those that may have vehicles that they only use at weekends. SC did point out that we would not be meeting the Development Plan requirements but would be in line with new national guidance. Any numbers proposed must be backed up by factual information. Need to look at GO Car / electric charging points / cycle parking – SC stated that these were all being considered.		SC
6.	SC stated that Atkins have looked at connectivity for walking and cycling and will be included within the TTA. We are awaiting feedback from NTA re changes to bus routes, existing and proposed. SL believes that frequency of bus services has increased within the area.		
7.	There is an area undeveloped to the south of the western distributor SL asked what had been included in the traffic assessment for this. SC to check but did not believe that there was any planning applications in place for this area.		SC
8.	SL asked if a Road Safety Audit would be undertaken. They would like to see at least a Stage F included.		SC
9.	SC to give GCC programme for the submission.		SC
10.	SL would like the opportunity for further review of information. SC stated once we have TTA drafted and traffic / car parking complete we will have further meeting to discuss details.		SC



## Meeting Notes

<b>Project:</b>	Gateway Urban Village Knocknacarra		
<b>Subject:</b>	Traffic and Transport Assessment Scoping		
<b>Meeting place:</b>	Galway City Council	<b>Meeting no:</b>	2
<b>Date and time:</b>	1 February 2019 at 11:30	<b>Minutes by:</b>	Sharon Connolly
<b>Present:</b>	Susan Loughnane Colm O Riordan Uinsinn Finn  Sharon Connolly	<b>Representing:</b>	Galway City Council Galway City Council Galway City Council (part only) Atkins

ITEM	DESCRIPTION AND ACTION	DEADLINE	RESPONSIBLE
1.	SC went through the updated Traffic and Transport Assessment with GCC. It was mentioned that the number of residential units were likely to increase to over 330.		
2.	SL would like to see existing bus stops shown on the drawings. Also for proposal where bus stops will be placed.		SC
3.	SC explained the connectivity with regards to walking and cycling. There is provision of footpaths and a two-way cycle lane from the crossing at the roundabout on Gort Na Bró to the Gaelscoil. GCC would like the image on the document to show full extent of it and more of an explanation on this including design standards used. SC to review.		SC
4.	Cycle parking GCC want numbers and locations, whether secure / covered to be included within the report.		SC

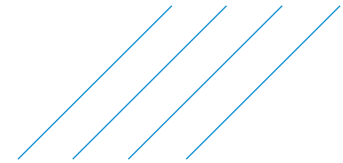
**Next meeting:**

**Distribution:**

<b>Date issued:</b>	17 December 2018	<b>File Ref:</b>	5168265MG0001
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**NOTE TO RECIPIENTS:**

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ITEM	DESCRIPTION AND ACTION	DEADLINE	RESPONSIBLE
5.	Trip generation for retail and residential taken from TRICS data. SL prefers if this was not used. SC stated that for retail in particular, really option and typically this is what we use on all developments. SL has stated preference for actual count information at similar locations in Galway for apartments as rates given in Table 7 seemed very low. SC would review and would get wording amended in section 8.5.2.1 to better explain Internal Trips.		SC
6.	SC went through the parking provision for residential and that we were providing a 0.8 ratio at the moment. This ratio is based on car ownership information from the CSO data in Galway City for similar developments. It is also based on current government guidelines that are lowering numbers of car parking spaces being provided in similar developments. This also ties in with Galway City Councils policies to move people away from their cars and onto public transport. These apartments are close to both the hospital, NUIG and town centre which are big employees. Also development is served with a good bus service and will be on a high frequency bus corridor. GCC agreed in principle that we had evidence to stand over the 0.8 provision.		
7.	SL stated that we should liaise with Arups on the TTA traffic assumptions.		SC
8.	Road Safety Audit is complete and will be included within final TTA.		
9.	SC briefly covered the traffic analysis. Typically all junctions operated within capacity. There were two junctions that were marginally over capacity, the roundabout on Western Distributor Road with Bothair Stiofáin and the T junction on Bothair Stiofáin. These however will be over capacity with the committed development in the area and the Phase 3 and 4 only add typically 0.03 to the RFC.		



## Garvey, Kasia

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**From:** Susan Loughnane <Susan.Loughnane@galwaycity.ie>  
**Sent:** 2019-04-24 13:13  
**To:** Garvey, Kasia; Connolly, Sharon  
**Cc:** Theo Mcloughlin; Uinsinn Finn  
**Subject:** RE: Gateway Knocknacarra - GCC Close out meeting

Kasia / Sharon

I have reviewed the documents sent and can confirm that they are in line with the issues discussed at the meeting.

With regard to the Mobility management Plan, it would be good to have the initial travel survey and site audit complete in order to set realistic targets. This may not be possible in advance of the planning application however a target date for completion of these items should nbe included.

Kind regards

Susan

---

**From:** Garvey, Kasia [mailto:Kasia.Garvey@atkinsglobal.com]  
**Sent:** 04 April 2019 17:43  
**To:** Susan Loughnane <Susan.Loughnane@galwaycity.ie>  
**Cc:** Connolly, Sharon <Sharon.Connolly@atkinsglobal.com>; Uinsinn Finn <Uinsinn.Finn@galwaycity.ie>  
**Subject:** Gateway Knocknacarra - GCC Close out meeting

Susan,

Thank you for your time today. Please see attached minutes of today's close out meeting regarding TTM and related items for Phase 3 Gateway Urban Village Knocknacarra project.

Please review and confirm that this is in line with what we have discussed today.

As requested, see attached Mobility Management Plan for your information. Also, when preparing the minutes I noted that RSA was an item previously raised, but not discussed today. See attached.

We would appreciate your feedback as soon as possible.

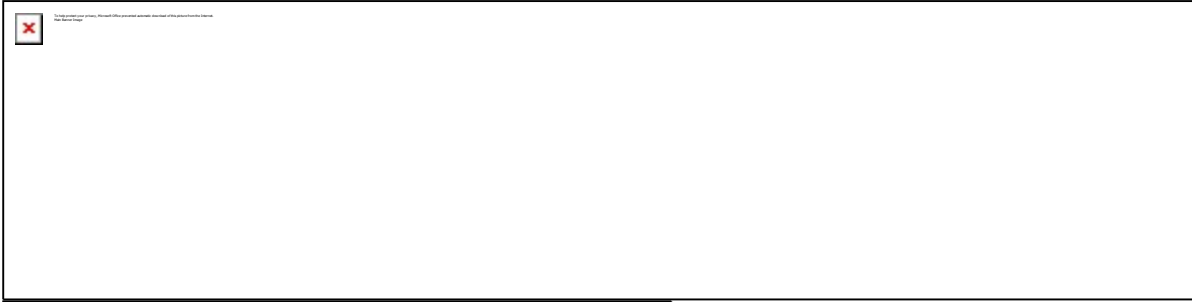
Regards,  
Kasia

**Kasia Garvey** *Msc Eng, MIEI*  
Senior Engineer Transport  
Galway, Ireland

091461016 Mob:0876572972



1st Floor, Parkmore Technology House, Parkmore, Co. Galway, Ireland



Company 

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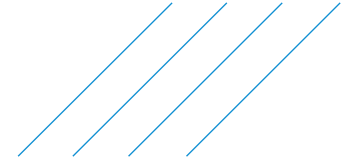
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**Tá fáilte roimh chomhfhreagras i nGaeilge nó i mBéarla.**

**Correspondence is welcome in Irish or in English.**



## Meeting Notes

<b>Project:</b>	Gateway Urban Village Knocknacarra		
<b>Subject:</b>	Close-out meeting with regards to Traffic and Transport Assessment and related items		
<b>Meeting place:</b>	Galway City Council	<b>Meeting no:</b>	3
<b>Date and time:</b>	4th April 2019 11:30am	<b>Minutes by:</b>	Kasia Garvey
<b>Present:</b>	Susan Loughnane (SL) Kasia Garvey (KG)	<b>Representing:</b>	Galway City Council Atkins

ITEM	DESCRIPTION AND ACTION	Action required	By
1.	<b>Pedestrian and Cycling Facilities.</b> - <i>Re Item 3 GCC Meeting Feb 2019</i> KG explained the current pedestrian and cyclin proposal as illustrated on drawing 5168265/ATK/HT/0101.	N/A	N/A
2.	<b>The bicycle parking provision.</b> - <i>Re Item 4 GCC Meeting Feb 2019</i> KG explained the bicycle parking provision is discussed in the TTA Para 7.3. It is generous and in excess of minimum requirements set-out by Galway City Development Plan. including secured and sheltered spaces.	N/A	N/A

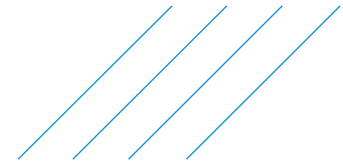
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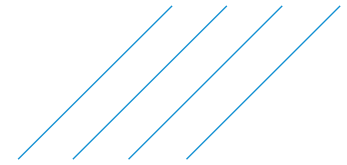
<b>Date issued:</b>	04 April 2019	<b>File Ref:</b>	5168265MINUTES0013
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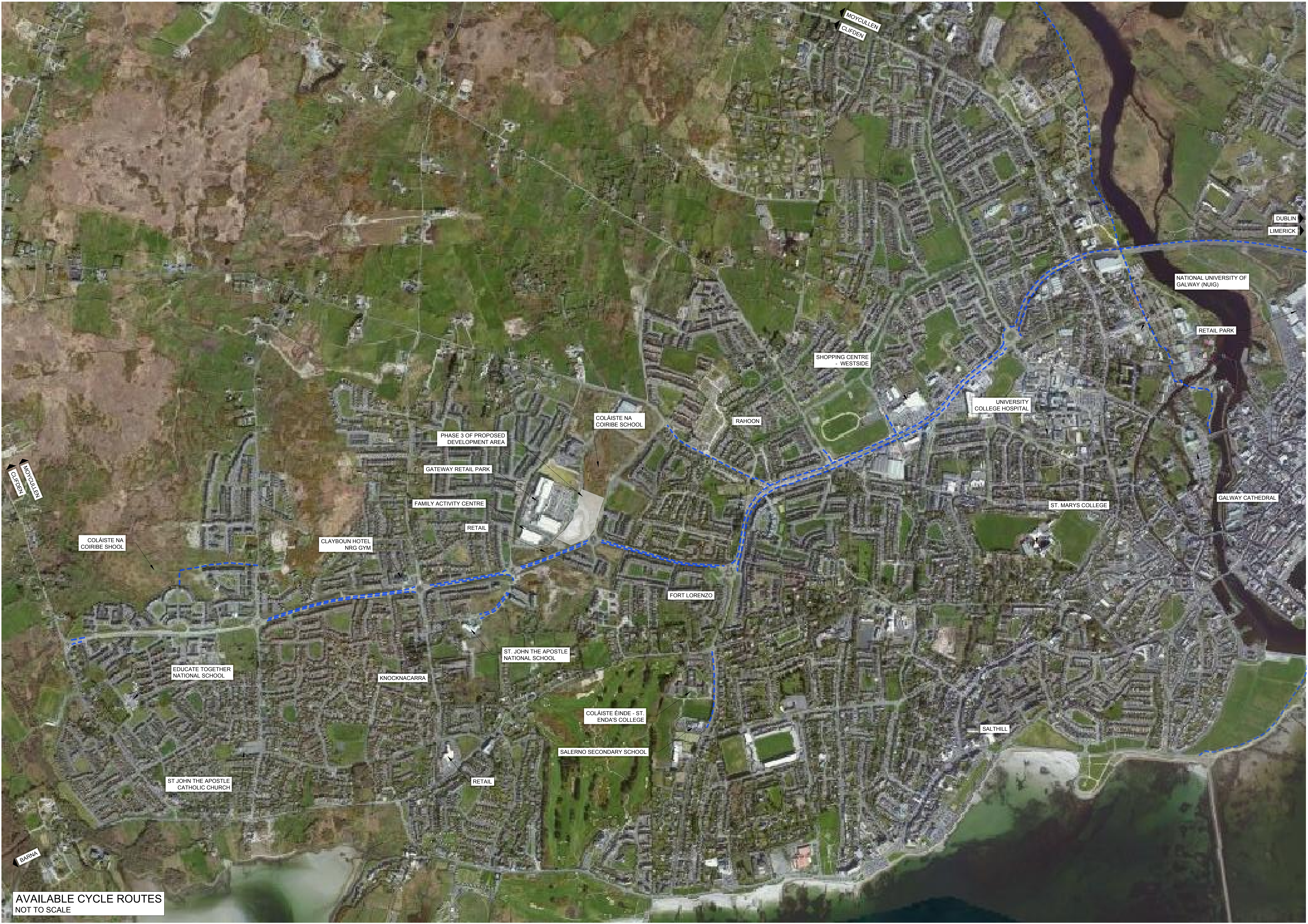
ITEM	DESCRIPTION AND ACTION	Action required	By
3.	<p><b>Traffic Assessment and Trip Distribution.- Re Item 6 GCC Meeting Feb 2019</b></p> <p>KG explained the Sensitivity Testing of the road network carried out by Atkins to satisfy the SL concerns raised with regards the traffic assessment included in TTA.</p> <p>The proposed residential trips generation and distribution for the sensitivity test is based on the local traffic count and distributions observed at the nearby residential developments Altan Apartments and An Logan estate. The results of this assessment are included in Appendix D of the TTM.</p> <p>The trip generation figures used in the sensitivity test, based on figures from Altan Apartments survey, are much greater than those determined by TRICS for the original TTM. The TTM trip distribution was based on the existing traffic distribution in the area. However, as the residential aspect of the development is a new origin in this location, the distribution of traffic at adjoining An Logan estate was used to reflect local residential trip distribution.</p> <p>The summary of the sensitivity test are similar to that of TTM. The proposed development will have minor impact on the assessed road network. Also, although the revised trip generation figures were higher than originally estimated, the results show lesser impact on junctions 7 and 8 to that shown in the main body of the TTM report.</p> <p>SL enquired on junction improvements proposed in the TTA with regards to Junctions 7 and 8. KG clarified that the proposed improvements are generic. In '+15 years with all committed developments' these junctions will operate above capacity As the traffic analysis illustrate, the impact on these junctions from the proposed development is minor and no improvement works have been proposed as part of this development.</p>	N/A	N/A
4.	<p><b>Residential Parking Ratio. - Re Item 7 GCC Meeting Feb 2019</b></p> <p>KG presented the proposed parking provision ratio of 0.8. This is in line with the current guidelines recommendation to provide less than 1.0 ratio for new well serviced developments. It also aligns with the current car ownership data for similar developments within Galway City. The proposed development is well served by public transport, it is in the area of future proposed transport upgrades. Multiple sustainable transport modes are incorporated within the proposed development, including significant bicycle parking provision or facilities for carsharing initiative. SL expressed understanding of this approach and was satisfied with the supporting information provided.</p>	N/A	N/A
5.	<p><b>Traffic Assessment and Trip Distribution.- Re Item 8 GCC Meeting Feb 2019</b></p> <p>KG explained that Atkins are in liaison with N6 office and expect feedback next week.</p>	N/A	N/A



ITEM	DESCRIPTION AND ACTION	Action required	By
6.	Mobility Management Plan. KG confirmed that the MMP has been prepared as part of this submission for the whole of the Gateway Development with intend of being a life document and implemented by appointed Mobility Coordinator.	Submit copy	KG
7.	<b>POST MEETING NOTES:</b>  <i>RSA.- Re Item 9 GCC Meeting Feb 2019</i> Attached.	Submit copy	KG



# Appendix B. Figures and Drawings



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LIMERICK

NATIONAL UNIVERSITY OF GALWAY (NUIG)

RETAIL PARK

SHOPPING CENTRE - WESTSIDE

UNIVERSITY COLLEGE HOSPITAL

COLÁISTE NA COIRIBE SCHOOL

RAHEEN

PHASE 3 OF PROPOSED DEVELOPMENT AREA

GATEWAY RETAIL PARK

FAMILY ACTIVITY CENTRE

RETAIL

CLAYBOUN HOTEL NRG GYM

FORT LORENZO

ST. MARYS COLLEGE

GALWAY CATHEDRAL

COLÁISTE NA COIRIBE SHOOL

MOYCULLEN  
CLIFDEN

EDUCATE TOGETHER NATIONAL SCHOOL

KNOCKNACARRA

ST. JOHN THE APOSTLE NATIONAL SCHOOL

COLÁISTE ÉINDE - ST. ENDA'S COLLEGE

SALERNO SECONDARY SCHOOL

SALTHILL

ST JOHN THE APOSTLE CATHOLIC CHURCH

RETAIL

BARNA

AVAILABLE CYCLE ROUTES  
NOT TO SCALE





COLÁISTE NA COIRIBE SHOOL

EDUCATE TOGETHER NATIONAL SCHOOL

ST JOHN THE APOSTLE CATHOLIC CHURCH

CLAYBOUN HOTEL NRG GYM

KNOCKNACARRA

PHASE 3 OF PROPOSED DEVELOPMENT AREA

GATEWAY RETAIL PARK

FAMILY ACTIVITY CENTRE

RETAIL

ST. JOHN THE APOSTLE NATIONAL SCHOOL

RETAIL

COLÁISTE NA COIRIBE SCHOOL

COLÁISTE ÉINDE - ST. ENDA'S COLLEGE

SALERNO SECONDARY SCHOOL

RAHOON

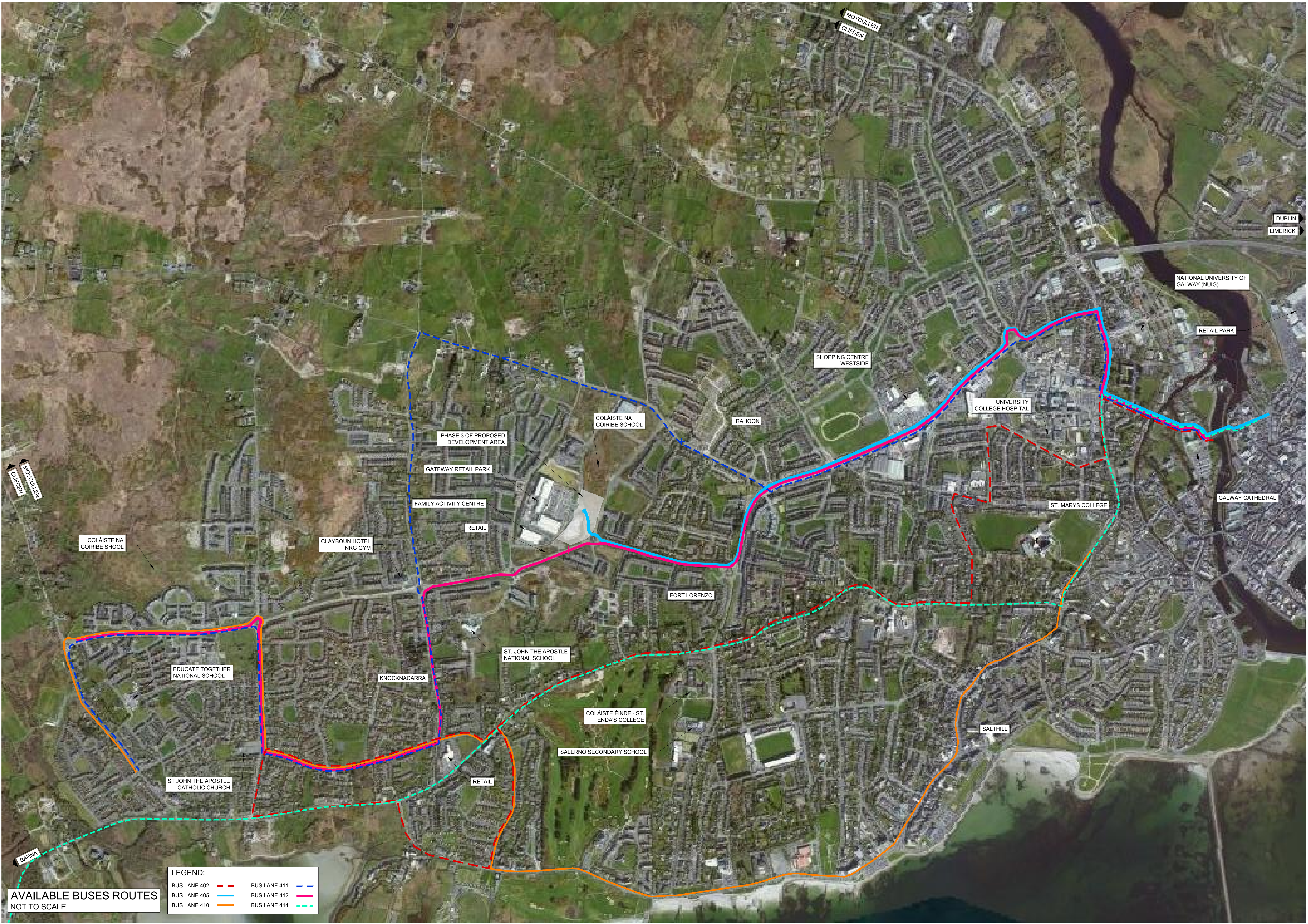
FORT LORENZO

SHOPPING CENTRE - WESTSIDE

	WALKING DISTANCES TO/FROM PROPOSED DEVELOPMENT AREA
<b>PRIMARY SCHOOL</b>	
Coláiste na Coiribe National School	350m
St. John the Apostle National School	600m
Educate Togheter National School	2800m
<b>SECONDARY SCHOOL</b>	
Coláiste Éinde - St. Enda's Collage	1100m
Salerno Secondary School	1300m
Coláiste na Coiribe Shool	2100m
<b>RETAILS</b>	
Alid	200m
Gateway Retail Park	150m
Shopping Centre - Westside	1800m
Joyce	1400m
<b>LEISURE AMENITIES</b>	
Pure Skills/Monkey Business	200mm
Claybaun Hotel	850m
NRG Gym	850m
<b>CHURCH</b>	2050m
<b>ALTERNATIVE ROUTES</b>	
Knocknakarra estate	~ 1400m
Fort Lorenzo estate	~ 1100m

AVAILABLE PEDESTRIANS ROUTES  
NOT TO SCALE





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RETAIL PARK

SHOPPING CENTRE - WESTSIDE

UNIVERSITY COLLEGE HOSPITAL

COLÁISTE NA COIRIBE SCHOOL

RAHOON

PHASE 3 OF PROPOSED DEVELOPMENT AREA

GATEWAY RETAIL PARK

FAMILY ACTIVITY CENTRE

RETAIL

CLAYBOUN HOTEL NRG GYM

ST. MARYS COLLEGE

GALWAY CATHEDRAL

FORT LORENZO

ST. JOHN THE APOSTLE NATIONAL SCHOOL

KNOCKNACARRA

COLÁISTE ÉINDE - ST. ENDA'S COLLEGE

SALERNO SECONDARY SCHOOL

SALTHILL

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ST JOHN THE APOSTLE CATHOLIC CHURCH

RETAIL

MOYCULLEN  
CLIFDEN

COLÁISTE NA COIRIBE SHOOL

BARNA

**LEGEND:**

BUS LANE 402	- - -	BUS LANE 411	- - -
BUS LANE 405	— — —	BUS LANE 412	— — —
BUS LANE 410	— — —	BUS LANE 414	- - -

**AVAILABLE BUSES ROUTES**  
NOT TO SCALE





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RETAIL PARK

SHOPPING CENTRE - WESTSIDE

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COLÁISTE NA COIRIBE SCHOOL

RAHOON

PHASE 3 OF PROPOSED DEVELOPMENT AREA

GATEWAY RETAIL PARK

FAMILY ACTIVITY CENTRE

RETAIL

ST. MARYS COLLEGE

GALWAY CATHEDRAL

CLAYBOUN HOTEL NRG GYM

COLÁISTE NA COIRIBE SHOOL

MOYCULLEN  
CLIFDEN

FORT LORENZO

ST. JOHN THE APOSTLE NATIONAL SCHOOL

KNOCKNACARRA

EDUCATE TOGETHER NATIONAL SCHOOL

COLÁISTE ÉINDE - ST. ENDA'S COLLEGE

SALTHILL

SALERNO SECONDARY SCHOOL

ST JOHN THE APOSTLE CATHOLIC CHURCH

RETAIL

MOYCULLEN  
CLIFDEN  
BARNNA

GALWAY CITY CYCLEWAY  
ROUTE STRATEGY  
NOT TO SCALE





MOYCULLEN  
CLIFDEN

DUBLIN  
LIMERICK

NATIONAL UNIVERSITY OF GALWAY (NUIG)

RETAIL PARK

SHOPPING CENTRE - WESTSIDE

UNIVERSITY COLLEGE HOSPITAL

COLÁISTE NA COIRIBE SCHOOL

RAHOON

PHASE 3 OF PROPOSED DEVELOPMENT AREA

GATEWAY RETAIL PARK

FAMILY ACTIVITY CENTRE

RETAIL

ST. MARYS COLLEGE

GALWAY CATHEDRAL

CLAYBOUN HOTEL  
NRG GYM

COLÁISTE NA COIRIBE SCHOOL

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RETAIL

BARNNA

GALWAY CITY BUS ROUTE STRATEGY  
NOT TO SCALE



**Glenveagh**  
Living

## STAGE 3 SUBMISSION DRAWINGS

Drawing List

DRAWING_No	Sheet Title	REVISION
HT / 0000	COVER SHEET	-
HT / 0101	EXISTING LAYOUT	A
HT / 0102	GENERAL ARRANGEMENT	A
HT / 0103	PROPOSED TRAFFIC SIGNALS & VISIBILITY SPLAYS	A
HT / 0104	PROPOSED INDICATIVE ROAD LEVELS	A
HT / 0105	PROPOSED TRAFFIC SIGN & ROAD MARKINGS	A
HT / 0106	BASEMENT CARPARK - GENERAL ARRANGEMENT	A
HT / 0107	BASEMENT CARPARK - CARPARK PLAN	A
SCD / 001	TYPICAL CROSS SECTIONS AND DETAILS	A
SK / 1009	VEHICULAR TRACKING - SHEET 1 OF 3	A
SK / 1010	VEHICULAR TRACKING - SHEET 2 OF 3	A
SK / 1011	VEHICULAR TRACKING - SHEET 3 OF 3	A

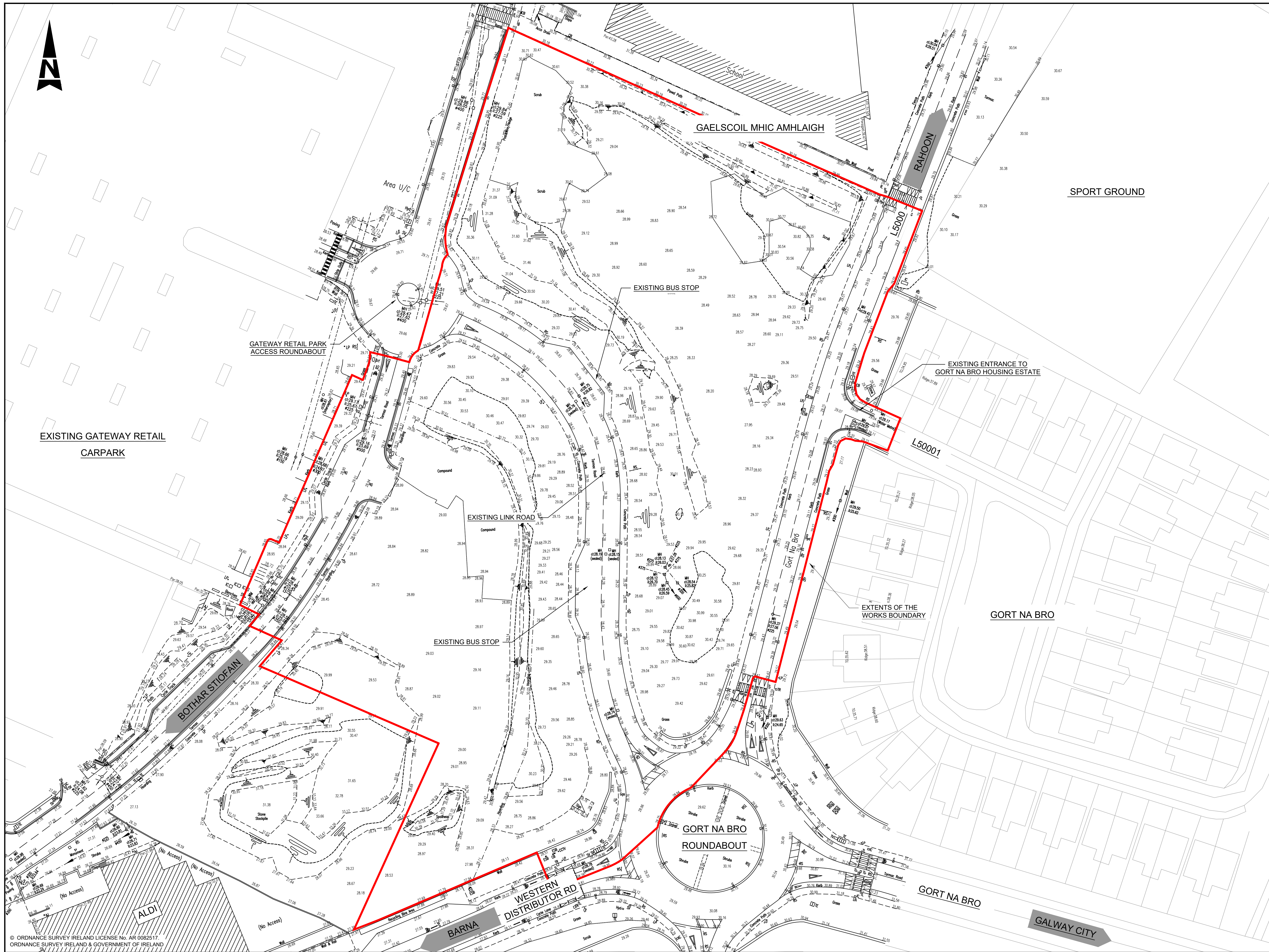
## KNOCKNACARRA DISTRICT CENTRE



A1

DO NOT SCALE

File: 5168265\_ATK\_HT\_0101.dwg  
Date: Oct 30, 2019 - 12:15pm  
Plotted by: Akomptonizer



- GENERAL NOTES**
1. ALL DIMENSIONS ARE IN METRES UNLESS NOTED OTHERWISE
  2. ONLY WRITTEN DIMENSIONS SHALL BE USED. NO DIMENSIONS SHALL BE SCALED FROM THE DRAWINGS
  3. ALL LEVELS ARE IN METRES AND ARE TO MALIN HEAD DATUM
  4. ALL COORDINATES ARE IN METRES AND ARE TO IRISH TRANSVERSE MERCATOR
  5. DRAWINGS ARE TO BE READ IN CONJUNCTION WITH THE SPECIFICATION
  6. POSITIONS OF EXISTING UTILITIES ARE BASED ON RECORDS FROM UTILITY COMPANIES WHERE AVAILABLE. THESE ARE SHOWN FOR BACKGROUND INFORMATION ONLY.
  7. ALWAYS REFER TO UTILITY RECORDS PACK AND VERIFY POSITIONS OF ASSETS ON SITE PRIOR TO COMMENCING ANY EXCAVATIONS.

**LEGEND:**  
 EXTENT OF THE WORKS BOUNDARY

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Rev	Description	By	Date	Chk'd	Auth
A	ISSUED FOR INFORMATION	YC	02.10.19	AN	KG
-	ISSUED FOR INFORMATION	RG	17.04.19	AN	KG



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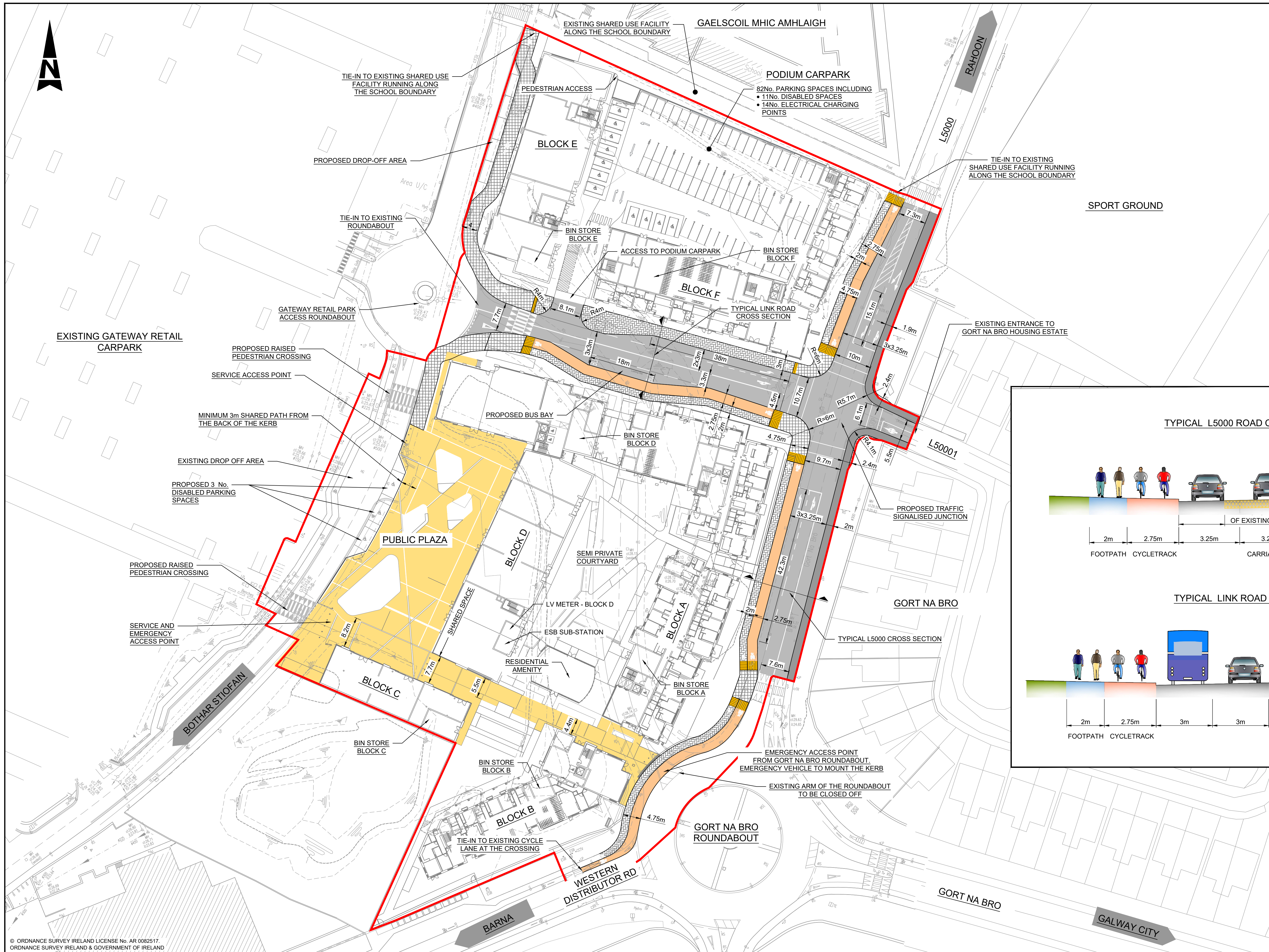
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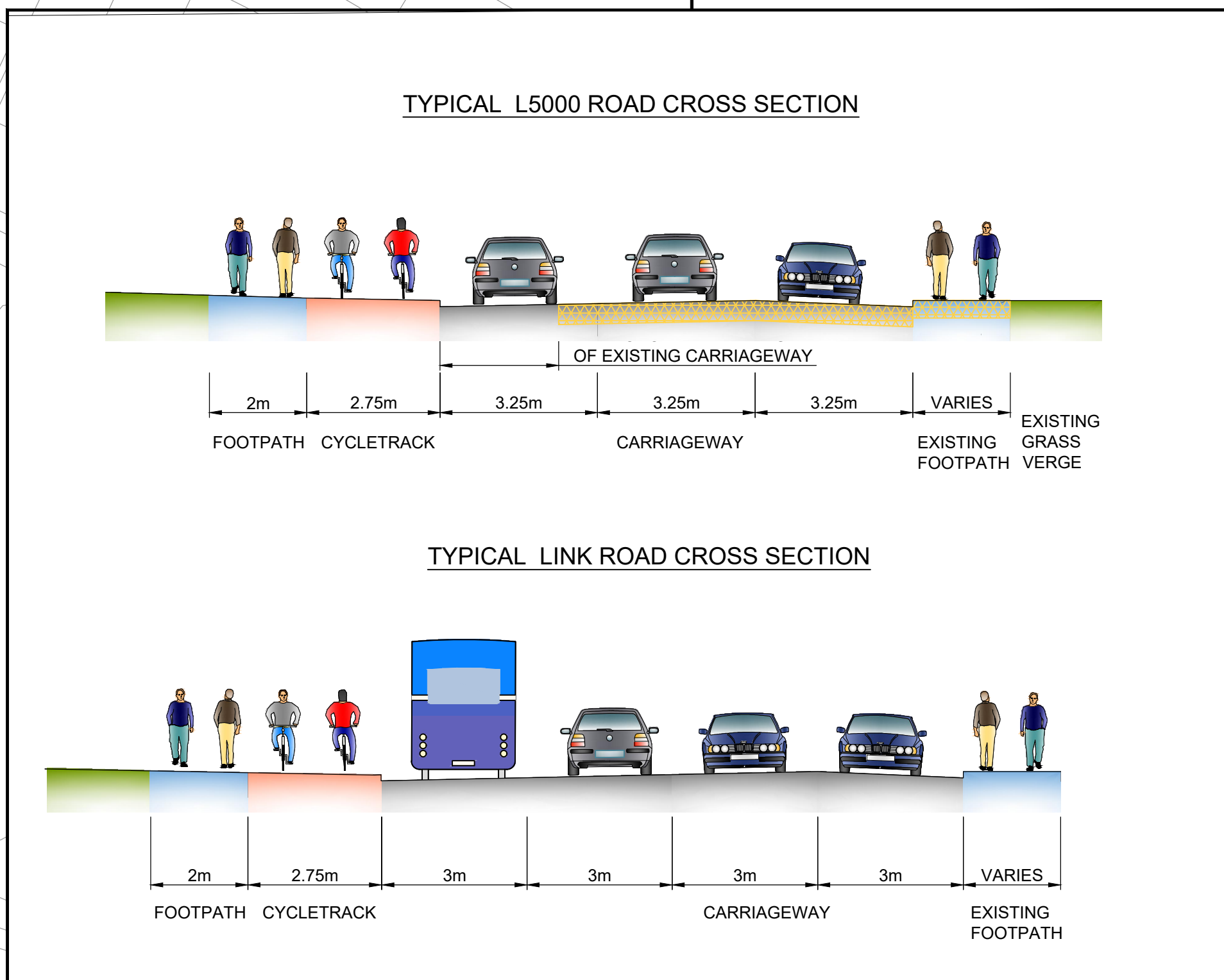
Project: KNOCKNACARRA DISTRICT CENTRE

Purpose: STAGE 3 SUBMISSION			
Title: EXISTING LAYOUT			
Original Scale: 1:500 at A1 1:1000 at A3	Design/Drawn: YC Date: 19.03.19	Checked: AN Date: 19.03.19	Authorised: KG Date: 17.04.19
Status: I	Drawing Number: 5168265 / ATK / HT / 0101	Rev: A	





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- LEGEND**
- EXTENT OF THE WORKS BOUNDARY
  - EXISTING FOOTPATH
  - PROPOSED FOOTPATH
  - PROPOSED CARRIAGEWAY
  - PROPOSED CYCLEWAY
  - PROPOSED SHARED USE FACILITY FOR PEDESTRIANS AND CYCLISTS
  - TACTILE PAVING (LADDER & TRAMLINIE)
  - PUBLIC PLAZA AND SHARED USE ACCESS

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Rev	Description	By	Date	Chk'd	Auth
A	ISSUED FOR INFORMATION	YC	02.10.19	AN	KG
-	ISSUED FOR INFORMATION	RG	17.04.19	AN	KG

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**Glenveagh Living**

Project: **KNOCKNACARRA DISTRICT CENTRE**

**STAGE 3 SUBMISSION**

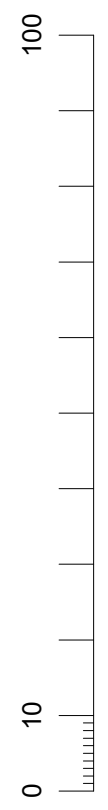
**GENERAL ARRANGEMENT**

Original Scale 1:500 at A1 1:1000 at A3	Design/Drawn YC	Checked AN	Authorised KG
Status I	Date 15.03.19	Date 15.03.19	Date 17.04.19
Drawing Number 5168265 / ATK / HT / 0102	Rev A		



A1

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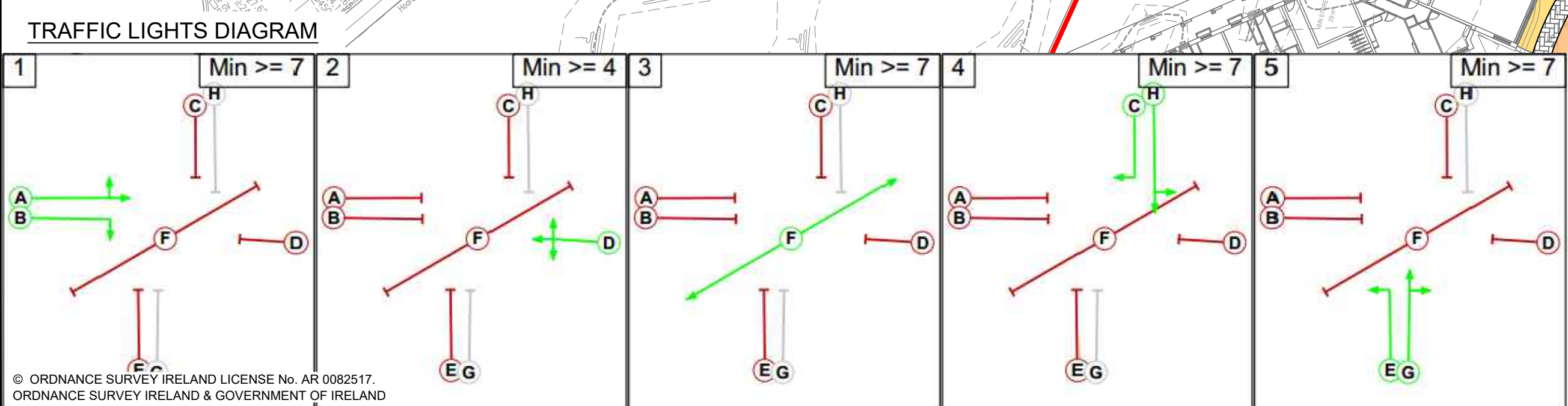


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- NOTES**
1. ALL TRAFFIC SIGNALS AND THEIR LOCATION TO BE IN ACCORDANCE WITH THE DEPARTMENT OF TRANSPORT TRAFFIC SIGNS MANUAL TSM AND TII STANDARDS.
  2. SIGNAL HEAD REFERENCE NUMBERS REFER TO THE DEPARTMENT OF TRANSPORT TRAFFIC SIGNS MANUAL 2010 (TSM) UNLESS OTHERWISE SPECIFIED.
  3. PROVISION OF TRAFFIC SIGNALS TO BE IN ACCORDANCE WITH THE REQUIREMENTS OF APPENDIX 12/5 - TRAFFIC SIGNS TRAFFIC SIGNALS.
  4. FINAL POSITION OF LOOP DETECTORS TO BE CONFIRMED WITH THE EMPLOYER'S REPRESENTATIVE ON SITE.
  5. FOR TRAFFIC SIGNALS LOCATIONS REFER TO DRAWINGS 5168265/ ATK/ HT/ 0105
  6. FOR ROAD MARKINGS DETAILS REFER TO DRAWINGS 5168265/ ATK/ HT/ 0105

- LEGEND:**
- EXTENT OF THE WORKS BOUNDARY
  - PRIMARY TRAFFIC HEAD TO RTS 001
  - SECONDARY TRAFFIC HEAD TO RTS 001
  - PEDESTRIAN TRAFFIC HEAD TO RPC 004
  - PROPOSED PEDESTRIAN PUSH BUTTON UNIT
  - PRIMARY TRAFFIC SIGNAL ADDITIONAL ASPECT
  - CYCLE TRAFFIC HEAD TO RTS 007

- LEGEND:**
- EXTENT OF THE WORKS BOUNDARY
  - EXISTING FOOTPATH
  - PROPOSED FOOTPATH
  - PROPOSED CARRIAGEWAY
  - PROPOSED CYCLEWAY
  - PROPOSED SHARED USE FACILITY FOR PEDESTRIANS AND CYCLISTS
  - TACTILE PAVING (LADDER & TRAMLINE)
  - PLUBLIC PLAZA AND SHARED USE ACCESS



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Date: Oct 30, 2019 - 2:02pm  
Plotted by: Akopyakolsew

Rev	Description	By	Date	Chk'd	Auth
A	ISSUED FOR INFORMATION	YC	02.10.19	AN	KG
-	ISSUED FOR INFORMATION	RG	17.04.19	AN	KG

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Client: **Glenveagh Living**

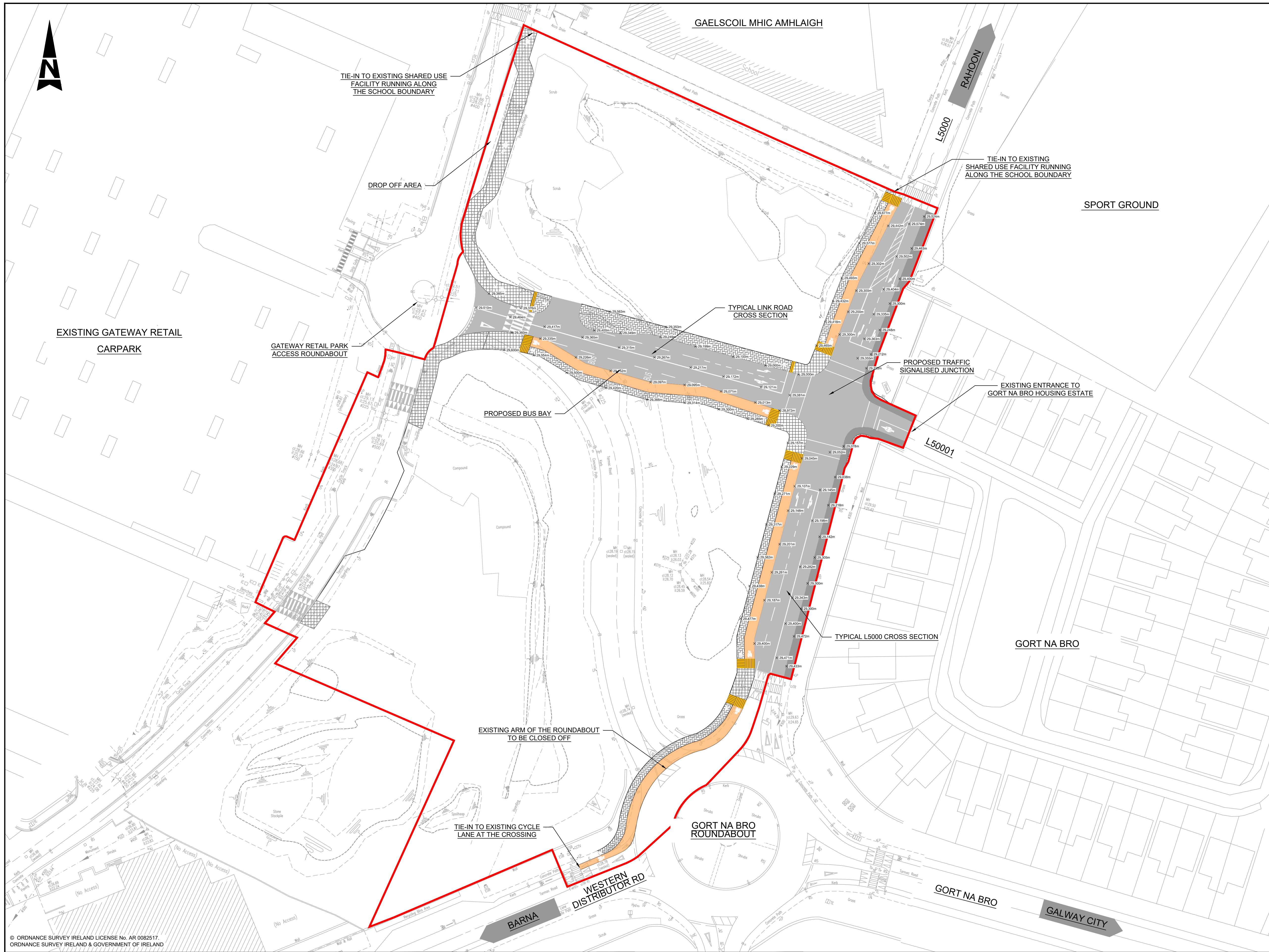
Project: **KNOCKNACARRA DISTRICT CENTRE**

Purpose: **STAGE 3 SUBMISSION**

Title: **PROPOSED TRAFFIC SIGNALS & VISIBILITY SPLAYS**

Original Scale: 1:500 at A1 1:1000 at A3	Design/Drawn: YC Date: 19.03.19	Checked: AN Date: 19.03.19	Authorised: KG Date: 17.04.19
Status: I	Drawing Number: 5168265 / ATK / HT / 0103	Rev: A	





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  4. ALL COORDINATES ARE IN METRES AND ARE TO IRISH TRANSVERSE MERCATOR
  5. DRAWINGS ARE TO BE READ IN CONJUNCTION WITH THE SPECIFICATION
  6. POSITIONS OF EXISTING UTILITIES ARE BASED ON RECORDS FROM UTILITY COMPANIES WHERE AVAILABLE. THESE ARE SHOWN FOR BACKGROUND INFORMATION ONLY.
  7. ALWAYS REFER TO UTILITY RECORDS PACK AND VERIFY POSITIONS OF ASSETS ON SITE PRIOR TO COMMENCING ANY EXCAVATIONS.

- LEGEND**
- EXTENT OF THE WORKS BOUNDARY
  - EXISTING FOOTPATH
  - PROPOSED FOOTPATH
  - PROPOSED CARRIAGEWAY
  - PROPOSED CYCLEWAY
  - PROPOSED SHARED USE FACILITY FOR PEDESTRIANS AND CYCLISTS
  - TACTILE PAVING (LADDER & TRAMLIN)
  - PLUBLIC PLAZA AND SHARED USE ACCESS

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A	ISSUED FOR INFORMATION	YC	02.10.19	AN	KG
-	ISSUED FOR INFORMATION	RG	14.05.19	AN	KG

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**Glenveagh Living**

Project: **KNOCKNACARRA DISTRICT CENTRE**

Purpose: **STAGE 3 SUBMISSION**

Title: **PROPOSED INDICATIVE ROAD LEVELS**

Original Scale <b>1:500 at A1 1:1000 at A3</b>	Design/Drawn YC	Checked AN	Authorised KG
Status I	Drawing Number 5168265 / ATK / HT / 0104	Date 19.03.19	Date 19.03.19





**GENERAL NOTES:**  
 THESE NOTES APPLY EXCEPT WHERE NOTED OTHERWISE ON THE DRAWINGS OR IN THE SPECIFICATION.

- DO NOT SCALE. USE ONLY FIGURED DIMENSIONS.
- ALL DIMENSIONS ARE IN METRES UNLESS STATED OTHERWISE.
- LEVELS SHOWN TO MALIN HEAD DATUM UNLESS STATED OTHERWISE.
- COORDINATES ARE TO ITM UNLESS STATED OTHERWISE.
- DRAWINGS ARE TO BE READ IN CONJUNCTION WITH THE SPECIFICATION AND SPECIFICATION APPENDICES.
- MARKER POST LOCATIONS SHOWN ARE INDICATIVE ONLY.

**ROAD MARKINGS AND TRAFFIC SIGNS NOTES:**

- ALL ROAD MARKINGS, ROAD STUDS AND TRAFFIC SIGNS TO BE IN ACCORDANCE WITH THE DEPARTMENT OF TRANSPORT TRAFFIC SIGNS MANUAL 2015 (TSM).
- MARKING AND SIGN REFERENCE NUMBERS REFER TO THE DEPARTMENT OF THE TRANSPORT TRAFFIC SIGNS MANUAL 2015 (TSM).
- PROVISION OF ROAD MARKINGS, ROAD STUDS AND TRAFFIC SIGNS TO BE IN ACCORDANCE WITH THE REQUIREMENTS OF APPENDIX 12/1 AND 12/3 OF THE SPECIFICATION - TRAFFIC SIGNS: ROAD MARKING & STUDS.
- PROPOSED ROAD MARKINGS TO TIE INTO AND MATCH EXISTING ROAD MARKINGS AT INTERFACE BETWEEN PROPOSED WORKS AND EXISTING.
- FINAL POSITION OF TRAFFIC SIGNS TO BE CONFIRMED WITH THE EMPLOYER'S REPRESENTATIVE ON SITE.
- DO NOT SCALE FROM DRAWING.

**LEGEND:**

- EXTENT OF THE WORKS BOUNDARY
- TRAFFIC SIGN LOCATION

**ROAD MARKING SCHEDULE**

KEY	REF No.	LENGTH OF LINE (m)	LENGTH OF GAP (m)	WIDTH OF LINE (m)	COLOUR
---	RRM 001	CONTINUOUS	N/A	0.10	WHITE
---	RRM 002B	3.0	3.0	0.10	WHITE
---	RRM 003B	2.0	2.0	0.10	WHITE
---	RRM 003C	1.0	1.0	0.10	WHITE
→	RRM 004	LANE INDICATION ARROWS AS PER FIG. 7.24 TRAFFIC SIGNS MANUAL 2010			WHITE
→	RRM 005	LANE INDICATION ARROW AS PER 7.24 TRAFFIC SIGNS MANUAL 2010			WHITE
---	RRM 008	CONTINUOUS	N/A	0.10	YELLOW
---	RRM 017	CONTINUOUS	N/A	0.20	WHITE
---	RRM 018C	0.3	0.3	0.10	WHITE
---	RRM 022	CONTINUOUS	N/A	0.10	WHITE
---	RRM 023	0.75	0.75	0.10	WHITE
---	RRM 024	CONTINUOUS	N/A	0.25	WHITE
---	RRM 030	BUS STOP MARKINGS AS PER TRAFFIC SIGNS MANUAL 2010			WHITE
↔	M 102	BIFURCATION ARROW AS PER TRAFFIC SIGNS MANUAL 2010			
↔	M 115C	CYCLE TRACK TRIANGULAR YIELD MARKING AS PER SECTION 7.8 TRAFFIC SIGNS MANUAL 2010			WHITE
↔	M 116	CYCLE SYMBOL, 1200mm HIGH, AS PER TRAFFIC SIGNS MANUAL 2010			WHITE
→	M 118	LANE DESTINATION AS PER TRAFFIC SIGNS MANUAL 2010			WHITE
→	M 125	LANE INDICATION ARROW AS PER 7.24 TRAFFIC SIGNS MANUAL 2010			WHITE
↔	M 130	DOUBLE-HEADED BUS LANE END ARROW AS PER TRAFFIC SIGNS MANUAL 2010			WHITE
→	M 131	CONTINUOUS	N/A	0.10	WHITE
↔	M 111	PEDESTRIAN SYMBOL			WHITE

**LEGEND:**

- EXTENT OF THE WORKS BOUNDARY
- EXISTING FOOTPATH
- PROPOSED FOOTPATH
- PROPOSED CARRIAGEWAY
- PROPOSED CYCLEWAY
- PROPOSED SHARED USE FACILITY FOR PEDESTRIANS AND CYCLISTS
- TACTILE PAVING (LADDER & TRAMLIN)
- PUBLIC PLAZA AND SHARED USE ACCESS

Purpose: **STAGE 3 SUBMISSION**

**PROPOSED TRAFFIC SIGN & ROAD MARKINGS**

Original Scale	Design/Drawn	Checked	Authorised
1:250 at A1 1:500 at A3	YC	AN	KG
Date	Date	Date	Date
20.03.19	20.03.19	20.03.19	17.04.19
Status	Drawing Number	Rev	
I	5168265 / ATK / HT / 0105	A	

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A ISSUED FOR INFORMATION YC 02.10.19 AN KG		- ISSUED FOR INFORMATION RG 17.04.19 AN KG		Project: <b>KNOCKNACARRA DISTRICT CENTRE</b>



A1

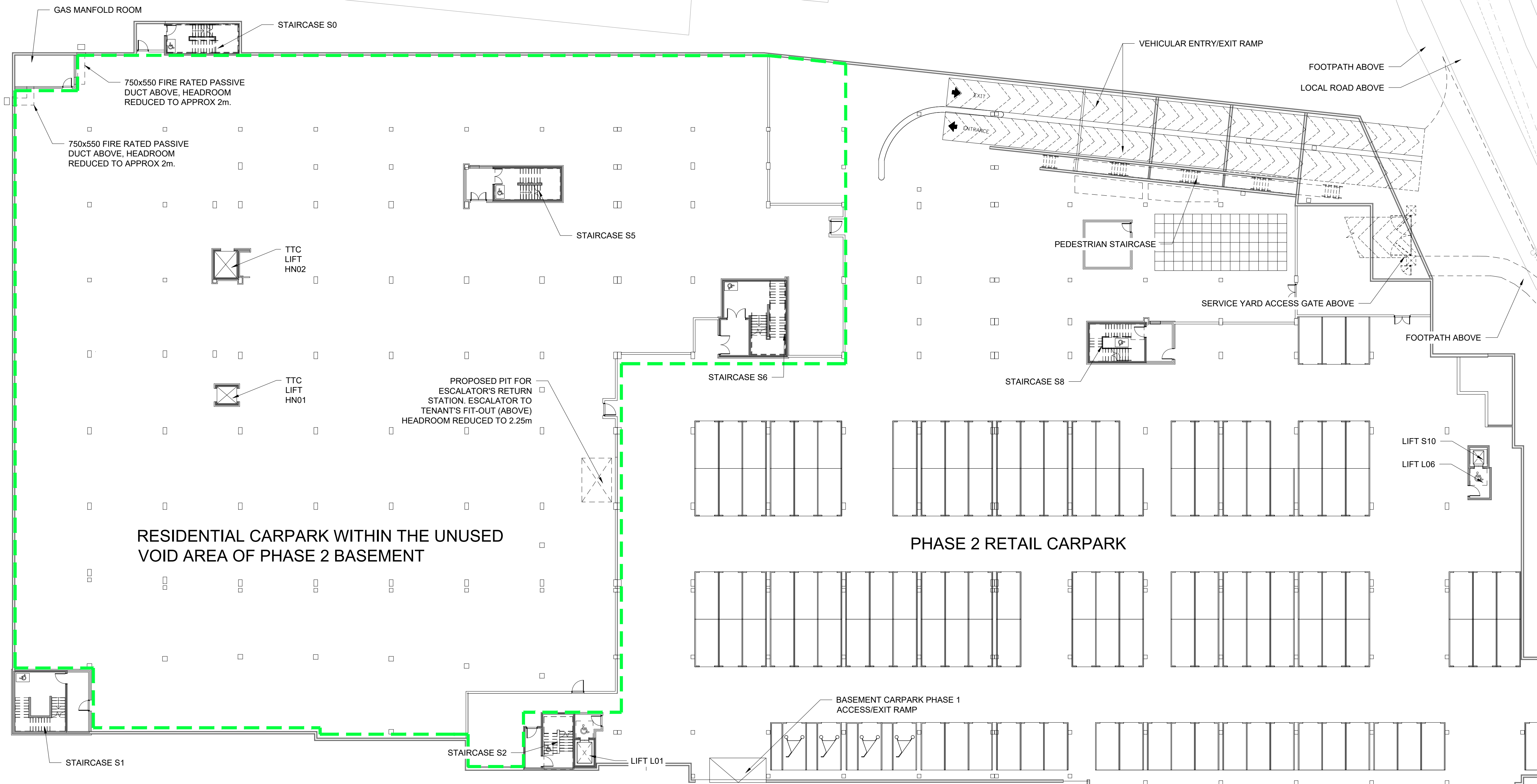
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Date: Nov 14, 2019 - 1:31pm

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**LEGEND:**

--- EXTENTS OF AREA REQUIRED FOR RESIDENTIAL CARPARK WITHIN THE UNUSED VOID AREA OF PHASE 2 BASEMENT

RESIDENTIAL CARPARK WITHIN THE UNUSED VOID AREA OF PHASE 2 BASEMENT

PHASE 2 RETAIL CARPARK

BASEMENT CARPARK PHASE 1 ACCESS/EXIT RAMP

Purpose: **STAGE 3 SUBMISSION**

Title: **BASEMENT CARPARK GENERAL ARRANGEMENT**

Rev	Description	By	Date	Chk'd	Auth
A	ISSUED FOR INFORMATION	YC	02.10.19	AN	KG
-	ISSUED FOR INFORMATION	RG	14.05.19	AN	KG

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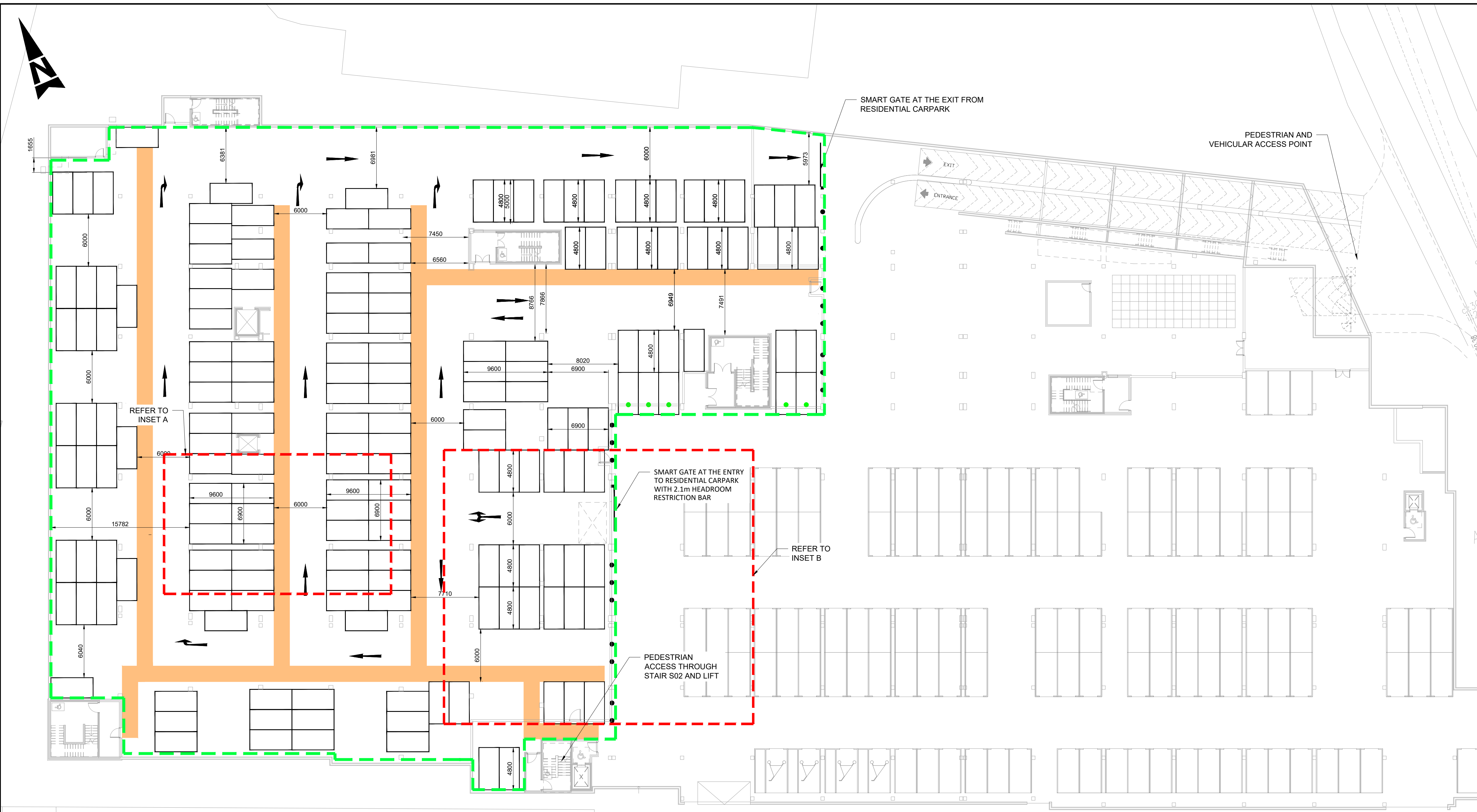
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Client: **Glenveagh Living**

Project: **KNOCKNACARRA DISTRICT CENTRE**

Original Scale	Design/Drawn	Checked	Authorised
1:250 at A1	KH	KG	
1:500 at A3	Date 09.04.19	Date 09.04.019	Date 09.04.019
Status	Drawing Number	Rev	
I	5168265 / ATK / HT / 0106	A	





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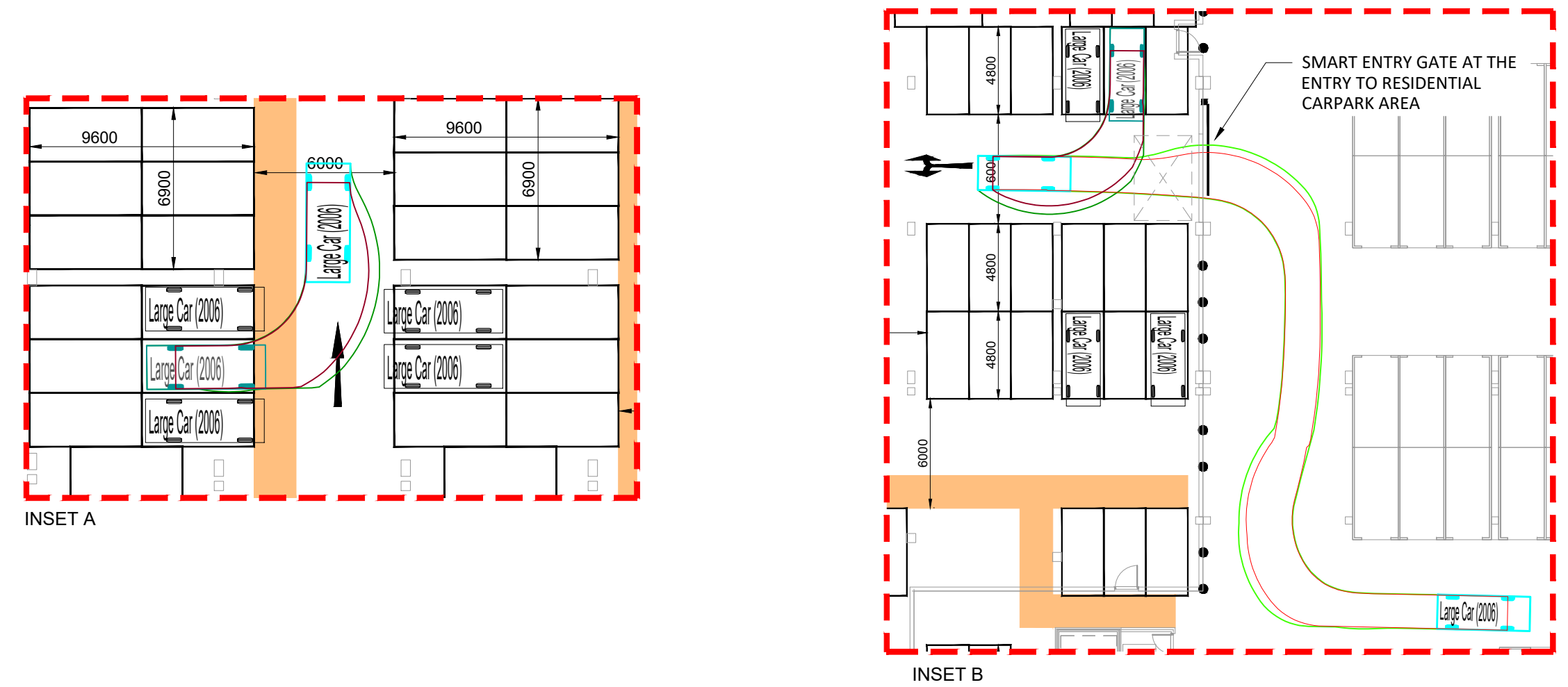
**LEGEND:**

- EXTENTS OF AREA REQUIRED FOR RESIDENTIAL CARPARK WITHIN THE UNUSED VOID AREA OF PHASE 2 BASEMENT
- 1.8m WIDE PEDESTRIAN WALKWAY WITHIN THE RESIDENTIAL CARPARK CIRCULATORY CARRIAGEWAY
- BOLLARDS TO DELINEATE RESIDENTIAL CARPARK
- COLLAPSIBLE BOLLARDS TO MANAGE RESIDENTIAL PARKING SPACE ACCESS
- M111, WHITE, 1200mm
- RRM 004, WHITE, 3600mm
- RRM 006, WHITE, 3600mm
- M 126, WHITE, 3600mm

LARGE CAR (2006)

OVERALL LENGTH	5.079m
OVERALL WIDTH	1.872m
OVERALL BODY HEIGHT	1.525m
MIN BODY GROUND CLEARANCE	0.310m
MAX TRACK WIDTH	1.831m
LOCK-TO-LOCK TIME	4.00s
CURB TO CURB TURNING RADIUS	5.900m

**RESIDENTIAL CARPARK PLAN**  
181 No. Parking spaces



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-	ISSUED FOR INFORMATION	RG	14.05.19	AN	KG

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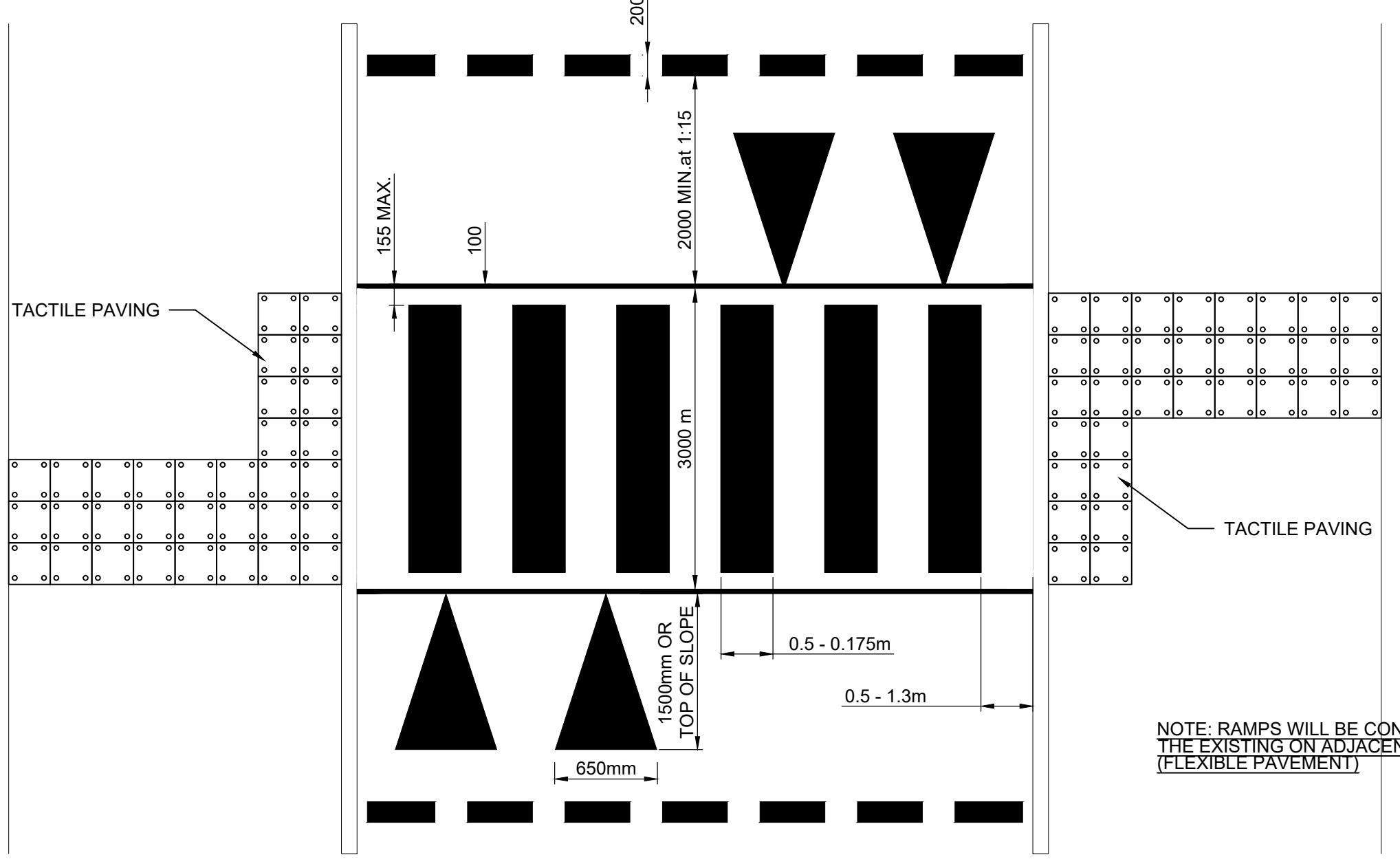
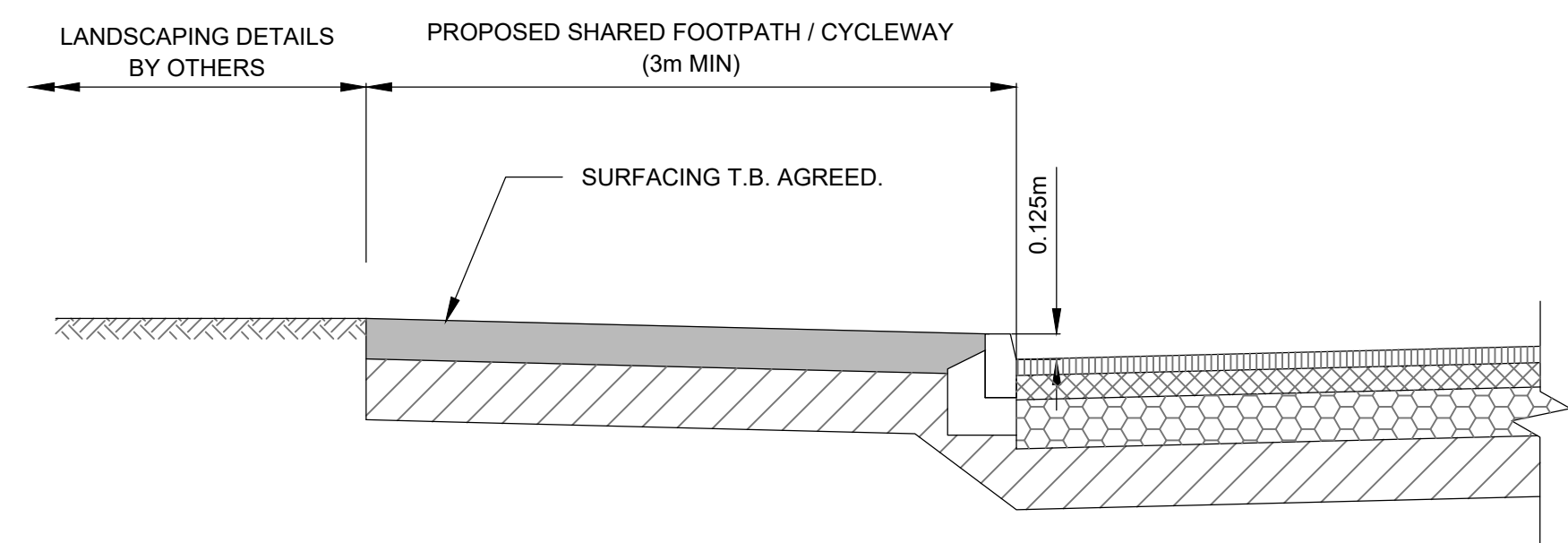
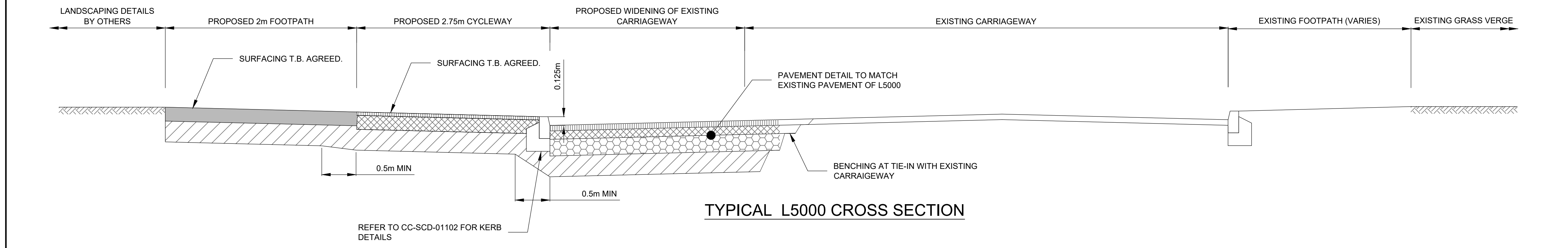
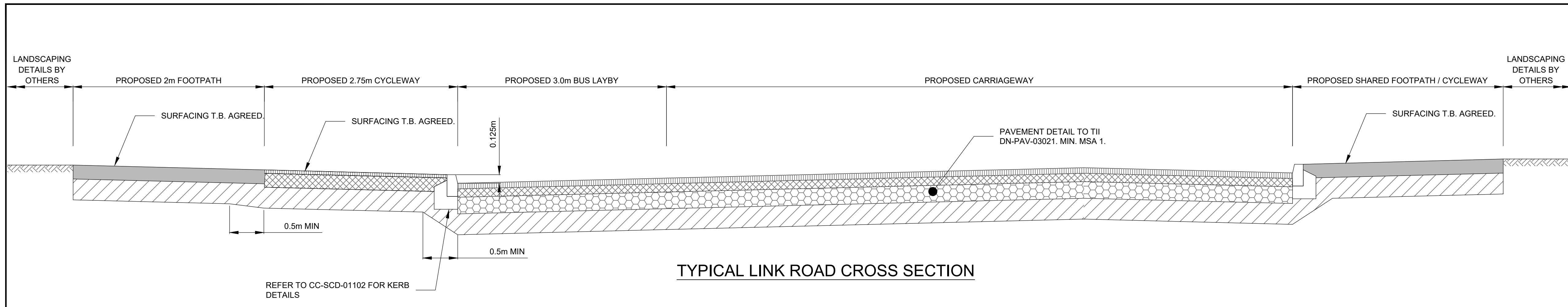
Client: **Glenveagh Living**

Project: **KNOCKNACARRA DISTRICT CENTRE**

Purpose: <b>STAGE 3 SUBMISSION</b>			
Title: <b>BASEMENT CARPARK CARPARK PLAN</b>			
Original Scale: <b>1:200 at A1 1:400 at A3</b>	Design/Drawn: <b>KH</b>	Checked: <b>KG</b>	Authorised:
Status: <b>I</b>	Drawing Number: <b>5168265 / ATK / HT / 0107</b>	Date: <b>09.04.19</b>	Date: <b>17.04.19</b>
Rev: <b>1</b>			Rev: <b>A</b>

A1

DO NOT SCALE



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- LEGEND**
- 100mm CONCRETE FOOTWAY TO CL.1106
  - PMSMA SURFACE COURSE TO CL.942
  - ASPHALT CONCRETE BINDER COURSE TO CL.906
  - ASPHALT CONCRETE BASE COURSE TO CL.906
  - 150mm SUB BASE TYPE B TO CL.804

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Rev	Description	By	Date	Chk'd	Auth
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Client: **Glenveagh Living**

Project: **KNOCKNACARRA DISTRICT CENTRE**

Purpose: **STAGE 3 SUBMISSION**

Title: **TYPICAL CROSS SECTIONS AND DETAILS**

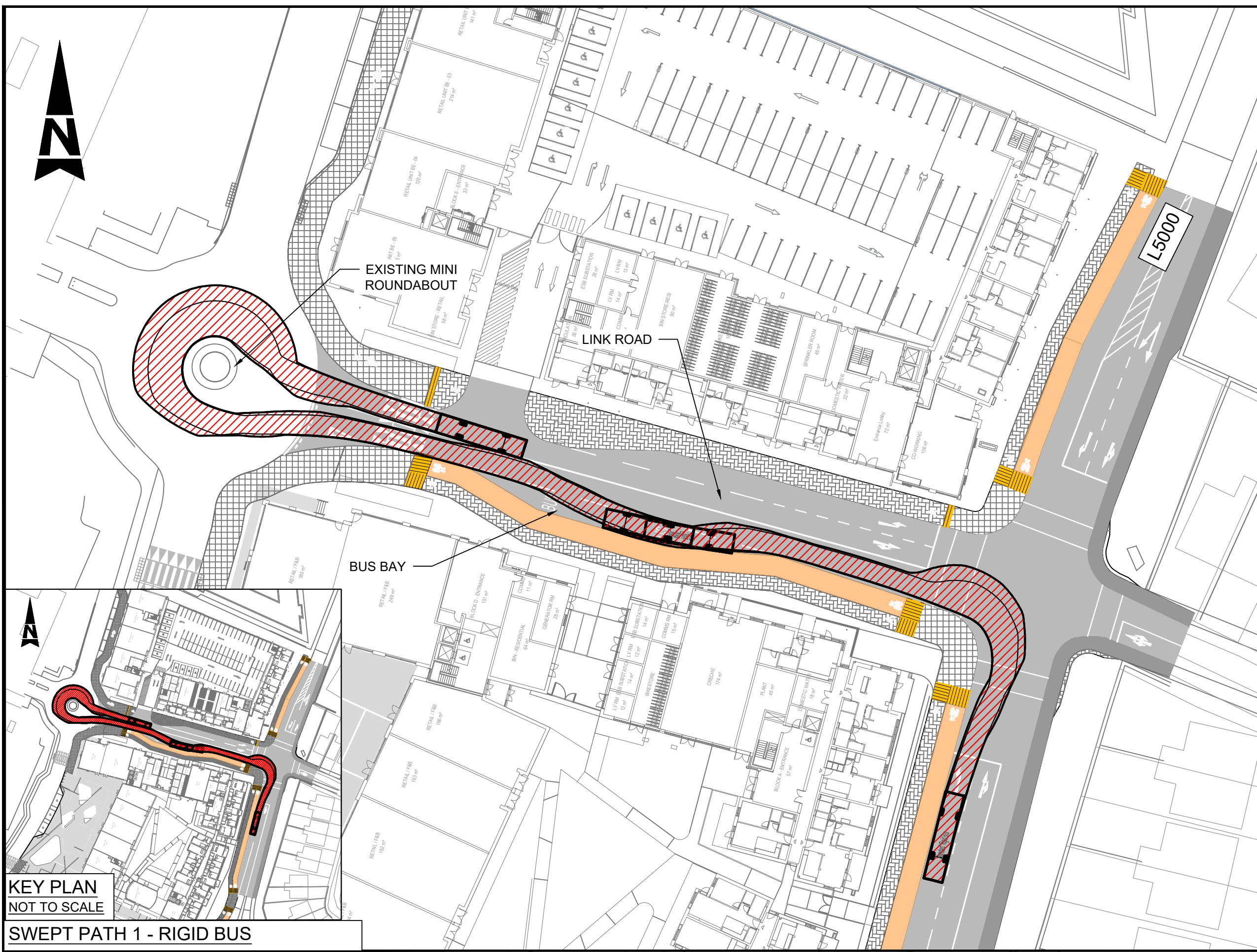
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Date: 16.04.19	Date: 16.04.19	Date: 16.04.19	Date: 16.04.19

Status	Drawing Number	Rev
I	5168265 / ATK / SCD / 001	A

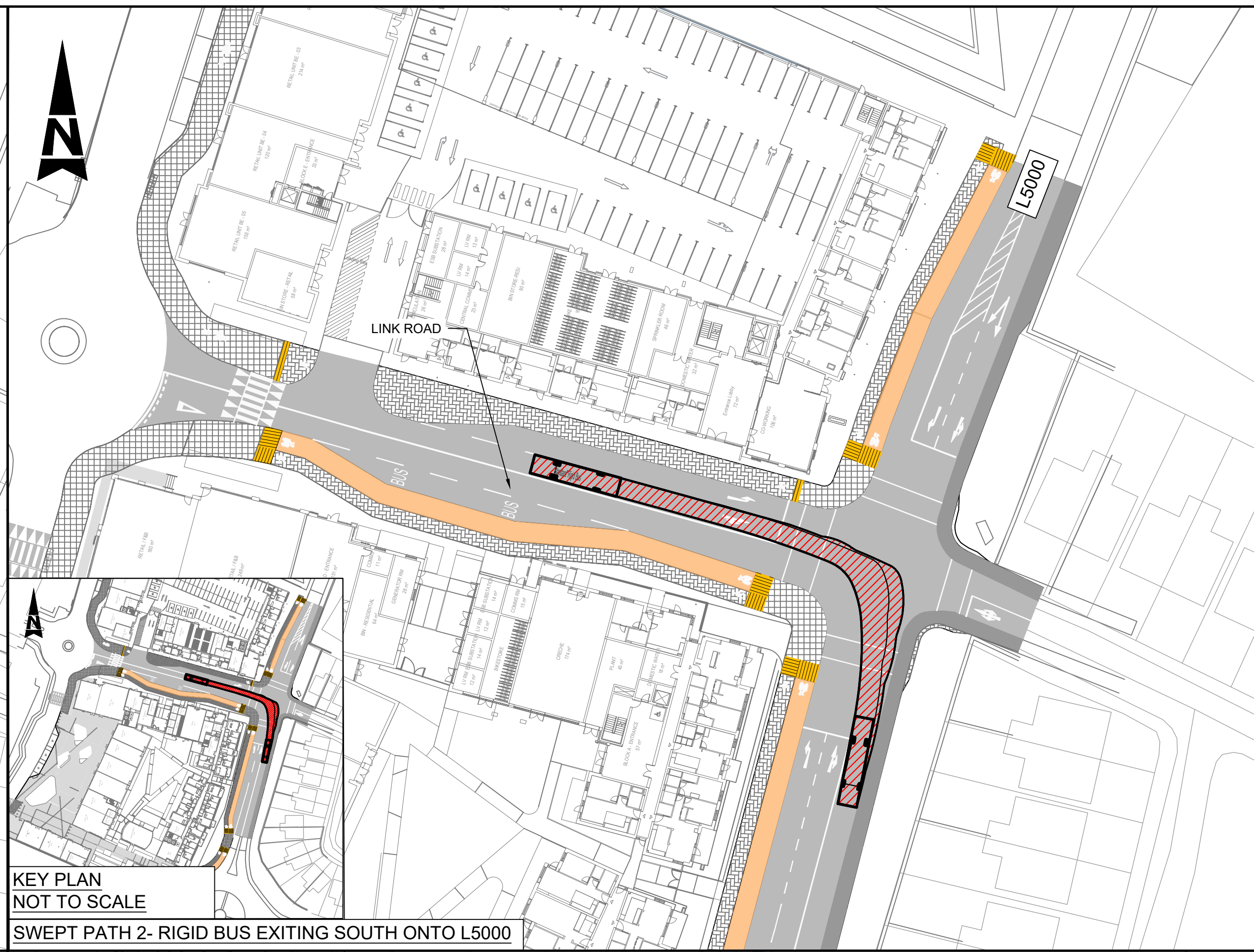


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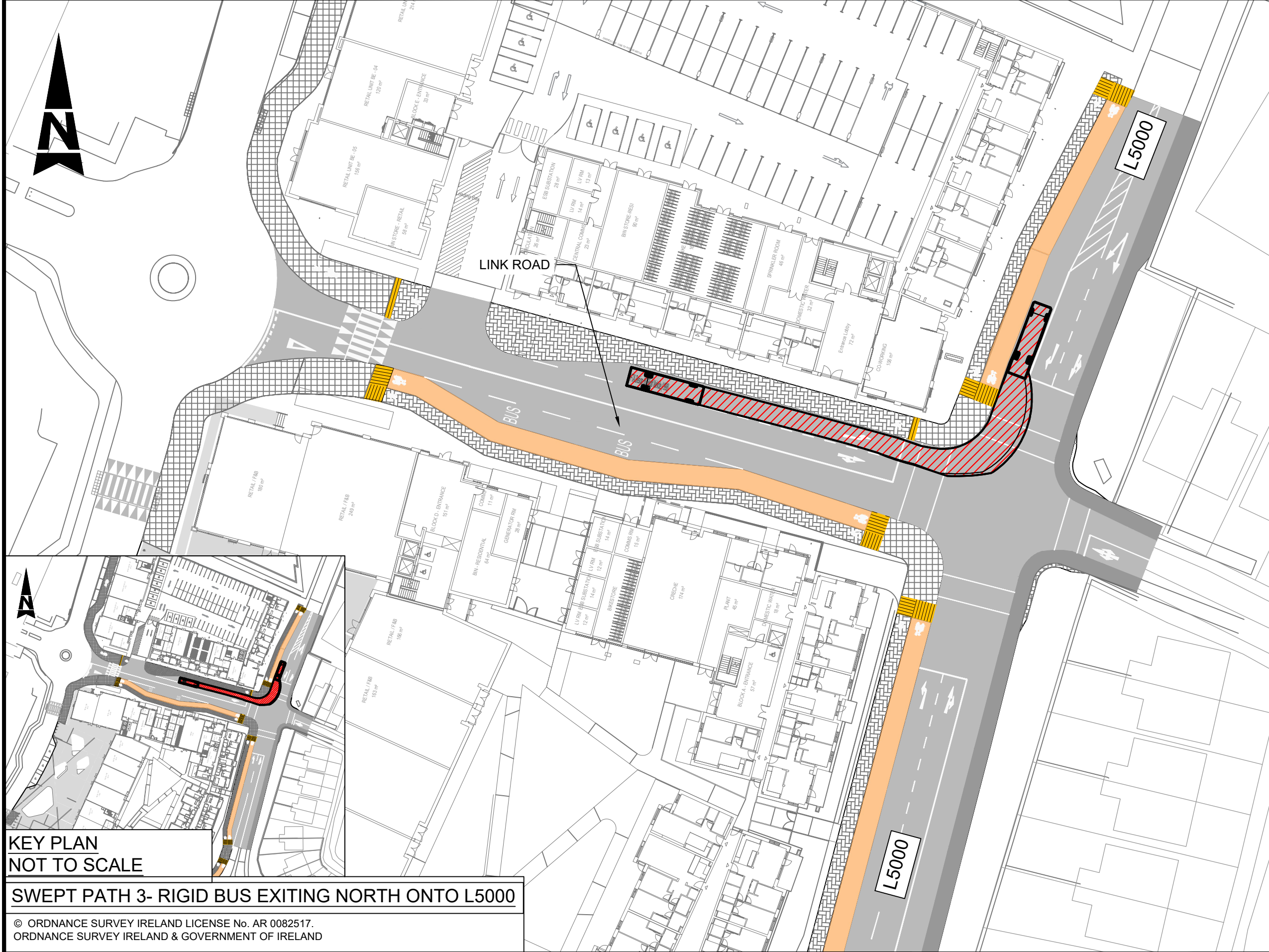
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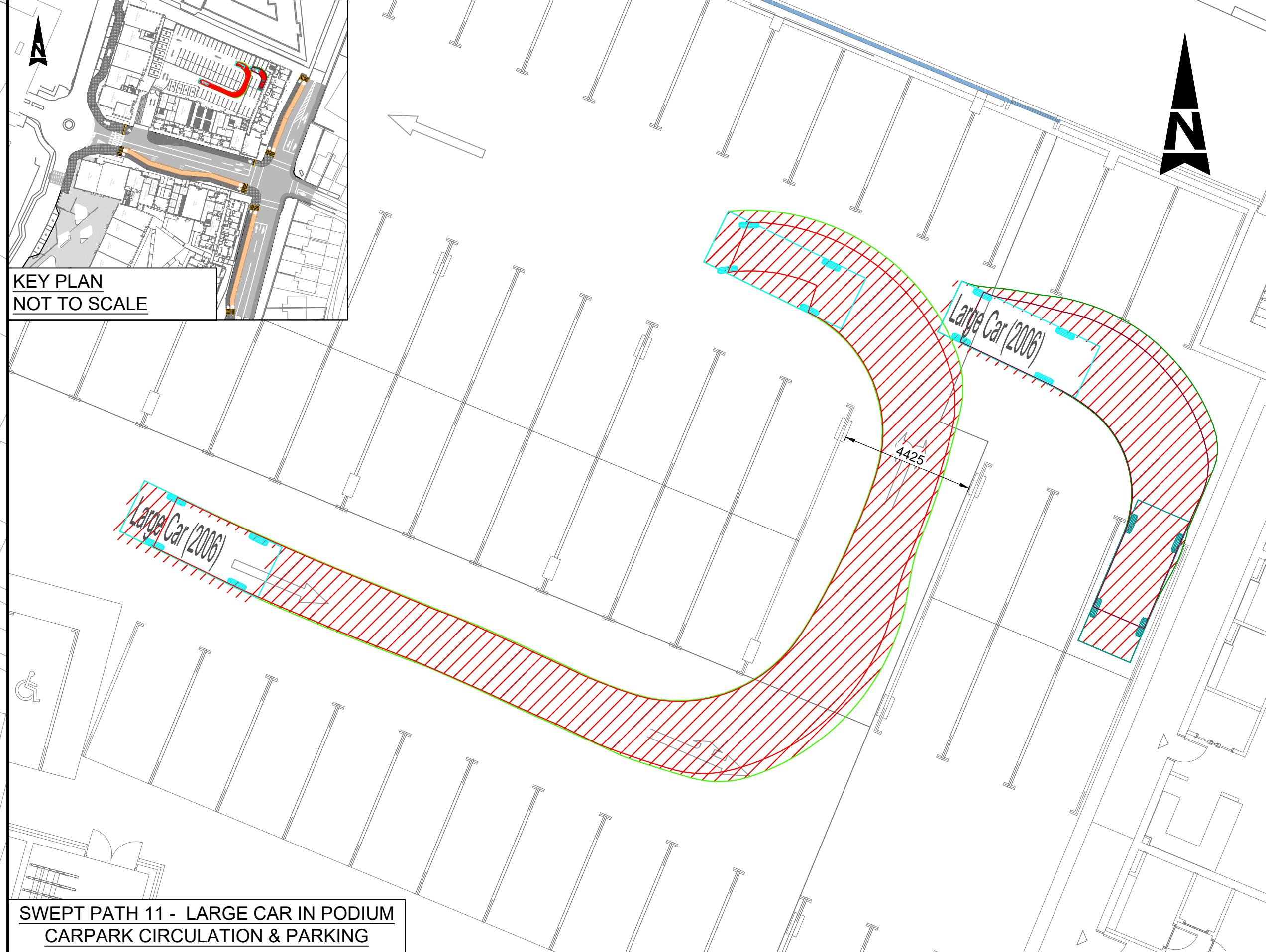
KEY PLAN  
NOT TO SCALE  
SWEEP PATH 1 - RIGID BUS



KEY PLAN  
NOT TO SCALE  
SWEEP PATH 2 - RIGID BUS EXITING SOUTH ONTO L5000



KEY PLAN  
NOT TO SCALE  
SWEEP PATH 3 - RIGID BUS EXITING NORTH ONTO L5000



KEY PLAN  
NOT TO SCALE  
SWEEP PATH 11 - LARGE CAR IN PODIUM CARPARK CIRCULATION & PARKING

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**VEHICLE PROFILES**

**DELIVERY TRUCK**

FTA Design HG Rigid Vehicle

Overall Length	10.000m
Overall Width	2.500m
Overall Body Height	3.645m
Min Body Ground Clearance	0.440m
Track Width	2.470m
Lock-to-lock time	3.00s
Curb to Curb Turning Radius	11.000m

**PASSANGER CAR**

Overall length	5.079m
Overall width	1.872m
Overall body height	1.525m
Min body ground clearance	0.310m
Max track width	1.831m
Lock-to-lock time	4.00s
Curb to curb turning radius	5.900m

**PUBLIC TRANSPORT BUS**

'Standard' Rigid Bus

Overall Length	12.000m
Overall Width	2.550m
Overall Body Height	3.069m
Min Body Ground Clearance	0.309m
Track Width	2.350m
Lock-to-lock time	4.00s
Wall to Wall Turning Radius	10.771m

File: 5168265-ATK-HT-SK-1009.DWG  
Date: Oct 30, 2019 - 12:24pm  
Plotted by: A.Konopkova

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Client: **Glenveagh Living**

Project: **KNOCKNACARRA DISTRICT CENTRE**

Purpose: **STAGE 3 SUBMISSION**

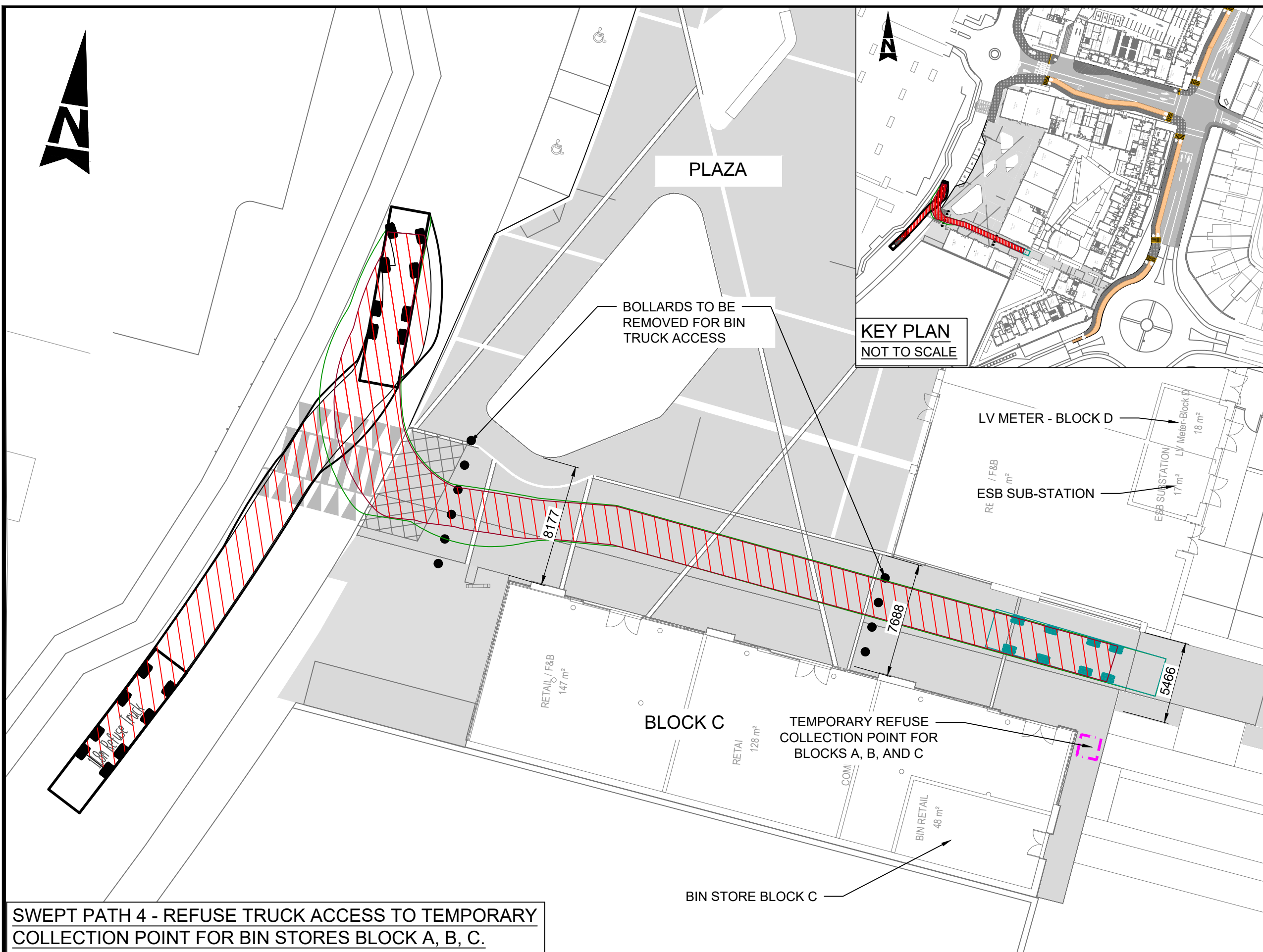
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Drawing Number	Rev		
5168265 / ATK / SK / 1009	A		

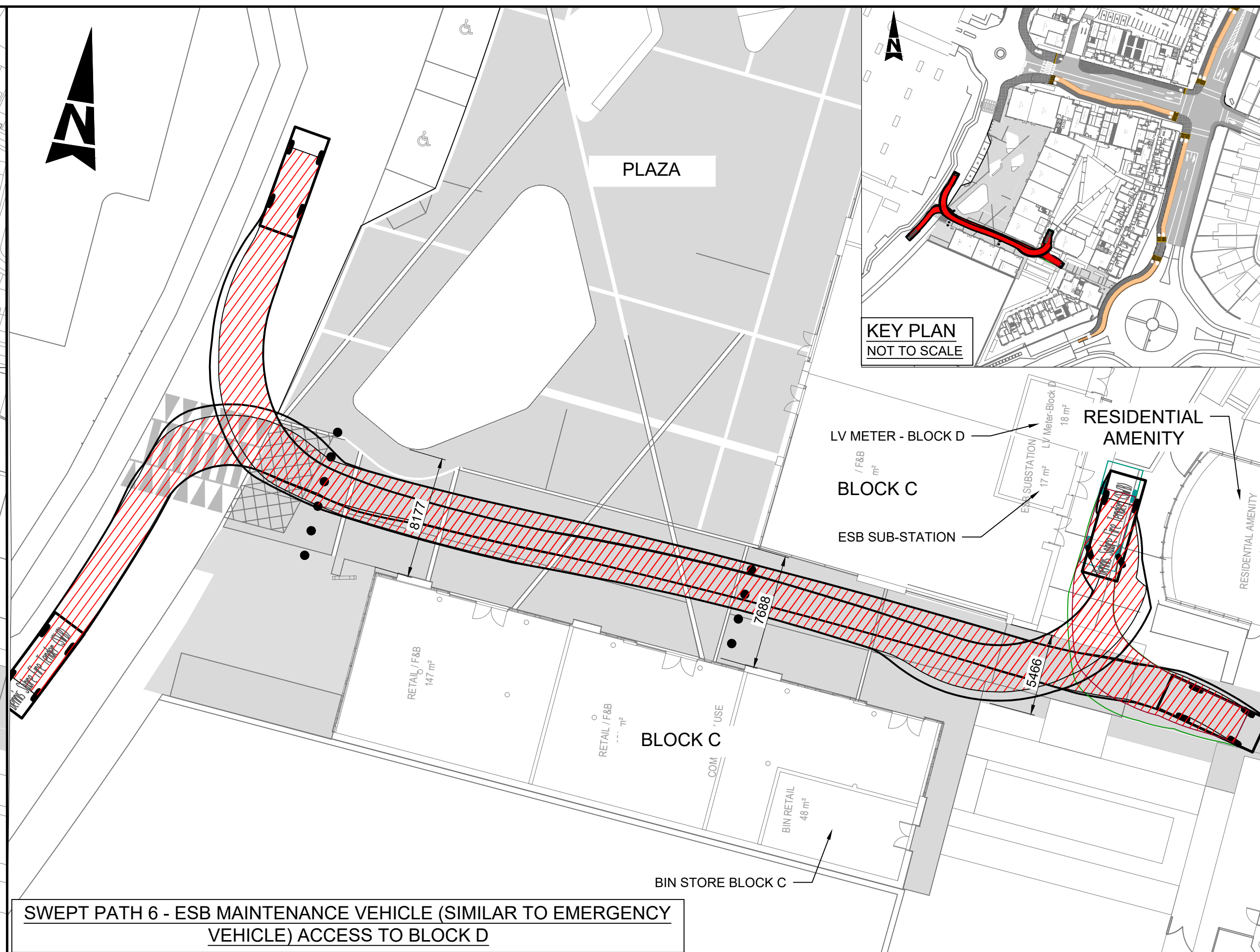


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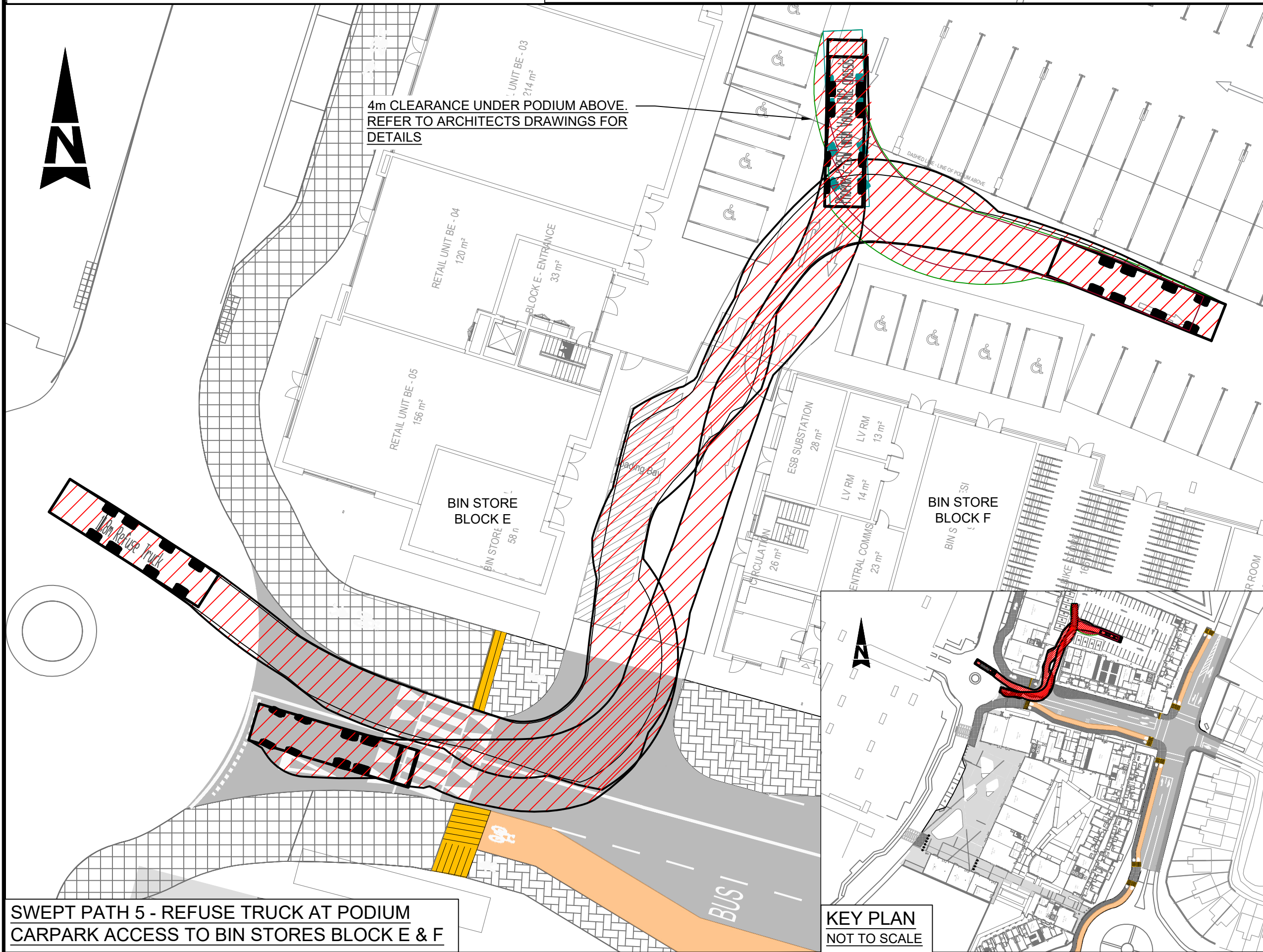
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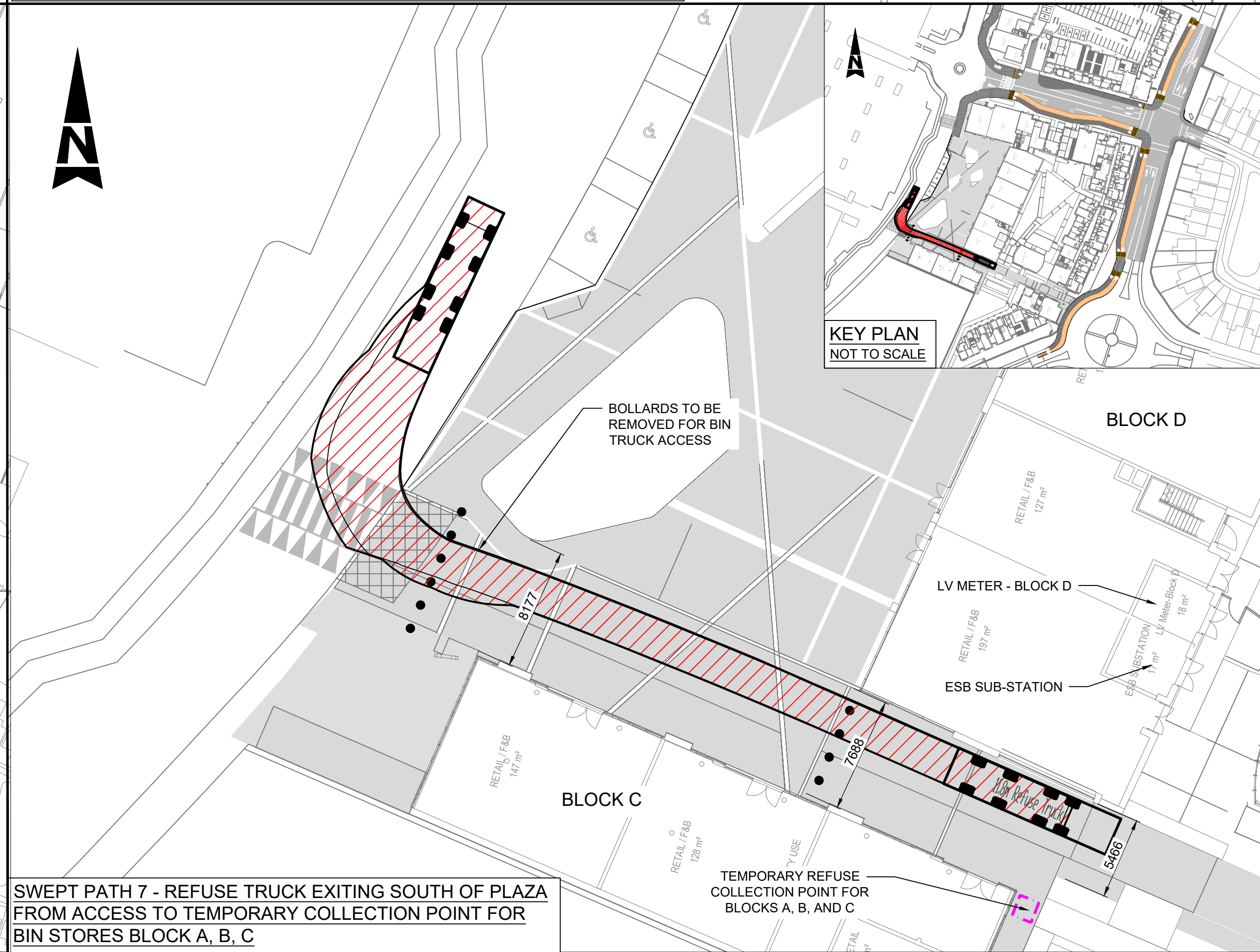
SWEPT PATH 4 - REFUSE TRUCK ACCESS TO TEMPORARY COLLECTION POINT FOR BIN STORES BLOCK A, B, C.



SWEPT PATH 6 - ESB MAINTENANCE VEHICLE (SIMILAR TO EMERGENCY VEHICLE) ACCESS TO BLOCK D



SWEPT PATH 5 - REFUSE TRUCK AT PODIUM CARPARK ACCESS TO BIN STORES BLOCK E & F



SWEPT PATH 7 - REFUSE TRUCK EXITING SOUTH OF PLAZA FROM ACCESS TO TEMPORARY COLLECTION POINT FOR BIN STORES BLOCK A, B, C

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**VEHICLE PROFILES**

**EMERGENCY VEHICLE**

Dennis Sabre Fire Tender (SWB)	
Overall Length	22.966ft
Overall Width	7.972ft
Overall Body Height	11.521ft
Min Body Ground Clearance	1.301ft
Track Width	7.808ft
Lock-to-lock time	5.00s
Curb to Curb Turning Radius	22.425ft

**REFUSE VEHICLE**

11.8m Refuse Truck	
Overall Length	11.800m
Overall Width	2.600m
Overall Body Height	3.205m
Min Body Ground Clearance	0.410m
Track Width	2.500m
Lock-to-lock time	4.00s
Curb to Curb Turning Radius	9.250m

- LEGEND:**
- PROPOSED REMOVABLE SOCKET BOLLARDS
  - PROPOSED PAVEMENT

Rev	Description	By	Date	Chk'd	Auth
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-	ISSUED FOR INFORMATION	RG	14.05.19	AN	KG

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Purpose: **STAGE 3 SUBMISSION**

Title: **VEHICULAR TRACKING SHEET 2 OF 3**

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Not To Scale	RG	KG	SC
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Status	Drawing Number		Rev
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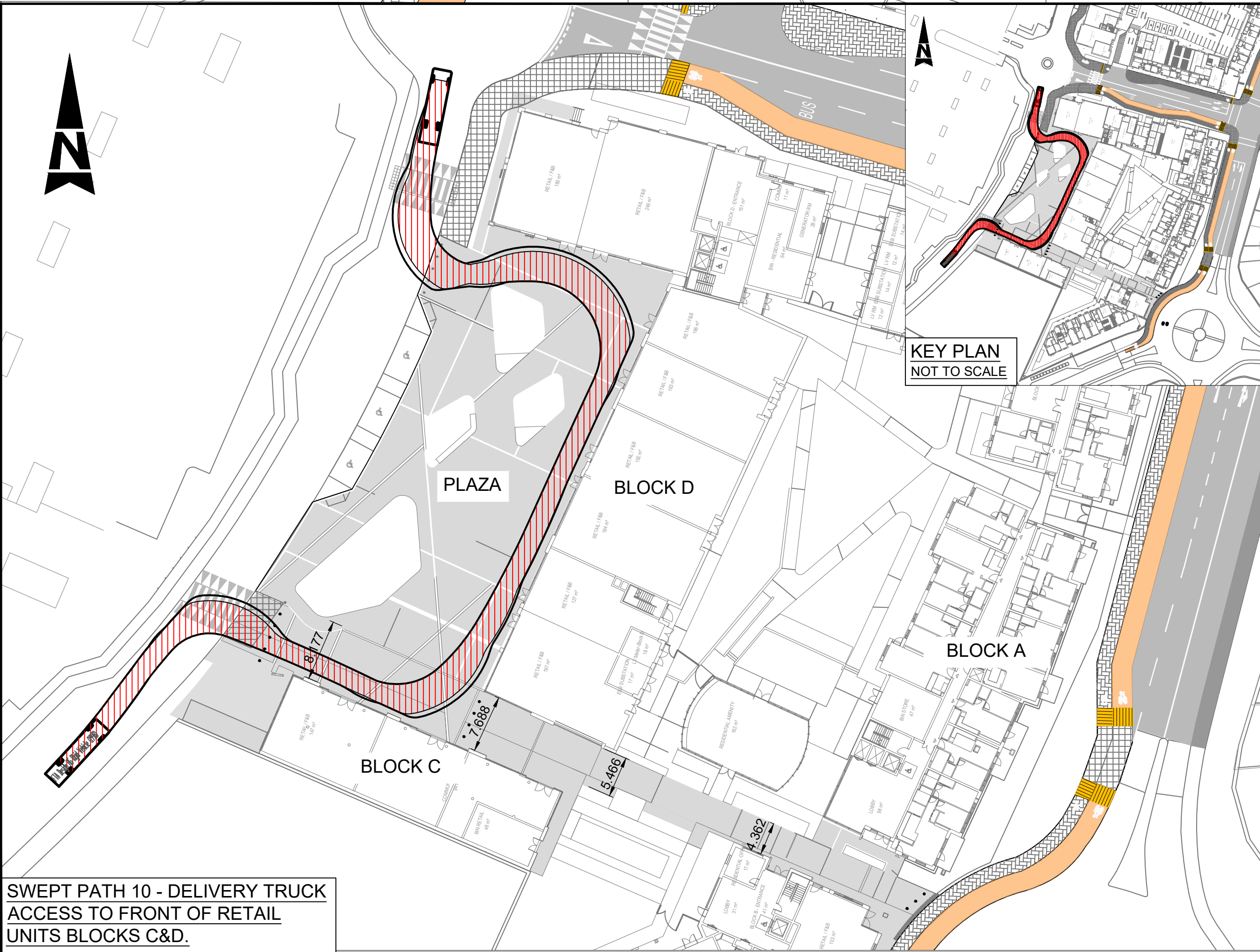
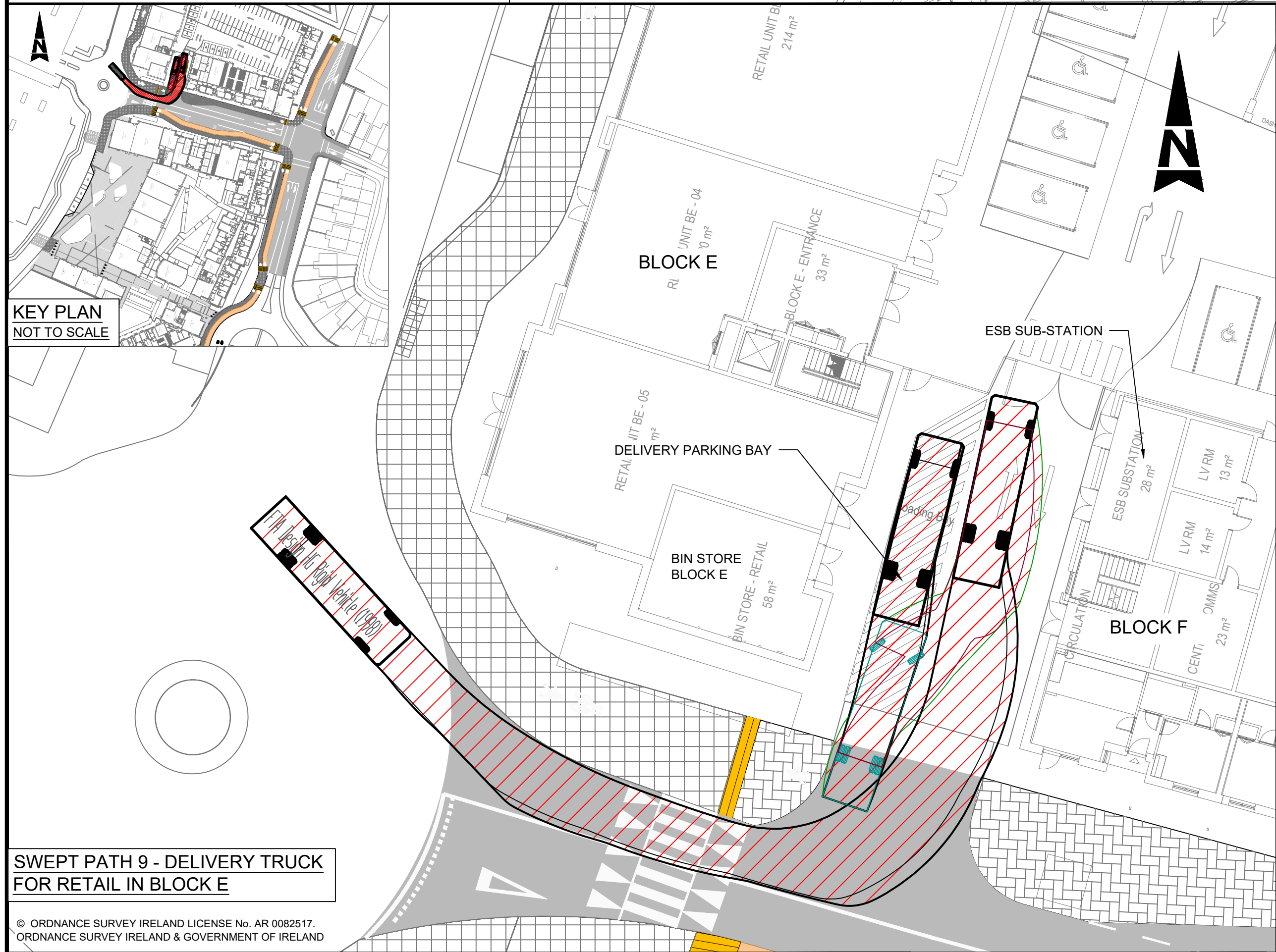
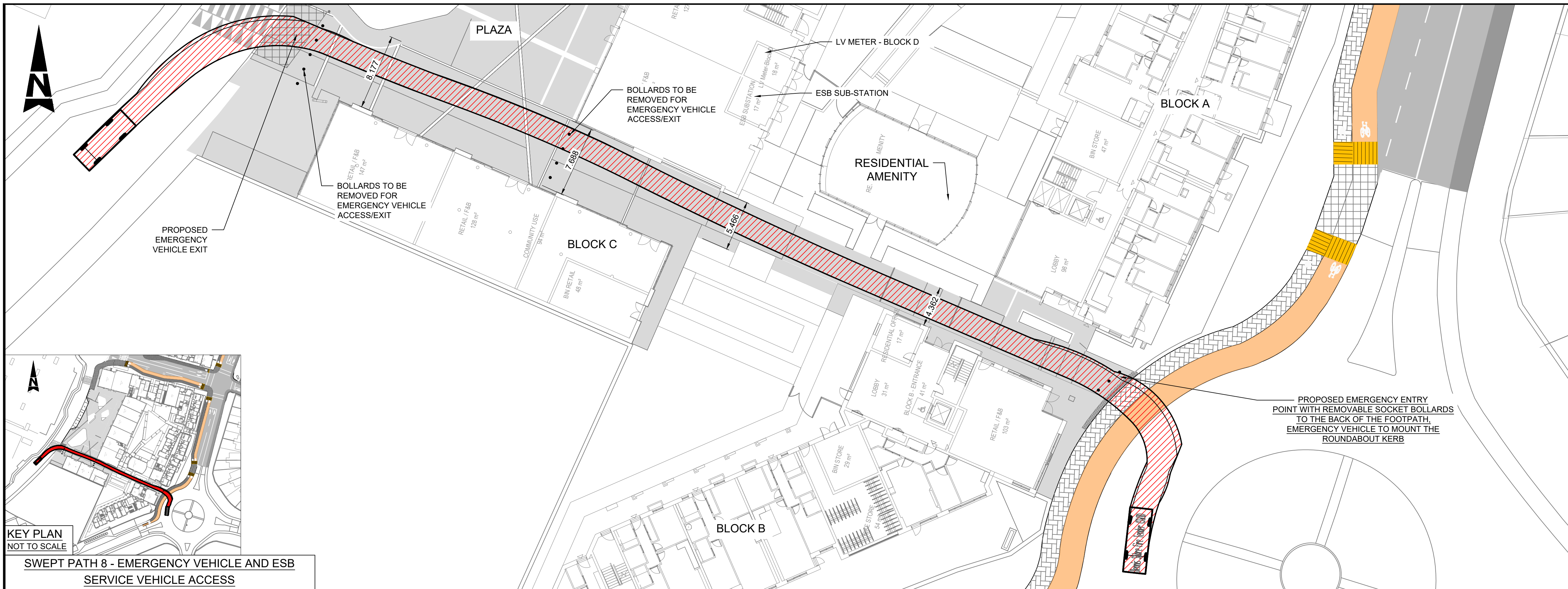
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Plotted by: Akonpkotiser



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**VEHICLE PROFILES**

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Dennis Sabre Fire Tender (SWB)

Overall Length	22.966ft
Overall Width	7.972ft
Overall Body Height	11.521ft
Min Body Ground Clearance	1.301ft
Track Width	7.808ft
Lock-to-lock time	5.00s
Curb to Curb Turning Radius	22.425ft

**DELIVERY TRUCK**

FTA Design HG Rigid Vehicle (1998)

Overall Length	10.000m
Overall Width	2.500m
Overall Body Height	3.645m
Min Body Ground Clearance	0.440m
Track Width	2.470m
Lock-to-lock time	3.00s
Curb to Curb Turning Radius	11.000m

- LEGEND:**
- PROPOSED REMOVABLE SOCKET BOLLARDS
  - PROPOSED PAVEMENT

**KEY PLAN NOT TO SCALE**

**SWEPT PATH 8 - EMERGENCY VEHICLE AND ESB SERVICE VEHICLE ACCESS**

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**KEY PLAN NOT TO SCALE**

**SWEPT PATH 9 - DELIVERY TRUCK FOR RETAIL IN BLOCK E**

**KEY PLAN NOT TO SCALE**

**SWEPT PATH 10 - DELIVERY TRUCK ACCESS TO FRONT OF RETAIL UNITS BLOCKS C&D.**

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Project: **KNOCKNACARRA DISTRICT CENTRE**

Purpose: **STAGE 3 SUBMISSION**

Title: **VEHICULAR TRACKING SHEET 1 OF 3**

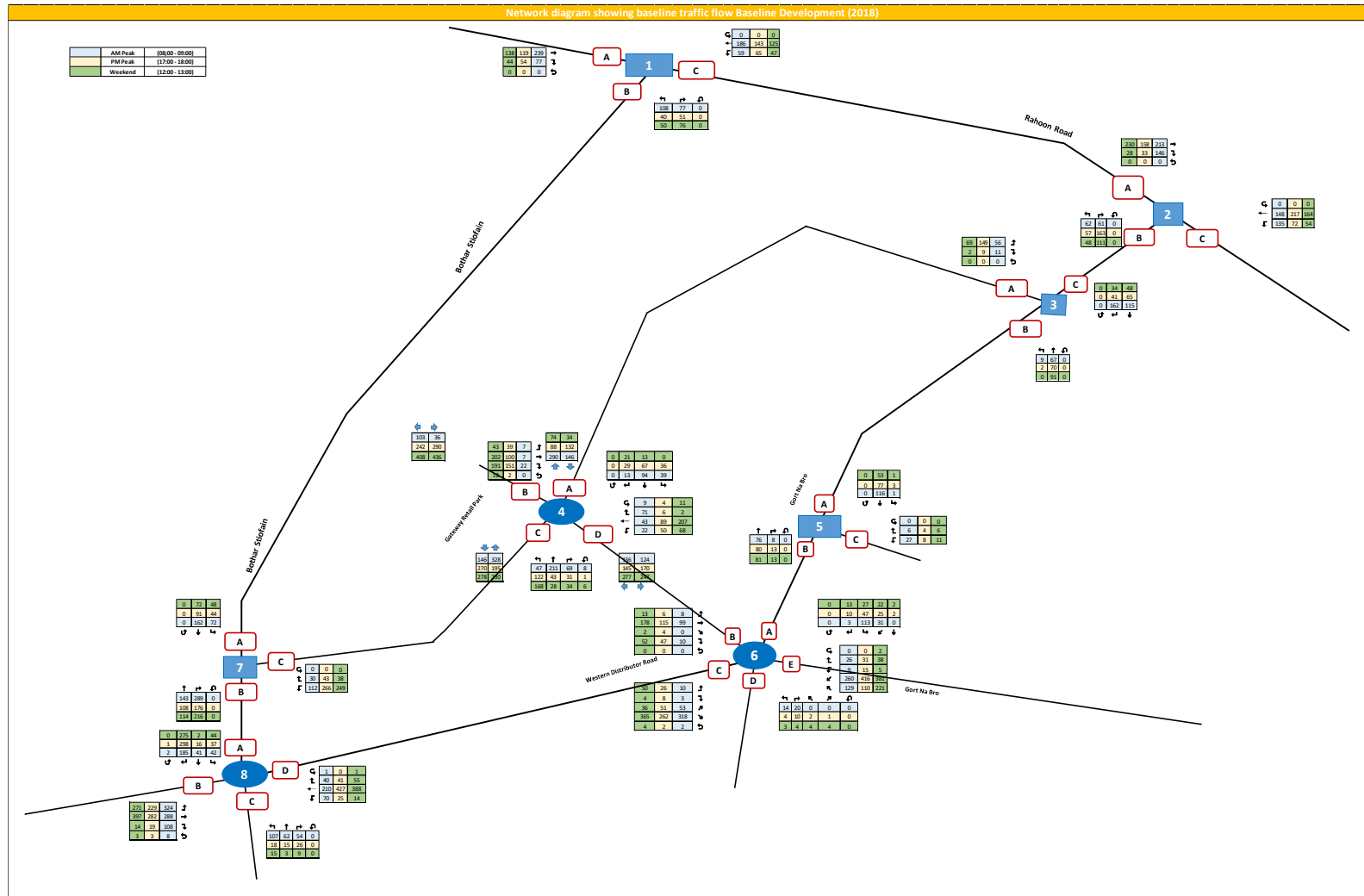
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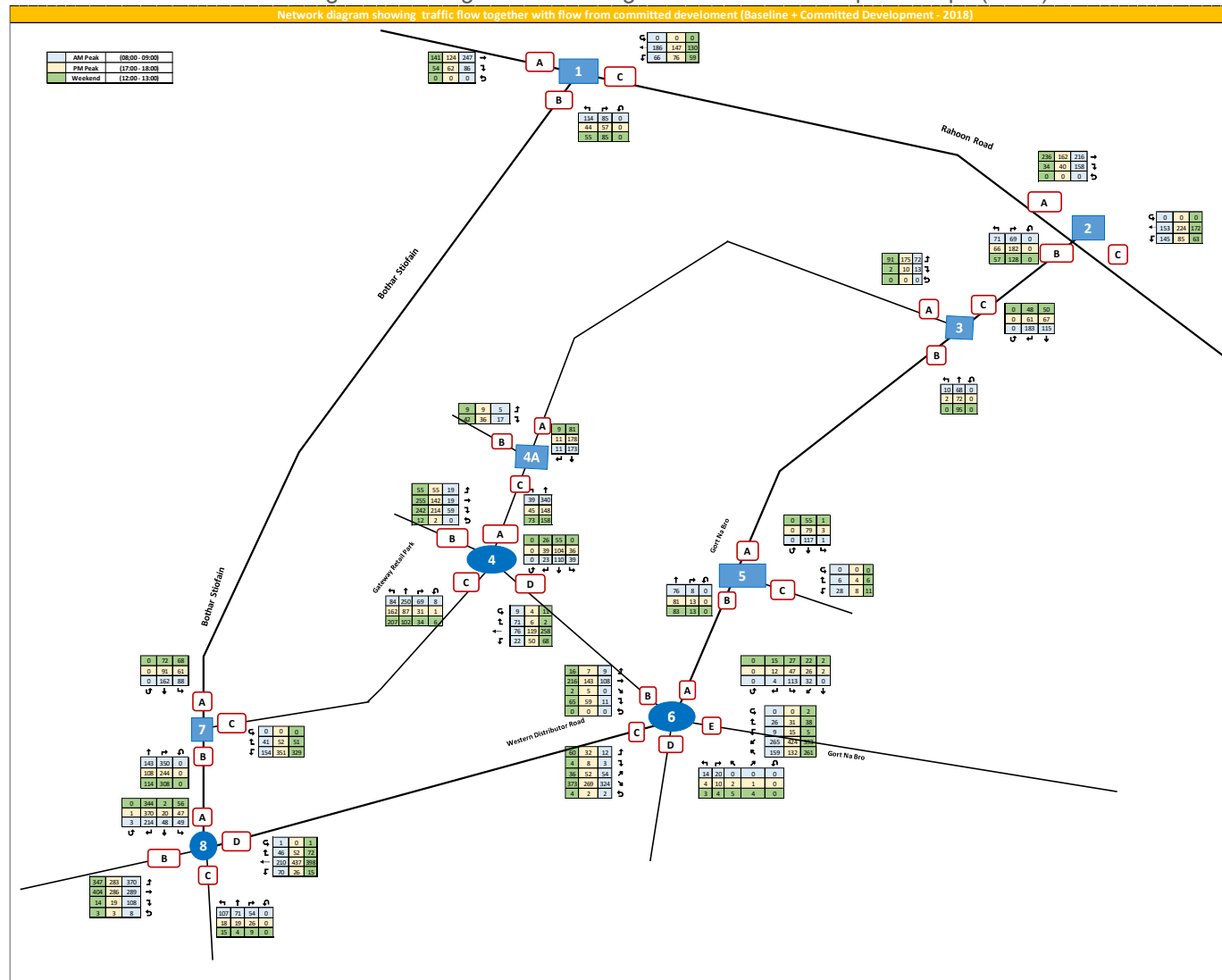
# Appendix C. Network Diagrams



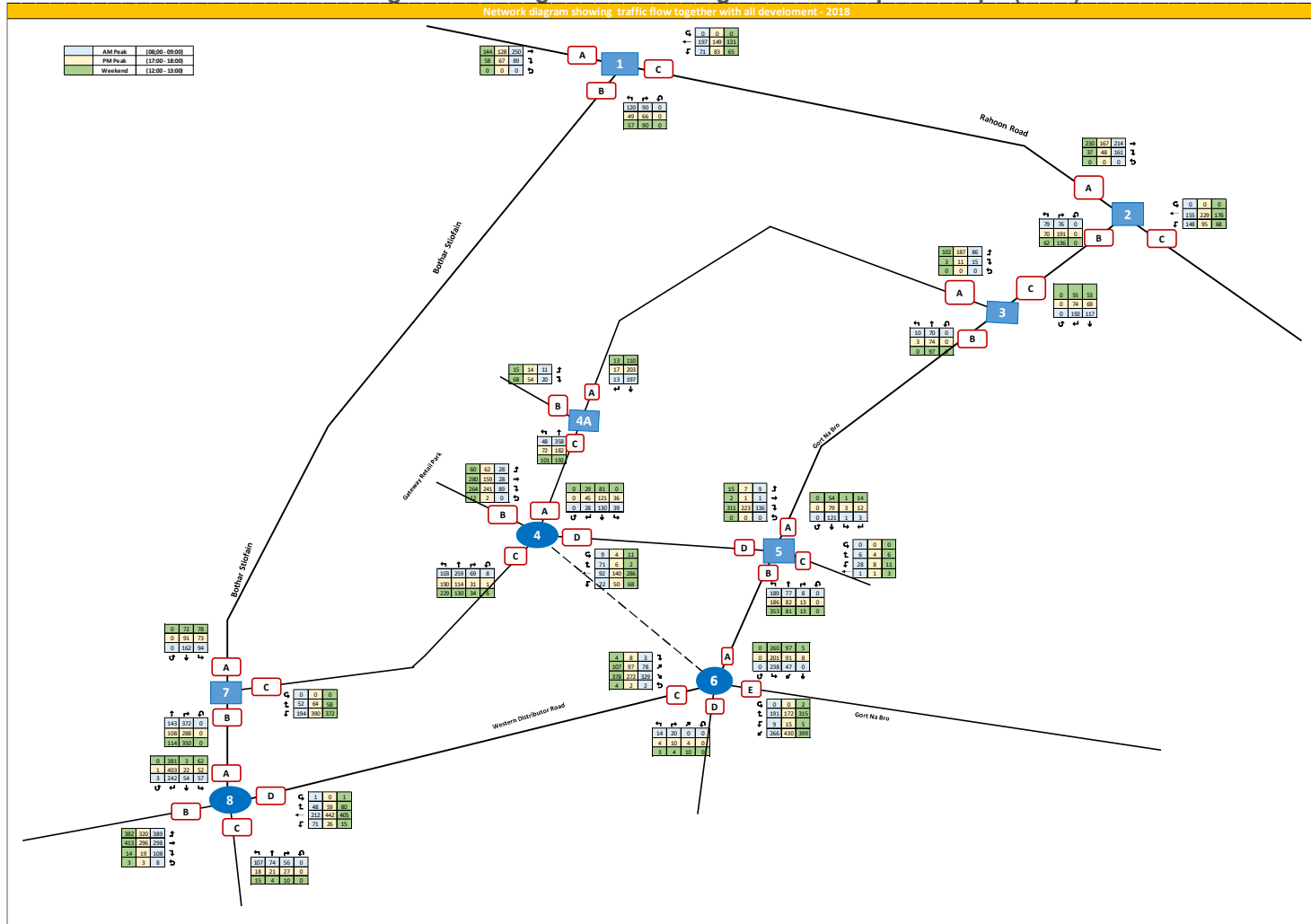
### Network diagram showing baseline traffic flow (2018)



### Network diagram showing flow consisting of committed development trips (2018)

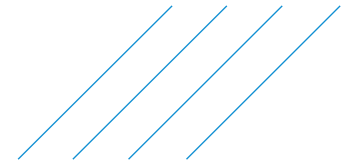


### Network diagram showing flow consisting of all development trips (2018)





# Appendix D. Sensitivity Testing



## Technical Note

Project:	5168265		
Subject:	Knocknacarra District Centre Sensitivity Analysis		
Author:	Manish Anand	Atkins No.:	5168265DG0013
Date:	Oct 2019	Icepac No.:	
		Project No.:	5168265
Distribution:		Representing:	

### 1. Introduction

Atkins were appointed by Glenveagh Living to provide Traffic and Transport Assessment for a proposed development Knocknacarra District Centre, Ragoon, Galway. The development is a mixed use which includes:

- 332 new residential units;
- Commercial floor space of 2,667 square metres;
- 266 number of car parking spaces and provision of realigned road between Gort na Bró and Gateway Retail Park Road; and
- Community development, shared communal and private open space, site landscaping and all associated development works.

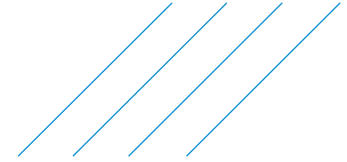
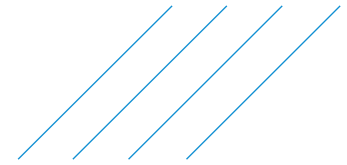


Figure 1.1 - Location of proposed development

## 2. Objective of the Technical Note

The TTA consists of the analysis of the junctions in the vicinity of the proposed development which may be affected due to the additional trips generated by the development. These junctions are illustrated in the figure below:

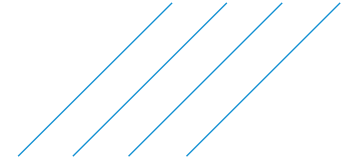




**Figure 2.1 - Location of Junctions which were analysed near the proposed development**

The analysis carried out as part of the TTA was done based on the trips obtained from the TRICS database and these trips were distributed at each junction based on the existing flow pattern.

Atkins have been requested to assess the sensitivity of the surrounding network when additional trips are considered based on worst case scenarios for residential development trips. This technical note sets out the sensitivity testing undertaken to determine the impacts of this additional traffic on the network.



### 3. Trip Generation

A manual count was undertaken by Atkins for the AM Peak 08:00 – 09:00 at Altan Apartments which is located south of Western Distributor Road and can be accessed off the roundabout at Junction 6. This development consists of 112 apartments with 168 parking spaces.

The outbound and inbound trips were observed to be 37 and 14 respectively. However, it was observed that there is a creche facility and, in addition, few movements were also associated with dropping off children to John Apostle School which is less than 200m away. Therefore, these trips were not generated by the residential development and were discounted. The arriving and departing trips were, as a result, determined to be 32 and 8 respectively for the residents at this apartment.

Using the above data, the trip rates per apartment generated by this development are:

$$\text{Departure Trip Rate} = \frac{32}{112} = 0.286$$

$$\text{Arrival Trip Rate} = \frac{8}{112} = 0.071$$

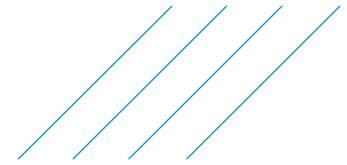
These trip rates were then applied to the proposed development based on the 332 residential units to be included. The trips for the Weekday PM and Weekend Peaks were increased on a pro-rata basis based on the increase from the TRICS data for the AM Peak, i.e. a growth factor was applied based on the following:

$$\text{Departure Trip Growth} = \frac{95}{44} = 2.16$$

$$\text{Arrival Trip Growth} = \frac{23}{9} = 2.56$$

**Table 1 - Trip generation for the residential development (Phase 3)**

Peak Hours	TRICS Data		Local Trip Data	
	Arrivals	Departures	Arrivals	Departures
Weekday AM Peak (08:00 – 09:00)	9	44	23	95
Weekday PM Peak (17:00 – 18:00)	37	13	95	28
Weekend Peak (12:00 – 13:00)	18	22	46	48



## 4. Trip distribution

The inbound and outbound trips from the Residential Car Parking were distributed as per the following assumptions:

- From analysing the distribution of traffic movements exiting from the residential development at An Logán at Junction 6, it was estimated that almost 60% of the outbound traffic will be heading eastward from the proposed development. Given the fact that many services like offices, colleges, schools etc are located east of the proposed development, it is feasible that residential trips from the proposed development will follow a similar distribution. The remaining 40% of the outbound traffic was assumed to be moving westward along the southern arm of the roundabout at Junction 4.
- Conversely, 60% of the vehicles coming into the residential car parking were assumed to be coming from the eastern side of the development and the remaining 40 percentage of the traffic approaching from the western side of the road will be coming into the proposed car parking using the southern arm of the Junction 4.
- For the remaining junctions, trips were distributed in accordance with the current traffic distribution at these junctions.

The trips distribution through the network for the Weekday AM peak traffic for the arrival and departing vehicles are demonstrated in the figure below:

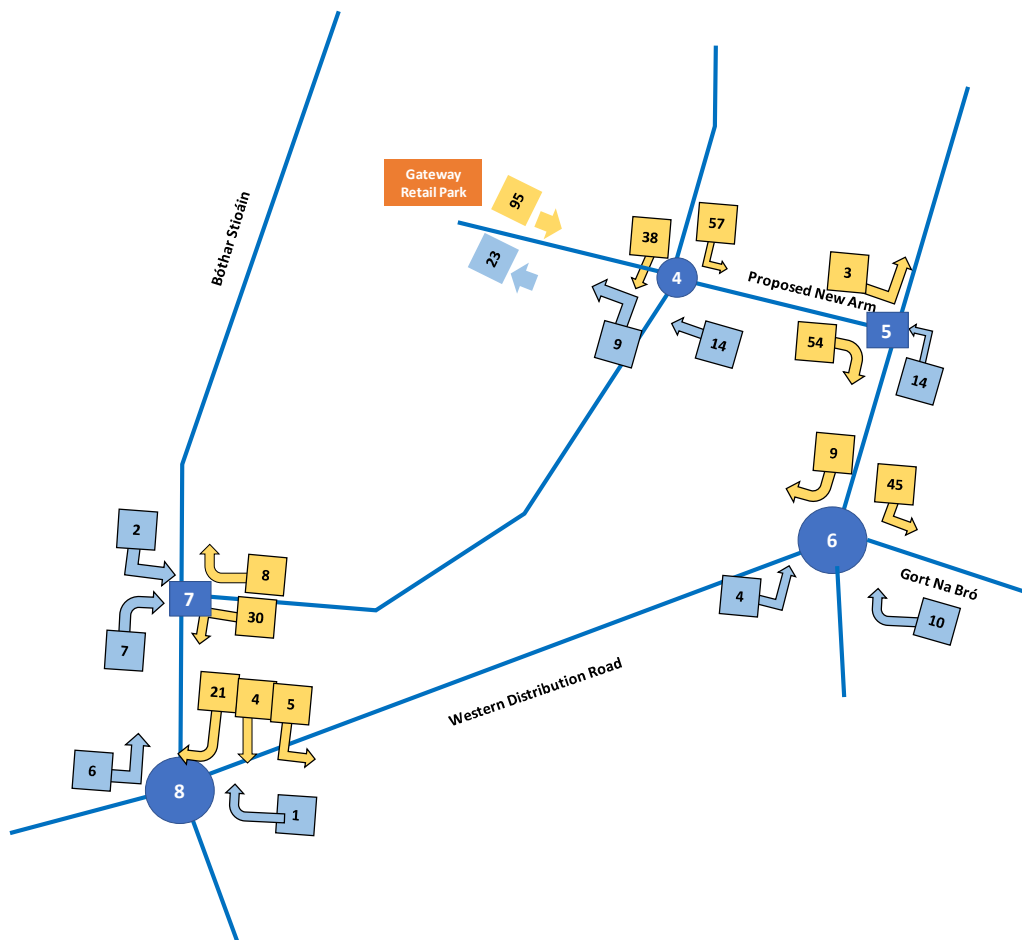
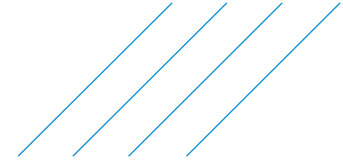


Figure 4.1 - Trip distribution along the various junctions





## 5. Junction Analysis

Based on the above trip generation and distribution, the sensitivity analysis of the junctions was carried out for Junction 5, 6, 7 and 8 for the Opening + 15 with development scenario. Junction 5 was analysed using JCT LinSig software, whereas the Junctions 6, 7 and 8 were analysed using TRL Junction 9 modelling software.

In all cases, only the volume and distribution of residential trips was changed while all other movements remained as set out in the TTA. This represents a worst-case scenario and is unlikely to occur given the proposed restrictions on the volume of parking spaces. In addition, no reduction in the number of trips as a result of the likelihood of retail trips etc. being undertaken on foot was included in this sensitivity analysis. It, therefore, represents the worst-case scenario of all trips generated by the development being by vehicle.

The terminology used throughout the analysis associated with each software is explained in the following sections.

### JCT LinSig

- **DOS:** This is the ratio of demand flow to capacity on a link. The saturation level is normally 90%. A degree of saturation below 90% represents a junction that is operating in an efficient and stable condition. If a link has a degree of saturation of between 90% and 100% it may still be operating to an adequate standard depending on the acceptability of queuing and delay. A degree of saturation of above 100% is considered to be over-capacity.
- **Mean Maximum Queue:** The sum of the maximum queue on a link (including uniform, random and oversaturation queues) averaged over all the cycles in the modelled time period.

### TRL Junction 9

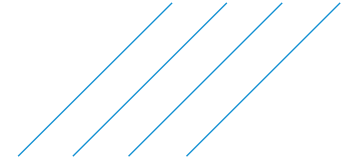
- **RFC:** This is the ratio of demand flow to capacity. The practical capacity threshold is normally approximately 0.85. An RFC below 0.85 represents a junction which is operating in an efficient and stable condition. An RFC of between 0.85 and 1 represents variable operation, and may be said to be operating adequately, if the queuing and delay are deemed acceptable. RFC values in excess of 1 represent an oversaturated condition.
- **Max Queue Length:** This represents the maximum queue length of vehicles waiting to enter the junction on each arm.
- **Average Delay:** This shows the average amount of traffic delay at the junction per vehicle over the peak hour period.

The results of the analysis of different junctions have been summarised below for the following two situations:

- Opening + 15 years with development scenario based on the original trips and its distribution.
- Opening + 15 years with development scenario based on the new modified trips along with the new assumed trip distribution.

### 5.1. Junction 5

Junction 5 is a priority junction connecting the Gort Na Bró Road to unnamed road which leads to a residential area. In the With Development scenario this junction will become a four-arm signalised junction providing access to the Gateway Retail Park. The layout of this junction is detailed in the figure below.



The junction was assessed with a 90 second cycle time using LinSig for the With Development scenario. The junction has been run for a double cycle time and an assumption that the pedestrian all red stage is called every second cycle.



Figure 5.1 - Junction 5 layout

Table 2 – Junction 5 Results (LinSig)

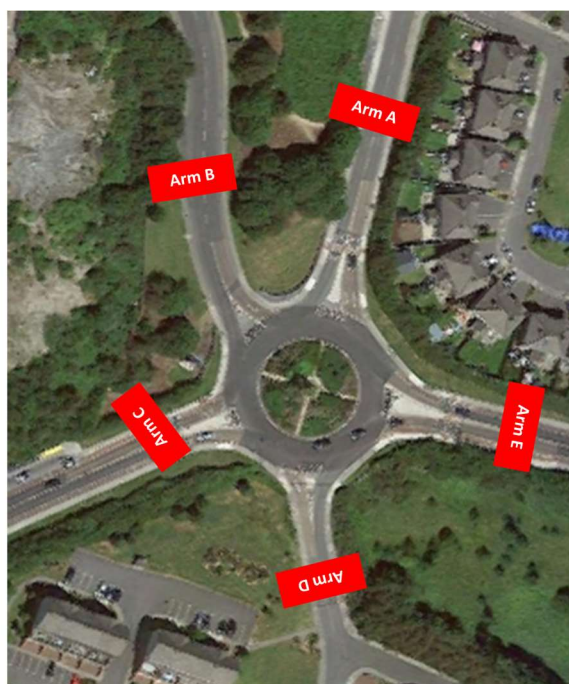
All Development + 15 years with TRICS Calculated Residential Trips						
	Queue Length (PCU)			DOS (%)		
	AM Peak	PM Peak	Weekend Peak	AM Peak	PM Peak	Weekend Peak
Arm A	4.0	3.0	1.8	46.4	49.8	36.5
Arm B	5.1	5.6	11.9	46.5	51.7	76.0
Arm C	1.5	0.5	0.7	39.9	15.8	20.4
Arm D	4.5	6.7	10.5	45.9	51.7	75.8
All Development + 15 years with Revised Residential Trips						
Arm A	4.2	3.2	1.8	51.5	55.7	36.5
Arm B	5.7	6.8	12.3	51.4	57.3	78.7
Arm C	1.5	0.5	0.7	39.9	15.8	20.4
Arm D	5.7	7.5	11.8	50.7	58.1	79.4



The results indicate that the queues and delays are within the acceptable limits and the proposed junction will be operating within the capacity for the modified flows. The weekend peak is the critical time period for this junction with a maximum degree of saturation of 76% indicating more than sufficient capacity at this location.

## 5.2. Junction 6

Junction 6 is a five-arm round about located on the intersection of Gort Na Bró Road and Western Distribution Road. In the With Development scenario this roundabout will be converted to a four-arm Roundabout by removing one arm connecting to Junction 4. The whole junction was analysed using TRL software package Junction 9.



**Figure 5.2 - Layout of Junction 6**

*(Note – The analysis of the Junction for Opening + 15 year with development scenario has been carried out by excluding the Arm B from the junction)*

**Table 3 - Junction 6 Results (TRL Junctions 9)**

All Development + 15 years with TRICS Calculated Residential Trips												
	Queue (PCU)	Delay (s)	RFC	LOS	Queue (PCU)	Delay (s)	RFC	LOS	Queue (PCU)	Delay (s)	RFC	LOS
	AM Peak				PM Peak				Weekend Peak			
<b>Arm A</b>	0.5	4.13	0.31	A	0.5	4.08	0.33	A	0.7	4.71	0.40	A
<b>Arm C</b>	1.6	10.64	0.63	B	1.4	9.35	0.58	A	3.2	18.93	0.77	C
<b>Arm D</b>	0.1	4.53	0.06	A	0.0	5.34	0.03	A	0.0	5.83	0.04	A
<b>Arm E</b>	0.9	5.30	0.49	A	2.1	8.66	0.68	A	2.8	10.93	0.74	B
All Development + 15 years with Revised Residential Trips												
<b>Arm A</b>	0.5	4.37	0.35	A	0.5	4.08	0.33	A	0.7	4.83	0.41	A
<b>Arm C</b>	1.6	10.51	0.62	B	1.4	9.63	0.59	A	3.5	20.32	0.78	C
<b>Arm D</b>	0.1	4.53	0.06	A	0.0	5.38	0.03	A	0.0	5.92	0.04	A
<b>Arm E</b>	0.9	5.28	0.48	A	2.1	8.88	0.68	A	3.0	11.55	0.76	B





The analysis indicates that the junction has enough capacity to accommodate the proposed development and that all the arms of the junction will operate within capacity for the revised flows in the future year scenario. Delays and queues are comparable to those included in the TTA.

### 5.3. Junction 7

Junction 7 is a priority junction located at the intersection of Bothar Stiofáin and Unnamed Road connecting to the Gateway Retail Park. The junction provide access to the Gateway Retail park for from the west side of both Rahooon road and Western Distribution road. The junction was analysed using TRL software package Junction 9. The junction diagram and results are shown below.

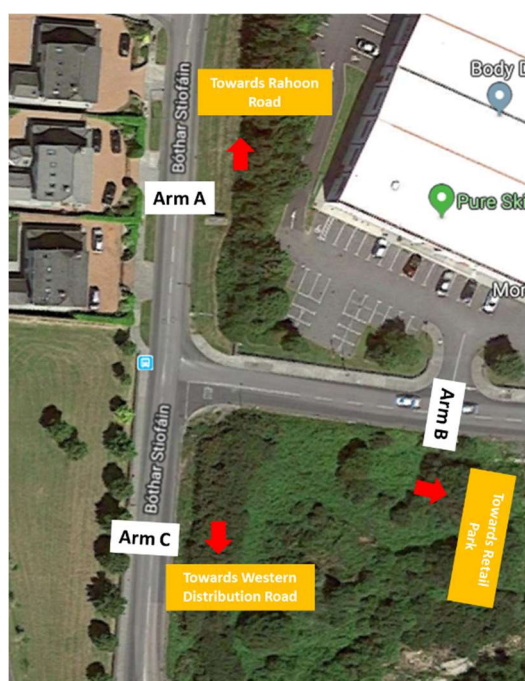


Figure 5.3 - Layout of Junction 7

Table 4 - Junction 7 Results (TRL Junctions 9)

All Development + 15 years with TRICS Calculated Residential Trips												
	Queue (PCU)	Delay (s)	RFC	LOS	Queue (PCU)	Delay (s)	RFC	LOS	Queue (PCU)	Delay (s)	RFC	LOS
	AM Peak				PM Peak				Weekend Peak			
<b>B – C</b>	0.7	11.10	0.43	B	5.2	39.39	0.86	E	2.5	20.96	0.72	C
<b>B – A</b>	0.3	18.22	0.24	C	0.3	14.08	0.24	B	0.2	13.31	0.20	B
<b>C – AB</b>	14.5	77.97	0.97	F	2.4	16.65	0.68	C	2.8	18.79	0.72	C
All Development + 15 years with Revised Residential Trips												
<b>B – C</b>	0.8	11.47	0.44	B	4.2	32.97	0.82	D	2.2	19.22	0.69	C
<b>B – A</b>	0.3	17.92	0.25	C	0.3	13.71	0.23	B	0.2	12.73	0.19	B
<b>C – AB</b>	11.5	62.98	0.94	F	2.2	15.68	0.66	C	2.2	15.78	0.67	C

The revised distribution of flows reduces the delay and queue length for Arm B and C compared to the TTA. However, the reduction is not significant, and the junction would still be experiencing significant delays and queue length in the future year scenarios. Therefore, the recommendations provided by Atkins in the TTA are still applicable.



(Note – The table does not show the result for the Arm A, since it has priority over other Arms and therefore does not experience any queues or delays.)

## 5.4. Junction 8

Junction 8 is a four-arm roundabout connecting Western Distribution Road to Bothar Stiofáin. This junction connects to Junction 7 which leads further to Gateway Retail Park. The junction would be considered sensitive as it plays a key junction for N6 Galway Ring Road together with Junction 6. The junction was analysed using TRL software package Junction 9. The junction diagram and the results have been shown below.

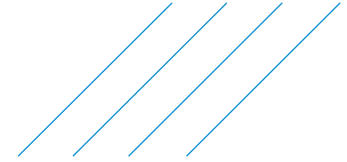


Figure 5.4 - Junction 8 Layout

Table 5 – Junction 8 Results (TRL Junction 9)

All Development + 15 years with TRICS Calculated Residential Trips												
	Queue (PCU)	Delay (s)	RFC	LOS	Queue (PCU)	Delay (s)	RFC	LOS	Queue (PCU)	Delay (s)	RFC	LOS
	AM Peak				PM Peak				Weekend Peak			
Arm A	0.6	5.04	0.39	A	1.0	5.63	0.50	A	0.8	5.24	0.43	A
Arm B	20.8	70.87	0.99	F	3.0	12.94	0.76	B	5.6	21.43	0.86	C
Arm C	0.4	5.00	0.31	A	0.1	5.56	0.12	A	0.0	4.56	0.04	A
Arm D	1.0	7.74	0.49	A	4.0	20.98	0.81	C	1.9	11.11	0.66	B
All Development + 15 years with Revised Residential Trips												
Arm A	0.7	5.11	0.40	A	0.9	5.51	0.48	A	0.7	5.10	0.42	A
Arm B	17.7	62.23	0.98	F	3.0	12.74	0.75	B	4.6	18.14	0.83	C
Arm C	0.4	5.04	0.31	A	0.1	5.47	0.12	A	0.0	4.50	0.04	A
Arm D	1.0	7.94	0.50	A	3.8	19.74	0.80	C	1.8	10.74	0.65	B

The revised distribution of flows reduces the delays and queue lengths generally at this reduction. However, the junction would still be experiencing significant delays and queue length in the future year scenarios at Arm B. It should be noted that within the GTS this junction is highlighted to be changed to a signalised junction with bus priority.



## 6. Conclusion

The sensitivity analysis was carried out using a worst-case scenario for the trip generation of residential vehicles and a distribution based on local factors.

The results show that Junction 7 and Junction 8 will still be operating over their capacity with the delay and queue values reaching above acceptable values.

The results also illustrate that Junction 5 and Junction 6 will operate within the capacity in the future year scenario even with the increased flow through these junctions. In general, the analysis shows minor differences between the sensitivity tests and the TTA results with a smaller impact on the critical Junctions 7 and 8 seen in the sensitivity testing.

For Junction 7, the sensitivity testing shows minimal impact of the development on the junction with a critical RFC of 0.94 matching the critical RFC for the +15 Years with Committed Development scenario.

At Junction 8, the sensitivity test shows an increase in the critical RFC of only 0.02 to 0.98 from 0.96 in the +15 Years with Committed Development scenario with an increase in delays from 53s to 62s. This suggests that the development would have only a minor impact on this junction.

The proposed development will have only a minor impact on the surrounding network with Junctions 5 and 6 operating within capacity in all cases while Junctions 7 and 8 operate over capacity as in the +15 Years with Committed Development scenarios. The proposed development will not have a major impact on the operation of these junctions in the future.



# Appendix E. Mobility Management Plan

# Knocknacarra District Centre

Mobility Management Plan

Glenveagh Living

October 2019



# Notice

This document and its contents have been prepared and are intended solely as information for Glenveagh Living and use in relation to Planning Application

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This document has 30 pages including the cover.

## Document history

Revision	Purpose description	Originated	Checked	Reviewed	Authorised	Date
Rev 0.0	Information	CMcC	KG	KG	SC	04.04.2019
Rev 1.0	Stage 2 SHG Submission	KG	KG	SC	SC	16.05.2019
Rev 2.0	SHD Submission	KG / CF	KG	SC	SC	10.10.2019
Rev 3.0	Stage 3 Submission	KG/CF	SC	KG	SC	30.10.2019

## Client signoff

Client	Glenveagh Living
Project	Knocknacarra District Centre
Job number	5168265
Client signature / date	



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# Executive Summary

This Mobility Management Plan (MMP) has been prepared for the Knocknacarra District Centre as part of planning for the proposed development by Glenveagh Living. The Knocknacarra District Centre includes the existing Phase 1 which is operational, Phase 2 which is under construction, Phase 3 this planning application and future Phase 4 District Centre use site.

The Knocknacarra District Centre is situated in a prime setting, it enhances the neighbourhood and its environs, while ensuring existing and proposed residence have an accessible and permeable sense of place.

Along the southern boundary of the site runs the Western Distributor Road. The Galway Transport Strategy sets out to upgrade the existing public transport link along this road by developing a high quality and high frequency bus corridor. In turn this will increase uptake of public transport and reduce commuting time to National University of Ireland Galway, UC Hospital and the city centre to minutes.

The proposed development allows connectivity improvements with cycle routes and footpaths ensuring permeability within the neighbourhood and to the local schools. With permeability an important focus the development will provide links in and around the urban village to public transport links while also retaining the bus stop on the link road to ensure easy access to public transport.

This MMP will form a framework for sustainable travel planning for The Knocknacarra District Centre. It is intended that this document will change and adapt as the District Centre, the surrounding neighbourhood and infrastructure continues to be developed.



# 1. Introduction

## 1.1. Introduction

To ensure the sustainable expansion of the Knocknacarra District Centre, Glenveagh Living employed Atkins to prepare a Mobility Management Plan (MMP) for Phase 1 through to Phase 3 of the Knocknacarra District Centre. This MMP is prepared as part of the planning application for the proposed Phase 3 of the development within the Knocknacarra District Centre.

This Mobility Management Plan sets out a strategy and package of mitigation measures designed to promote access by sustainable modes for the site, inclusive of the existing Phase 1 Development, the currently being constructed Phase 2 and the Phase 3 i.e. the subject application. It supports the Transport Assessment and addresses both the employment and residential elements of the development in one document. In this respect this MMP should be seen as the overarching document that holistically addresses the Knocknacarra District Centre.

The proposed Phase 3 development comprises the construction of 332 no. residential dwellings and 2,667 m<sup>2</sup> of commercial floor space, with associated roads, footways, parking, drainage and landscaping infrastructure.

## 1.2. What is a Mobility Management Plan

A Mobility Management Plan is a strategic management tool designed to accommodate a site's specific transportation needs. The MMP aims to educate people regarding how, why and when they need to travel. It provides a forum to promote and support the use of alternative, active and sustainable transport modes such as walking, cycling, shared transport and mass transit such as buses and trains. Consequently, the MMP will also assist in reducing dependency on private car and mitigate against traffic congestion and its inherent environmental, social and economic impacts.

This document, the Mobility Management Plan (MMP) has been developed with specific reference to the site location, site context and proposed site layout and, describes the self-regulating management of travel demand. As such this MMP could help reduce the amount of car travel to and from the proposed development site. Not only will this bring benefits to those employed on site or living within the development but also to the wider local community and environment.

This MMP will form a framework for sustainable travel planning for the Knocknacarra District Centre, that will change and adapt as this Centre, the surrounding neighbourhood and infrastructure continues to be developed. As such this MMP should be seen as a dynamic and evolving mechanism for introducing and maintaining a package of measures. These measures focus on promoting access to the site by alternative, active and sustainable modes of transport and reducing single occupancy car travel. In general, the ultimate occupiers will be encouraged to put these measures into practice themselves

This MMP has been prepared in accordance with the following documents

- Background DTO *Advice note July 2002*
- NTA *Achieving Effective Workplace Travel Plans Guidance for Local Authorities*
- Galway City Council Development Plan 2017-2023
- TII *Traffic and Transport Assessment Guidelines May 2014*
- DMURS.

## 1.3. Previous MMP

The Existing MMP, undertaken in support of the permitted Phase 2 development (Reg.Ref. 17158) sets out to maximise use of infrastructure proposed and being developed in line with the Galway Transport Strategy. The report outlines targets and objectives along with the mechanisms including both hard and soft measures to support modal shift, which could be put in place to support the plan. Below is a summary of key objectives:

- An outline of the existing and proposed public transport services serving the site of the proposed development
- An outline of the existing and proposed pedestrian and cycle routes serving the site of the proposed development
- An outline of measures proposed in order to encourage and facilitate the use of non-car based travel to and from the proposed development.

It is proposed that this overarching MMP will build upon the framework set out within the existing MMP to form a holistic plan that addresses the requirements of all land uses both those existing and those proposed.

The existing MMP is included within Appendix A.

## 1.4. Policy

National, regional and local planning policy has been considered to ascertain compliance. Relevant policies and objectives which the proposed development will aim to fulfil are outlined below.

### 1.4.1. Smarter Travel

The Smarter Travel Policy, published in February 2009, outlined the Governments vision for achieving a sustainable transport system for Ireland by 2020. The document outlines a number of key policies to encourage a modal shift away from private car use and promote alternative travel modes such as public transport, walking and cycling. The Smarter Travel Policy document identifies a number of actions to implement school travel plans, work-based travel plans and personalised travel plans.

### 1.4.2. Galway Transportation Strategy

Smarter mobility is a key pillar of the Galway Transport Strategy (GTS). With regards to the proposed development site the following are some of the Smarter Mobility policies of interest:

- SM Policy 1: Ensure that Galway City' s transport network shall be safe, usable and equitable to all road users.
- SM Policy 5: Maximise the efficiency of the existing transport infrastructure in Galway.
- SM Policy 7: Increase the capacity of Galway' s transportation network.
- SM Policy 8: Remove unnecessary trips to Galway City Centre.
- SM Policy 9: Increase the mode share of sustainable transport across the network.

### 1.4.3. Galway City Development Plan 2017 - 2013

The Galway City Development Plan 2017-2023 outlines the following policies in relation to smart travel.

- Policy 3.8 Mobility Management and Smart Technologies. Support and promote the use of smarter mobility and Intelligent Transport Solutions (ITS) to increase efficiency, safety and co-ordination across all transport networks. Promote the implementation of Travel Plans with employers and schools.
- Policy 11.10.2 - Travel Plans, also known as Mobility Management Plans are required for proposed development with the potential to employ over 100 people.

## 2. The Subject Site

### 2.1. Site Location

The proposed development (Phase 3) is located within the Knocknacarra District Centre and is part of the Gateway Retail Park Development. The Existing Gateway Retail Park includes Phase 1 which is operational and Phase 2 which is currently under construction.

This development is situated in a prime setting, it enhances the neighbourhood and its environs, while ensuring existing and proposed residence have an accessible and permeable sense of place.



**Figure 2-1 - Location of Subject Development**

The existing Gateway Retail Park can be accessed from the Western Distributor Road to the south and the Rahoon Road to the north. From the Western Distributor Road, there are two access points. The main access point is at the Roundabout with Gort Na Bró, which is a 5-arm roundabout, of which one arm leads directly to a mini roundabout that provides access to the existing Gateway Retail Park. The second access point is from the roundabout with Bóthair Stiofáin, via an uncontrolled T Junction that leads onto an internal road that links to the mini roundabout at the access to the existing Gateway Retail Park.

Access from the north is via an uncontrolled T Junction with the Rahoon Road and L-5000/Millers Lane (local name), which leads to another uncontrolled T junction which links to the mini roundabout at the access to the existing Gateway Retail Park. Access routes are shown in Figure 2-2 below.





Figure 2-2 - Existing Access Routes

Specific details with regards to each Phase of the Subject Site at Knocknacarra is described below.

## 2.2. Phase 1 - Existing Development

The existing Gateway Retail Park, known as Phase 1, includes 5 retail units, associated access routes and parking facilities. This development is managed by Sigma Retail Partners in association with Bannon Property Management.

There is currently a total of 724 No. parking spaces within ground floor and basement carpark serving the retail development Phase 1. A total of 71 bicycle parking spaces are provided within ground floor carpark for visitors and staff.

## 2.3. Phase 2 – Permitted Development

The Phase 2 permitted development (Reg.Ref. 17158) of the Gateway Retail Park is currently under construction and consist of 9,885 m<sup>2</sup> of retail space, 786 m<sup>2</sup> of office space, 678 m<sup>2</sup> of gym space and 444 m<sup>2</sup> of creche space.

On completion of Phase 2, there will be a total of 896 No. parking spaces between ground floor and basement carpark serving the retail aspect of the development.

The total number of bicycle parking spaces are stated above and provided within Phase 1 of the development.

## 2.4. Phase 3 – Subject Development

Phase 3, the subject application, is a mixed-use development that consists of 332 no. residential units ,2,667 m<sup>2</sup> of commercial floor space and also a creche predominately for residents.

Parking ratio of 0.8 has been proposed for the residential aspect of Knocknacarra District Centre development and is discussed in Section 10.5 of the TTA. A total of 266 parking spaces have been provided between three areas available for residential parking within the development. The majority of the residential parking (181 No. spaces) is located within the void area in the basement of Phase 2. The podium carpark located between Blocks E and F provides for 82 No. of spaces and 3 No. parking spaces are proposed along the Plaza area.

A total of 677 No. cycle parking is provided for the community and commercial aspects of this site. There are a mix of covered and uncovered stands, with secure bicycle parking within residential buildings.

A bus lay-by is proposed as part of the development. The lay-by is located on the Link Road between the proposed signalised junction and existing mini roundabout at the entrance to Gateway retail park and will serve as a Bus Stop for Bus Route 405. See Figure 2-3 below for details.



Figure 2.3 – Location of Bus Lay-by for Bus Stop Route 405.

## 2.5. Pedestrian and cyclist permeability and connectivity

The proposed development enhances pedestrian and cyclist connectivity and permeability within the area. Figure 2-4 below illustrates the main pedestrian and shared routes through the development. Links will be provided through the development that will allow both pedestrians and cyclists to access the development from the Western Distributor Road, Gort Na Bró Roundabout and from proposed link road.

The proposed Phase 2 development provides a pedestrian link between Bóthair Stiofáin and L500/Millers lane through the development carpark and along the existing Gaelscoil Mhic Amhlaigh,



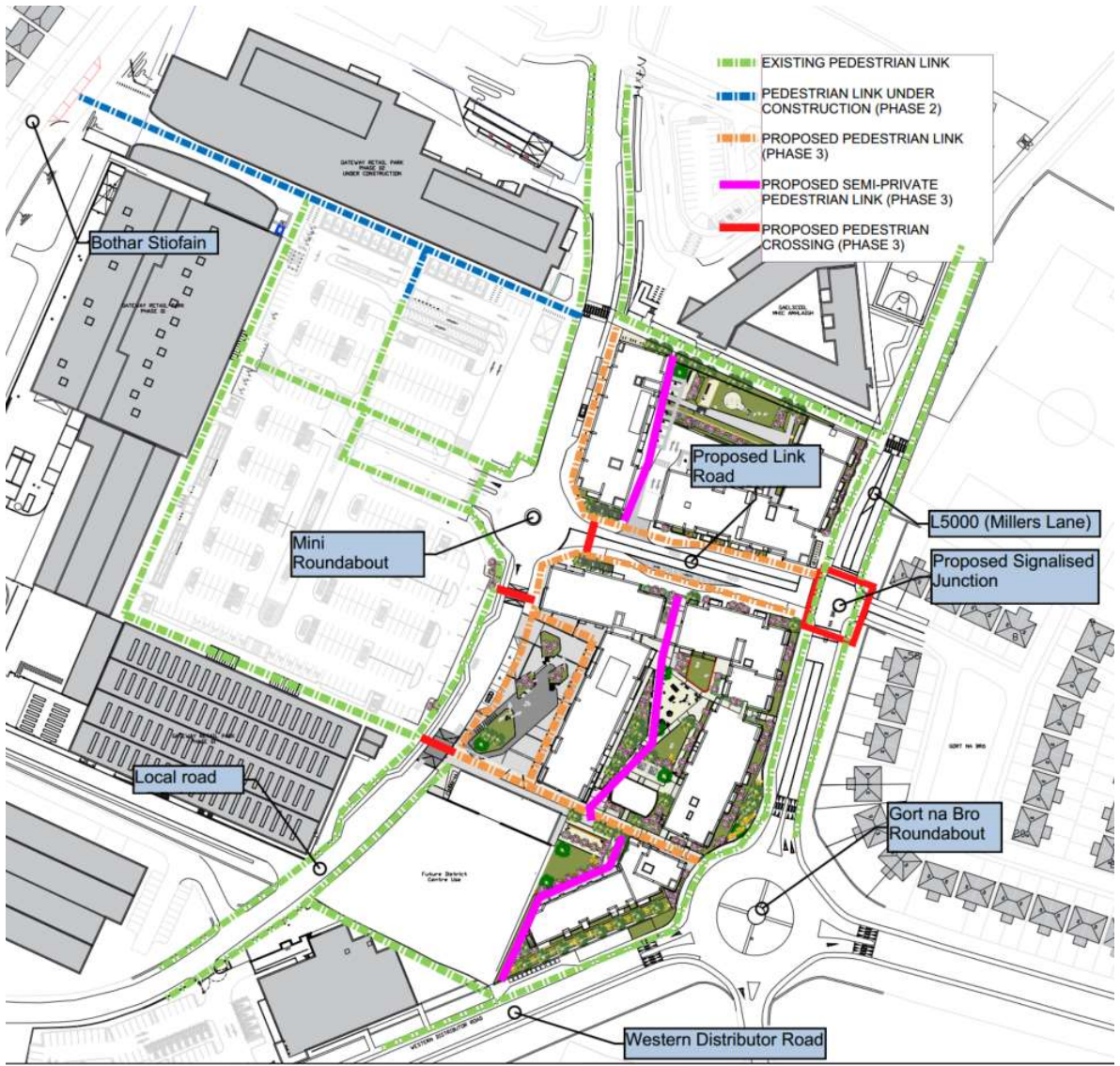


Figure 2-4 - Overview of Proposed Pedestrian Links



## 3. Existing Conditions

### 3.1. Local Road Network

The local road network in vicinity of the existing and proposed development site is made up of single carriageway local and connector roads. The Western Distributor Road is a major link through the Gort na Bró to Bishop O'Donnell Road connecting Knocknacarra North and South with Galway City Centre. The junctions in vicinity of the site are uncontrolled with roundabout junctions along the Western Distributor Road and Gort na Bró. There is a 50km/h speed limit on the roads adjacent to the site.

### 3.2. Walking and Cycling Facilities

There are footpaths and on-road cycle lanes both sides of the Western Distributor Road. At the four-arm roundabout with Bóthair Stiofáin raised zebra crossings are provided on three arms, Western Distributor Road east and west and Bóthair Stiofáin. Uncontrolled at grade crossing with drop kerbs is provided on the southern arm.

On the five-arm roundabout at Gort Na Bró raised zebra crossings are provided on three arms, the Western Distributor south and west and Gort Na Bró. Uncontrolled at grade crossings with drop kerbs are provided on the link road to Gateway Retail Park and on the southern arm. On Bóthair Stiofáin, there are no dedicated cycle facilities; there is a footpath on the east side of the road only.

On the Link Road access to the Gateway Retail Park, there is no dedicated cycle facilities, but footpaths are provided on both sides of the road. Gort Na Bró, has no dedicated cycle facilities; however, there are footpaths both sides of the road. There are two raised zebra crossings provided at Gaelscoil Mhic Amhlaigh, the southern one connects to a combined footway/cycleway that runs to the south of the school.

On the internal road network in the Gateway Retail Park, there are footpaths provided throughout adjacent to the roads. Dedicated cycle facilities are provided along the road that links Bóthair Stiofáin to the mini roundabout at the access to the main retail car park. A raised zebra crossing is provided on the internal road north of the mini roundabout. It provides access to the school and is aligned with the combined footway/cycleway.

Pedestrian access to the Gateway Retail Park can also be gained

- from Bóthair Stiofáin through the Aviva car park
- from Western Distributor Road through the existing steps and across Aldi retail site.

Other pedestrian links within the area include

- Millers Lane is a pedestrian link connecting the Kingston Road through the Manor Drive, across the Gort na Bró, along the side of the soccer pitches, between Gort Gréine and Ros Geal estate through to Ragoon Road.
- An unnamed pedestrian link connecting the Clybaun Rd south of the Western Distributor Road roundabout via John Apostle's School to Western Distributor Road.

There are 71 No. bicycle parking spaces in the ground floor carpark of Gateway Retail Park, see Figure 3-1 below for location details.

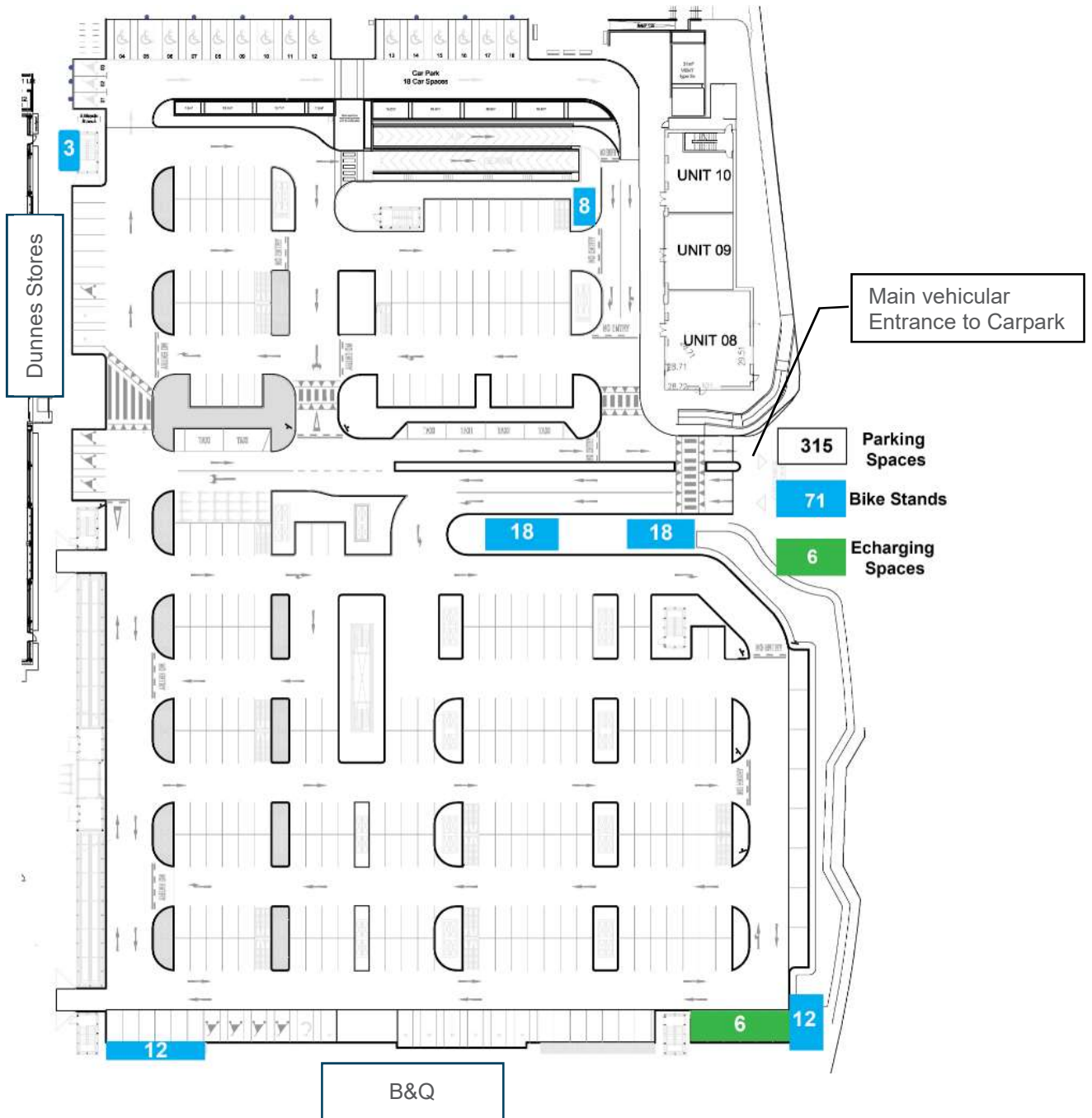


Figure 3-1 - Overview of Gateway Retail Park Groundfloor Carpark

### 3.3. Bus Access

The current public transport provision includes number of routes that service the general area. The key routes for the site are the 402, 405, 410, 411, 412, 414 services. Of these routes 405, 412 and 411 are within a 10-minute walk of the development. These services combined provide 7 No. of buses every hour during peak times. The table below summarises the bus routes, with relevant information on the route they take, the nearest bus stop to the development and how long it approximately takes to walk to the bus stop.

### 3.4. Taxi Access

A total of 6 No. Taxi parking spaces are located conveniently within the ground floor carpark outside the main entrance to Dunness Stores. This facility is provided as part of the existing development and is one of the measures that may encourage people to use alternative modes of transport.

### 3.5. Local Travel Patterns

In September 2019 Sigma Retail Partners carried out a Baseline Travel Survey of the existing Phase 1 Gateway Retail Park. The summary of this survey is shown in Table 3.1 below.

**Table 3-1 - Initial Travel Survey Data**

	<b>New Look</b>	<b>Dunnes</b>	<b>B&amp;Q</b>	<b>Next</b>	<b>McSharrys Pharmacy</b>
<b>Floor Area</b>	15,878	54,869	64,941	17,695	5,860
<b>Number of staff</b>	13	125 to 130	60 (Estimate)	20 - 25	15
<b>Mode of transport (car / car share / public transport / walking / cycling)</b>	Mostly walk or bus	Mix of all - walk, bus, cycle, car	Walk and car	Mix of all - walk, bus, cycle, car	Mostly car or bus
<b>Any staff incentives' (bike to work scheme etc)</b>	Bike to work scheme	Bike to work scheme	Bike to work scheme	Bike to work scheme	Bike to work scheme
<b>No of car parking permits issued</b>	5	96	36	15	22; 1 permit per staff member and 7 permit allowance made for visitors

A more detailed Travel Survey will be carried out to establish baseline travel patterns at the time of initial occupation of the full development by residents and staff.



# 4. Objectives and Targets

## 4.1. Objectives

The objectives of the Mobility Management Plan are set with the overall aim of keeping the number of single occupancy car trips associated with the employment and residential elements of the development below agreed levels. The objectives of the Knocknacarra District Centre Framework Mobility Management Plan are as follows:

- Achieve a high level of Community and Employee / Employer Awareness of the Plan.
- Ensure a high level of Community and Employee / Employer Participation in the development of the Travel Surveys to indicate participation.
- Improve conditions for pedestrians and cyclists travelling to and from the site.
- Develop on good urban design principles to enhance the permeability of the site and maximise accessibility by sustainable modes.
- Encourage the development of a healthy, sustainable and vibrant local community through promotion of travel by sustainable modes.

**Table 4-1 - MMP Objectives**

Objectives	Employment Travel Plan Targets	Residential Travel Plan Targets
<b>Awareness</b>	To provide information on sustainable travel as part of marketing material for the site.	To provide information on sustainable travel to each resident upon occupation.
<b>Participation</b>	Employers committed to undertaking a survey of staff within 6 months of occupation and completing a detailed travel plan within 9 months.	To develop a detailed residential travel plan within 9 months of first occupation.
<b>Accessibility</b>	To implement measures to encourage walking, cycling, public transport and car sharing from first occupation.	To implement measures to encourage walking, cycling, public transport and car sharing from first occupation.
<b>Maximise the Potential for Sustainable Travel</b>	Implement physical measures as part of the site layout to encourage sustainable modes of travel prior to first occupation.	Implement physical measures as part of the site layout to encourage sustainable modes of travel prior to first occupation.
<b>Reduce Car Related Travel</b>	Mode Share Targets to be agreed with Galway City Council following site surveys.	Mode Share Targets to be agreed with Galway City Council following site surveys.

## 4.2. Mode Share Targets

It is anticipated that mode share targets will be agreed with Galway City Council, following an initial travel survey to be undertaken following occupation of the site. These will be set against the existing mode share established from the survey. A timeframe will be set within which the targets should be achieved; however the plan will be a lifelong document evolving with the development of the site and addressing any changes in travel behaviour.

Any mode share targets will take into account those that are stated within both Galway City Development Plan and on targets originally set out in Smarter Travel – Sustainable Transport Future (2009 – 2020). The aim in this was by 2020 to reduce travel by car for the work commute to 45%, the rest would be made up of travel to work via public transport, cycling and walking. The most recent information for mode share within Galway City for trip distribution for travel to work is in the 2016 census. The 2016 census also has information for the whole of the Country and typically the split is just over 60% drive by car, 10% walk 3% cycle and nearly 6% use a bus. The rest is made up of van / lorry, car passenger and those that have not stated how they commute to work. However from 2016 Census data for Galway City modes of travel to work, are:

53.5% - motor car driver  
15.8% - walking  
5.5% - cycling  
7.5% - bus  
0.2% – train  
5% - passenger car  
0.2% - other means (van / lorry)  
2.8% work from home  
5.9% not stated.

As stated above the target set out in the Smarter Travel is that 45% in total commute to work by car in 2020 and the rest use sustainable modes of transport. For Galway City those commuting to work by car in 2016 was at 53.5%, which compares favourably with the national average of 60%. It is unlikely that the 2020 target will be met in Galway City or Nationally. Also it is unknown what the current split is for the commute to Knocknacarra District Centre, however the Knocknacarra District Centre should aim to be at 50% commute to work by car within 5 years of opening of the proposed development and aiming at reducing this to 45% within the following 3 years. These targets will need to be reviewed once surveys are complete and revised if necessary.

## 5. MMP Strategy

### 5.1. Introduction

This section of the Mobility Management Plan sets out the Strategy proposed for both the residential and employment elements of the mixed use development at Knocknacarra District Centre.

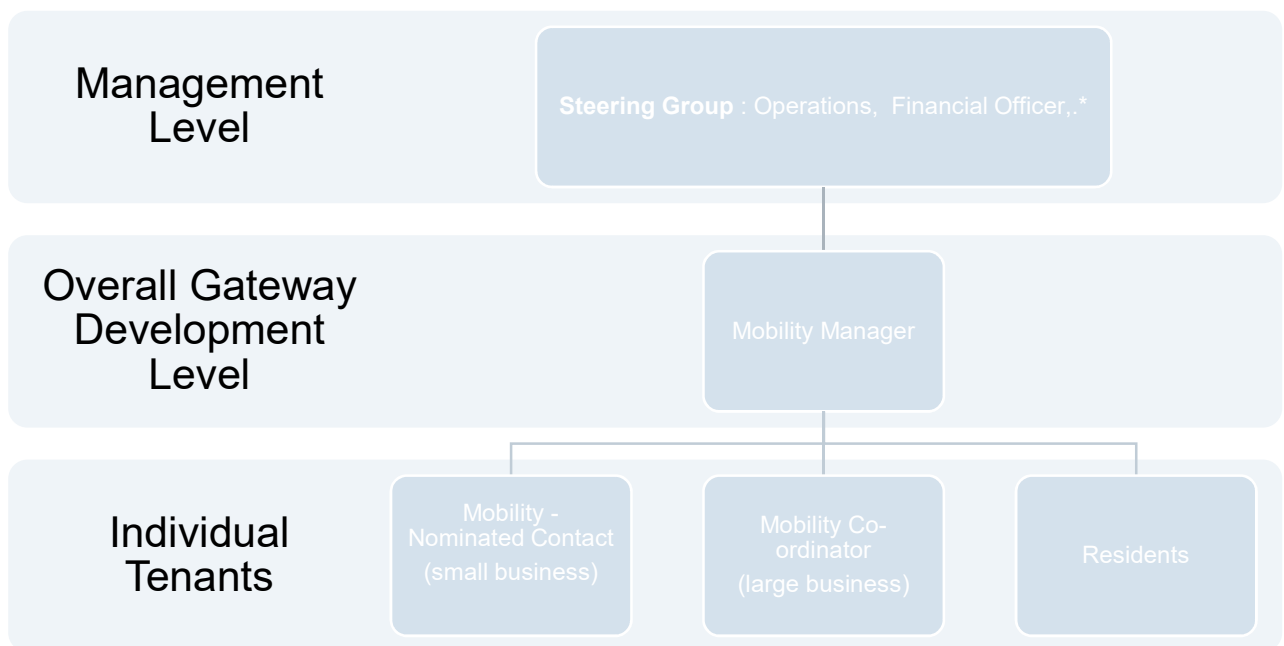
In particular this section identifies the role and duties of the Steering Group and the Mobility Manager in addition to determining a Branding Strategy, the base for the existing site and a strategy for the employment and residential elements of the development.

### 5.2. Management and Reporting Structure

The management and reporting structure for the Mobility Management Plan is key to the successful delivery of the plan. The following is the management structure for the Mobility Management Plan.

The Steering Group will guide the development of the strategy and objectives of the Plan and support the Mobility Manager in implementing and monitoring the plan.

The Mobility Manager (MM) will be responsible for implementing and promoting the Mobility Management Plan. The overall structure will be as follows



**Figure 5-1 - Management and Reporting structure**

*\* Note: Other stake holders such as representatives from within The Gateway Retail Park, the Gaelscoil Mhic Amhlaigh committee, Aviva, RSA and representatives from other landowners shall be invited to participate in the implementation of the Mobility Management Plan.*

#### 5.2.1. Steering Group Duties

The duties of the Steering Group are as follows:

- Supporting the MM in their role, in terms of expertise, personnel and funding.
- Promoting Sustainability.
- Reviewing the employee travel survey results and agreeing on an Action Plan.



- Sourcing or allocating resources to implement agreed actions in the Action Plan, in terms of expertise, personnel and funding.
- Reviewing the progress of the Action Plan in meeting its objectives, in conjunction with the MM.
- Reporting on successes to other Senior Management, and in the organisation's Annual Report (referencing corporate social responsibility, environmental management and employee wellbeing).
- Supporting the MC to plan for future events/ actions.

### 5.2.2. Mobility Manager

The responsibilities of the Mobility Manager (MM) will incorporate:

- Co-ordinating the activities of the Steering Group.
- Liaising with the nominated contact and/or Mobility Co-ordinators (MC) of the individual tenants and providing them with information.
- Liaising with Galway City Council's Smarter Travel Office and the NTA Smarter Travel Workplaces team.
- Coordinating the travel survey and analysis of results.
- Developing and updating the Action Plan to promote walking, cycling, public transport, car-sharing, technological alternatives to travel, flexible working practices and more sustainable business / fleet travel.
- Designing communication/ marketing strategies to promote the MMP.
- Attending presentations to new tenants.
- Organising and coordinating events in the Action Plan.
- Acting as a point of contact for external stakeholders.
- Monitoring relevant indicators and updating the Action Plan as required.
- Conducting staff focus groups on particular issues as they arise.
- On-going promotion of the MMP.
- Publicising success and reporting to the Steering Group.

Luke Kelly is identified as the appointed Mobility Manager for the Development Phases 1, 2 and 3. His contact details are shown below.

- Luke Kelly
- lkelly@bannon.ie
- (087) 244 8184

Luke is property manager for the existing Gateway Retail Park and is best placed for this role as he liaises with tenants on regular basis.

### 5.2.3. Occupiers and Tenants Duties

This MMP will form a Mobility Management Plan Framework that occupiers within the development will undertake to implement. The Framework will place different requirements of the tenant's dependent on the size of their operations. Minor tenants will simply be required to sign-up to the Mobility Management Plan Framework, nominate a point of contact and complete any Travel surveys that may be required. Medium sized (20-100 employees) companies will be asked to do the same, but in addition they will be requested to complete a short Mobility Management Plan Statement.

Larger businesses (>100 employees) will be required to prepare their own MMP and must appoint their own Mobility Co-ordinator (MC). The Mobility Manager (MM) for the Park will provide assistance and information to these businesses in meeting those requirements.

The nominated contact / MC for each business within The Knocknacarra District Centre will liaise with the overall MM to monitor travel information and employ ongoing initiatives to encourage staff to use sustainable modes of transport. The following table outlines the requirements of occupiers / tenants.

**Table 5-1 - Occupier / Tenant MMP Requirements**

Tenant Size	Management Requirements (minimum)	Mobility Management Plan Requirements
Small (<20 employees)	Nominated contact	Receive communications and complete travel surveys
Medium (20 -100 employees)	Nominated contact	As above + Mobility Management Plan statement
Large (100+ employees)	Mobility Co-ordinator	As above + Production of Mobility Management Plan and Attendance at meetings with overall building Mobility Co-ordinator

### 5.3. Branding Strategy

An overall brand will be developed for the MMP. This should be in keeping with the branding for The Knocknacarra District Centre. The MC will engage with a marketing team for The Knocknacarra District Centre and develop a logo and tagline for the MMP.



**Figure 5-2 - Example branding of UCD Mobility Management Plan**



**Figure 5-3 - Sample Mobility Management Plan logos**

### 5.4. Review of Current Situation

#### 5.4.1. Travel Survey

A full Travel Survey for existing workers and Phase 2 at The Gateway Retail Park should be undertaken once Phase 2 is operational. This Travel Survey will be an online survey that will be

distributed to the nominated travel plan contacts. Any new business or occupants will also be required to undertake this Travel survey.

Key Results in the survey will include:

- Baseline modal split between different modes of travel used by employees to get to work.
- Distance travelled by employees to get to work
- Occasional use of other modes of travel
- Willingness to use other modes
- Interest in actions to promote cycling, walking, car-sharing etc.

Knowledge of measures such as Tax saver tickets, Bike2Work etc.

### 5.4.2. Site Audit

As part of the MMP, the nominated contacts in each of the Tenant companies will be encouraged to complete a Site Audit of their offices.

Initially the MC will identify travel details from the existing employees. From this information the MC can better inform employees about initiatives to reduce private car dependency and highlight how these initiatives will:

- Have direct financial savings for those taking part.
- Reduce car parking demand and reduced congestion on the local network
- Encourage the use of more sustainable modes of transport as they are considered safer.
- Improve health & wellbeing for those using active transport modes.
- Optimise the level of safety for all staff and visitors.
- Identify additional cycle parking requirements; following the site audit and the travel surveys the need for additional or repositioned cycle parking will be reviewed & implemented.

## 5.5. Residential Element Strategy

The Steering Group will be responsible for ensuring a Mobility Manager (MM) is in place for the residential element.

As well as having the above specific duties in support of the MMP, The MM will act as a central point of contact between the Steering Group, local authority and key stakeholders (e.g. community group representatives). The MM will be responsible for undertaking surveys and developing and refining the MMP.

The MM's duties in relation to the residential element will include the distribution of Travel Information Packs to residents as part of a co-ordinated promotional and marketing strategy. Through a monitoring and review process, the MM will also be responsible for ensuring that the measures proposed are implemented in the most effective way possible.

The MM will also have the responsibility of setting up the Community Travel Forum where all community members can receive and provide feedback on the survey results, the adopted MMP measures, and improvements to the MMP.



## 5.6. Employment Element Strategy

Following occupation of the employment units on the site, a management structure will be put into place which will include the Steering Group and the MM. The MM will be a member of staff from the organisations / businesses based in the units. They will be given time out of their usual work schedule to perform the duties of the MM and will be given full support in this role by senior management of the Steering Group. The MM will act as a central point of contact between staff and the site management team.

Occupiers / Tenants of the employer units will be required to undertake a staff survey and prepare Mobility Statement or full MMP (depending on size) based on the targets and measures agreed with Galway City Council. The undertaking of this activity will be the responsibility of the MM with the support of the Steering Group.

Strict timelines will have to be adhered to in terms of appointing the MM, undertaking the staff survey and agreeing the targets and measures to be achieved with Galway City Council. The following timeline is therefore put forward.

- Within 1 month of occupying the site: Appoint TPC and inform of responsibilities and available time.
- Within 6 months of first occupation, TPC to undertake the staff surveys
- Within 1 month of undertaking the Staff Surveys meet with Somerset County Council and discuss results of the surveys and detailed targets and measures.
- Within 3 months of undertaking the staff surveys, each occupier to identify a Travel Plan (i.e. within 9 months of occupation) to be produced.

The MM's duties will include the distribution of Travel information Packs Information packs to staff as part of a coordinated promotional and marketing strategy. Through a monitoring and review process, the MM will also be responsible for ensuring that the measures proposed are implemented in the most effective way possible.

The staff Travel Information Packs will take a similar format to the resident's packs.

The MM will be responsible for the set-up of the Workplace Travel Forum. This forum whether web based or organise group workshops / meetings will provide feedback on the success and promotional activities of the MMP to the employer and employees. Both will also be able to interact with the MM and provide personal feedback through the forum.

The promotional and marketing strategy will also attempt to engage staff in the MMP process. This might include holding a series of lunch time seminars at which the aims and objectives of the MMP are set out. Staff will be given the opportunity to discuss current and potential MMP measures with the MM.

The MM will also contact local businesses and organisations with the aim of engaging them in a travel planning process for the wider area.

## 6. MMP Measures

### 6.1. Residential Measures

It will be the responsibility of the MM to liaise with residents and inform them of the elements of the MMP. The MM will encourage residents to use more sustainable methods of transport through the following ways:

- Organising “Active day” events at Knocknacarra District Centre. These events should be used to encourage people to use more sustainable modes of transport.
- Offering membership discounts for local gyms.
- Offering membership discounts for car clubs.
- Working with residents to provide individuals with the information to develop their own personalised travel plan (PTP). The plan should be tailored to reflect each resident’s situation.
- Organising car sharing schemes.
- Residents are to be provided with a welcome Travel Information Pack. This pack, which will be updated on an ongoing basis, will contain information on the following:
  - Public transport facilities in the area.
  - Walking and cycling facilities in the area.
  - Discounts for local gyms.
  - Discounts for car clubs.
  - Incentives that may be offered by resident’s employees to use sustainable modes of transport (e.g. cycle to work scheme).
  - Contact details for Mobility Manager and key travel websites and apps.

### 6.2. Employment Measures

With the exception of the existing Phase 1 development, the occupiers and tenants of the retail element of the Knocknacarra District Centre are yet unknown. The MM will liaise with the new tenants to encourage use of sustainable modes of transport.

An outline of the various measures that may be introduced are as follows

#### 6.2.1. Events

The MM will be responsible for organising information events for the MMP and inviting and informing companies within The Knocknacarra District Centre of the events. These events are designed to inform tenants on sustainable travel to work and healthy lifestyle habits.

The MM will organise four events over the course of the year; 2 large and 2 small events. The theme of these events could change each year. The events will be promoted to the tenants within The Knocknacarra District Centre through various communication channels.

An example of the information events to be hosted are listed below:

##### 6.2.1.1. Launch Event

A MMP launch will take place to inform and aid all staff and visitors about Smarter Travel options to and from The Knocknacarra District Centre. This launch will be organised by the Overall MC in conjunction with the individual business MC’s. This launch would be combined with the first large event carried out. The Smarter Travel Options Launch will promote businesses and initiatives which facilitate sustainable and active modes of transport.

### 6.2.1.2. Large Events

These will be one day events focussed around one specific theme

#### **Cycle Awareness:**

- This event will focus around the cycle to work scheme.
- Tenants will be made aware of their potential cycle route to and from work and the time taken to do so.
- Promotion of exercise will be encouraged with exercise bikes and challenges set-up.
- Exercise bike related games will encourage completion of small tasks for equipment-based reward (helmet, puncture kit etc.).
- Bike doctor facilities on site will carry out maintenance work on tenant's bikes and provide information on bike care
- Water bottles, Hi-Vis jackets etc. will be distributed as part of the cycle awareness event.



Figure 6-1 - Cycle Clinic in progress

#### **Healthy Lifestyle:**

- An event to place an emphasis on the benefits healthy eating and frequent exercise.
- The event may involve the erection of a Marquee in Knocknacarra District Centre. Group yoga or similar exercises could be planned and held in the Marquee.
- Fitness gurus invited to speak.
- Invite representatives from the HSE to present on the Healthy Ireland Strategy and to present on the national Healthy Eating Guidelines.
- Healthy snacks and fruit would be provided.
- Nearby gyms may choose to hand out leaflets on membership rates and proved facilities.
- Tenants in the Knocknacarra District Centre may choose to take the opportunity to hand out branded item such as water bottles, hi-vis jackets etc. to advertise their brand.

### 6.2.1.3. Small Events

Small events are events of approximately 2hrs in duration.

#### **Bus Travel Saver:**

- An information morning on the benefits of availing of the tax saver, ie tax saver commuter ticket options. These tickets offer the customer a reduced price based on tax bracket.
- A local recreational hall style area on site would be used to host this event.
- A small presentation followed by information desk and leaflet info will create awareness of the scheme.



### **Travel to Work:**

- Information on travel to work schemes such as carpooling and commuter transport methods will be made available. Car sharing profile on [carsharing.ie](http://carsharing.ie) will be created to allow commuters to seek lifts to and from work.
- The Travel to Work information could be presented during a coffee morning or an information night.

### **6.2.2. Walking**

The following initiatives and incentives could be used to encourage walking to work and to encourage walking trips during the working day including walking trips at lunchtime to the neighbourhood:

- Keep umbrellas in reception areas on a deposit system for use when raining and to encourage walking to the bus stops.
- Display information about walking routes in reception areas and public areas so staff can plan journeys.
- Organise lunchtime or afternoon walks as part of a workplace health and well-being programme.
- Promotion of walking events such as the Walktober Challenge (<https://www.smartertravelworkplaces.ie/step-challenge/resourceslinks/>) as promoted by the National Transport Authority.
- Promote participation in Active Travel Logger programme <https://activetravellogger.ie/login>.

### **6.2.3. Cycling to Work**

Facilities for cycling such as showers and lockers to be provided in the office building. All tenants will be made aware of the provision of cycling facilities. The following incentives and initiatives may be used to encourage cycling to work:

- Provide and publicise cycle parking for employees and visitors.
- Display maps of the site and its locality in reception and public areas so staff can plan journeys.
- Organise discounts in local bike shops.
- Promote cycling for business by setting mileage rates for business travel done by bike.
- Provide free cycle accessories (panniers, lights, visi-vests, helmets) in periodic draws for cyclists.
- Organise bike maintenance talks on site where bike shops can offer the service of repair work on site during work hours.
- Organise cycle training sessions on site to staff and their families on the rules of the road and the specific risks associated with the locality.
- Invite bike suppliers on site for a 'Green Day' or 'Green Week' so that staff can try bikes before buying.
- Set up a Bicycle User Group (BUG) to promote cycling.
- Highlight the direct savings gained due to reduced use of private vehicles.
- Take part in National Bike Week, see [www.bikeweek.ie](http://www.bikeweek.ie).

### **6.2.4. Public Transport**

The following initiatives and incentives can be used to encourage staff to take public transport bus services to work:

- Promote Tax Saver Commuter tickets, which offer savings to employers in PSRI per ticket sold and significant savings to employees in marginal tax rate and levies on the price of their ticket.
- Encourage public transport use for business travel by making smart cards available at reception to be signed out for business travel. Advertise the availability of these tickets to all employees.
- Publicise the availability of Real Time Information for the key Bus services surrounding the development. Real Time Information showing accurate bus time arrival allows to plan bus journey more accurately.

- Provide maps of access to local bus routes and the nearest bus stops, and the length of time it takes to walk to them.
- Provide ongoing updates on relevant changes to bus services.
- Promote the use of the Transport for Ireland (TFI) Journey Planner App.

### 6.2.5. Promotion of E-working

The suitability of e-working is something that will be very much dependant on the business models of the tenant companies and their policies. The Overall MC will advise the tenant companies of the potential of e-working and encourage them to consider inclusion of such within their own MMPs and/or Mobility Management Plan Statement.

### 6.2.6. Car Sharing

A group profile is to be set up on carsharing.ie. This profile will facilitate carpooling amongst tenants of The Knocknacarra District Centre with a view of reducing single car usage.

### 6.2.7. Car Clubs

Car Club are programmes designed to provide vehicles to users who only require them occasionally and can provide development exclusive cars. Information should be provided about these services and discounts offered to businesses and residents who wish to participate

## 6.3. Measures readily Applicable to Existing Development

The MM upon undertaking a travel survey and site audit of the existing development should consider what measures as outlined above can be immediately implemented.

## 7. Implementation, Monitoring and Review

The Mobility Management Plan (MMP) Strategy and Measures outlined in this report need to be implemented over a period of time and carefully monitored to ensure they continue to deliver the aims and objectives of the MMP.

### 7.1. Implementation

A key aspect of the MMP is the provision of travel information for staff and residents of the mixed use development. A sample of Travel Information Pack for Knocknacarra District Centre is included in Appendix B. It will be the role of Mobility Manager (MM) to review this and update as necessary.

A Mobility Manager has been appointed to ensure that the strategy and proposed measures are implemented.

It will also be the role of the MM to monitor and evaluate the impacts of the initiatives implemented through the MMP and report back to Galway City Council.

### 7.2. Monitoring and Review

Monitoring of the MMP will be important in understanding the changing nature of staff and resident travel habits and the effectiveness of the MMP Strategy and Measures. The monitoring process will involve annual surveys undertaken, starting one year from the initial post occupation surveys to assess changes to the mode share of trips to the development site over a three year period.

Residents will be engaged in the monitoring and review process through the community travel forum. An annual meeting of the forum will be held to review the travel plan initiatives in light of feedback from the questionnaires and to present the survey results.

Employees will also be engaged in the monitoring and review process through the work place travel forum. An annual meeting of the forum will be held to review the travel plan initiatives in light of feedback from the questionnaires and to present the survey results.

An annual monitoring report would be produced for each element of the site by the MM, setting out the results of the surveys and highlighting any issues arising from the review of the MMP Strategy and Measures for both the residential and employment element of the site. This would be submitted to Galway City Council and made available to residents and employees. The report would set out appropriate changes to existing strategy and measures if required in order to meet the MMP objectives.



# Appendices

# Appendix A. MMP Phase 2 Gateway Development

**Proposed mixed-use development,  
Knocknacarra District Centre,  
Knocknacarra, County Galway**

**Traffic Assessment and Mobility  
Management Plan**

Barrett Mahony Consulting Engineers

June 2017



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Figure 2: Proposed N6 re-alignment

Figure 3: Proposed bus routes

Figure 4: Proposed cycle network

Figure 5: Location of proposed development relative to Gort na Bro roundabout.

Figure 6: Location of Gort na Bro roundabout relative to main origin and destination of traffic in the Galway City Area

Figure 7: 19 No. flows measured within 23<sup>rd</sup> May traffic survey

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Figure 10: Existing Route 412 along Western Distributor Road

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### **APPENDIX 1: Traffic Survey, Tuesday 25<sup>th</sup> May, 2017**

### **APPENDIX 2: OSCADY results for three scenarios, AM and PM peak**

## 1 NON-TECHNICAL SUMMARY

Barrett Mahony Consulting Engineers have been requested by Galway City Council to provide a Traffic and Transport Assessment and a Mobility Management Plan for a proposed mixed-use development at the Knocknacarra District Centre, County Galway.

The proposed development consists of the following development types with associated Gross Floor Areas (GFA):

- 9,885 m<sup>2</sup> GFA Retail Development (including 197 m<sup>2</sup> GFA coffee shop)
- 786 m<sup>2</sup> GFA Office Development
- 678 m<sup>2</sup> GFA Gym Development
- 444 m<sup>2</sup> GFA Creche Development

The total extent of the proposed development is thus 11,794 m<sup>2</sup> GFA.

The current proposal is a replacement for the phase 2 application previously made in 2008 (Register Reference 08/567) and extended under Register Reference 13/353 until June 4<sup>th</sup> 2019.

The development will access the local road network via the 5-arm Gort na Bro Roundabout, the location of which is shown within Figure 1.

The Gort na Bro roundabout is located approximately 3km west of Galway City Centre. It forms part of the Western Distributor / Gort Siar road link which runs west to east, linking up with the regional road R338 / Seamus Quirke Road which links directly with the N6 / N59 at the Browne Roundabout.

The 2016 Galway Transport Plan has proposed an N6 Outer City Bypass, the emerging route for which is indicated within Figure 2. This route is located north of the Gort na Bro Roundabout and will result in a significant decrease in traffic along the Western Distributor Road. It has been predicted that the construction of the bypass, in addition to an enhanced public transport and soft mode network, will result in a decrease of 20% in vehicular traffic within Galway city centre.

Figures 3 and 4 detail the bus and cycle routes proposed within the Galway Transport Strategy. It can be seen that the Western Distributor / Gort Siar link forms a central part of the proposed bus and cycle network.

The Galway Transport Strategy further proposes that the 5-arm Gort na Bro roundabout be converted to a 4-arm signalised junction, with a new T-junction to its east providing access to



the Knocknacarra District Centre. However, this junction does not impact on the layout of the current phase 2 application.

The proposed day of opening for the mixed-use development is 2019. On that basis, the traffic analysis within this report will assume that the existing road network configuration will remain as is.

The day-of-opening is seen as the critical time frame for the proposed development, as, by the design year (year of opening plus 10), it can be assumed that the proposed N6 Outer Bypass will be in place, with significant traffic diverted from the Western Distributor Road onto the new N6. (The Galway Transport Strategy predicts a reduction of 19% in traffic within the city centre, assuming the bypass plus associated public transport and soft mode enhancement measures are in place and operational.

The design year will thus not be analysed within this report.

The report also contains a mobility report detailing how the proposed public transport measures within the Galway Transport Strategy will result in a reduction in car usage for travellers to and from the proposed development. The applicant undertakes to appoint a mobility management co-ordinator to ensure future predicted modal shift for the Galway area are replicated at the candidate site.

Section 2 details the local road network and the location of the candidate site relative to it, together with details of the traffic survey carried out in May 2017.

Section 3 provides estimates of the traffic generated by the proposed mixed-use development.

Section 4 assesses the traffic impact of the proposed development on the Gort na Bro roundabout. This analysis involves assessment of the existing situation (morning and evening weekday peaks), proposed day of opening (2019) without the development in place (morning and evening weekday peaks), and proposed day of opening (2019) with the development in place (morning and evening weekday peaks).

Section 5 details the quantum of car and cycle parking it is proposed to provide on-site.

Section 6 provides a mobility plan for the proposal, estimating day of opening modal splits for the proposed development, providing details of relevant public transport enhancements proposed within the Galway Transport Strategy, indicating how these will reduce dependence on the private car at the proposed development. The role of the mobility management co-ordinator is also detailed.

Section 7 makes some concluding comments regarding the sustainability of the proposal in transportation terms.

Both the scale of the traffic assessment and the parking provision detailed within this report were discussed and agreed with the Roads Section of Galway City Council.

## **2 SITE LOCATION, EXISTING ROAD NETWORK AND TRAFFIC SURVEY**

The site is located approximately 175 metres north-west of the Gort na Bro Roundabout, which is the major link between the proposed development and the local road network.

The Gort na Bro Roundabout is a central link within the Western Distributor / Gort Siar Road which runs east west connecting major residential areas in Knocknacarra to Galway City

The location of the site relative to the Gort na Bro Roundabout is detailed within Figure 5.

Figure 6, taken from the Galway Transport Strategy, demonstrates the centrality of the Gort na Bro Roundabout in transportation terms, linking the major residential centres in Knocknacarra to city centre / university area.

A traffic survey was carried out at the Gort na Bro Roundabout on Tuesday 23<sup>rd</sup> May 2017, measuring flows on all five arms (the 19 No. measured flows are detailed within Figure 7).

The survey was carried out over a 12-hour period between 0700 and 1900 in order to ascertain the peak hour flows for all traffic movements at the junction.

The survey indicated that the weekday morning and evening peaks occurred between 0800 and 0900 and 1700 and 1800 respectively - this was observed to be the timeframe during which the junctions were most heavily loaded. The following analysis is based on this peak period.

Between 0800 and 0900, a total of 1204 passenger car units were incident on the junction, with 1264 passenger 6units incident on the junction between 1700 and 1800.

Detailed survey results are reproduced in Appendix 1.

It is assumed that the proposed development will open in 2019.

The 2017 survey will be factored up by approved NRA growth rates in order to derive 2019 day-of-opening network flows. The

relevant NRA document is the Project Appraisal Guidelines: *Unit 5.5, Link-Based Traffic Growth Forecasting*

Future flow predictions for 2019 are based on annual traffic growth rates of 1.0% from 2017 to 2019, based on the medium growth scenario contained within the NRA document.

The existing flows at the 4 arms to the junction indicate peak hour volumes as follows:

Morning peak

Arm A - Gort na Bro (East approach): 433 pcu's  
Arm B - An Logan (South approach): 39 pcu's  
Arm C - Gort Siar (West approach): 563 pcu's  
Arm D - Galway Retail park access (north-west approach): 50 pcu's  
Arm E - Gort na Bro (north approach): 121 pcu's  
Total: 1206 pcu's

Evening peak

Arm A - Gort na Bro (East approach): 616 pcu's  
Arm B - An Logan (South approach): 14 pcu's  
Arm C - Gort Siar (West approach): 357 pcu's  
Arm D - Galway Retail park access (north-west approach): 203 pcu's  
Arm E - Gort na Bro (north approach): 75 pcu's  
Total: 1264 pcu's

One can see from the above figures that, during the morning peak, the main flow is west to east, towards the city centre, with Gort Siar the most heavily loaded approach, and the 2-way east-west flow (Gort Siar – Gort na Bro East), at 996 pcu's, constitutes 83% of the total incident flow at the roundabout.

During the evening peak, the main flow is east to west, away from the city centre, with Gort na Bro (East) the most heavily loaded approach, and the 2-way east-west flow (Gort Siar – Gort na Bro East), at 973 pcu's, constitutes 77% of the total incident flow at the roundabout.

During both peaks, the incident flow on the An Logan access is light. As one would expect, the flows on the Retail Park access are only of any significance during the evening peak.

### **3 TRAFFIC GENERATED BY PROPOSED DEVELOPMENT AND ITS DISTRIBUTION**

#### **3.1 INTRODUCTION**

The traffic impact of the proposed development is derived by assessing the trips generated by the proposal and, taking the existing and day of opening flows on the Gort na Bro Roundabout, the entry point to the local road network for



generated flows, the extent to which the superimposed flows from the proposed development will affect the efficiency of future network flows at the roundabout can be assessed.

### 3.2 TRIPS GENERATED BY CANDIDATE SITE

The proposed mixed-use development consists of the following development types with associated Gross Floor Areas (GFA):

- 9,688 m<sup>2</sup> GFA Retail Development (excluding a food superstore)
- 786 m<sup>2</sup> GFA Office Development
- 678 m<sup>2</sup> GFA Gym Development
- 444 m<sup>2</sup> GFA Creche Development
- 197 m<sup>2</sup> GFA Café Development

The filter on the TRICS Database has been utilised to ensure that appropriate surveys have been selected for this assessment.

TRICS typically gives the following weekday morning and evening peak trip rates for the retail component of the proposed development, where the development excludes a food superstore outlet:

		Weekday peak hours			
		AM in	AM out	PM in	PM out
Retail	Trips/100m <sup>2</sup> GFA	1.02	0.68	1.14	1.41

Table 3-1: Trip rates for retail component within development site

The above TRICS trip rates give rise to the following weekday morning and evening peak flows:

		Weekday peak hours			
		AM in	AM out	PM in	PM out
Retail	GFA (m <sup>2</sup> )	99	66	111	137

Table 3-2: Total Flows generated for retail component within development site

TRICS typically gives the following weekday morning and evening peak trip rates for the office component of the proposed development:

		Weekday peak hours			
		AM in	AM out	PM in	PM out
Offices	Trips/100m <sup>2</sup>	1.45	0.23	0.17	1.26

Table 3-3: Trip rates for offices within development site

The above TRICS trip rates give rise to the following morning and evening peak weekday flows:

		Weekday peak hours			
GFA (m <sup>2</sup> )		AM in	AM out	PM in	PM out
Offices	786	11	2	1	10

Table 3-4: Total Flows generated by offices within development site

TRICS typically gives the following weekday morning and evening peak trip rates for the gym component within proposed development:

		Weekday peak hours			
Trips/100m <sup>2</sup>		AM in	AM out	PM in	PM out
Gym		1.18	0.54	1.62	0.93

Table 3-5: Trip rates for the gym component within development site

The above TRICS trip rates give rise to the following morning and evening peak weekday flows:

		Weekday peak hours			
GFA (m <sup>2</sup> )		AM in	AM out	PM in	PM out
Gym	678	8	3	10	6

Table 3-6: Total Flows generated by the gym component within development site

TRICS typically gives the following weekday morning and evening peak trip rates for the crèche component of the proposed development:

		Weekday peak hours			
Trips/100m <sup>2</sup>		AM in	AM out	PM in	PM out
Crèche		4.33	3.70	2.99	3.69

Table 3-7: Trip rates for crèche within development site

The above TRICS trip rates give rise to the following morning and evening peak weekday flows:

		Weekday peak hours			
GFA (m <sup>2</sup> )		AM in	AM out	PM in	PM out
Crèche	444	19	16	13	16

Table 3-8: Total Flows generated by crèche within development site

TRICS typically gives the following weekday morning and evening peak trip rates for the café component of the proposed development:

		Weekday peak hours			
		AM in	AM out	PM in	PM out
Café	Trips/100m <sup>2</sup>	0	0	3.7	2

Table 3-9: Trip rates for café within development site

The above TRICS trip rates give rise to the following morning and evening peak weekday flows:

		Weekday peak hours			
		AM in	AM out	PM in	PM out
Café	GFA (m <sup>2</sup> )	00	0	7	4

Table 3-10: Total Flows generated by crèche within development site

The following are the combined flows generated by development types within the candidate site for the morning and evening peaks:

	Weekend peak hours			
	AM in	AM out	PM in	PM out
Retail	99	66	111	137
Office	11	2	1	10
Gym	8	3	10	6
Creche	19	16	13	16
Café	0	0	7	4
<b>Total generated flows</b>	<b>137</b>	<b>87</b>	<b>142</b>	<b>173</b>

Table 3-11: Total extra flows generated by proposed development mix within candidate site

### 3.3 REDUCTION DUE TO MULTI-PURPOSE TRIPS

It would be reasonable to assume that 25% of the gym, crèche and café trips are made by office workers / retail users.

Taking account of the 25% reduction for gym, crèche and café-related trips, the following are the peak time trip volumes:

Morning peak inbound - 130 vehicles per hour  
 Morning peak outbound - 82 vehicles per hour  
 Evening peak inbound - 134 vehicles per hour



Evening peak outbound - 166 vehicles per hour

### 3.4 **TRIP DISTRIBUTION**

The following distributions are based on the observed network flow patterns during both peaks.

#### Morning peak

##### *Outbound traffic*

All outbound trips generated by the proposed development will be incident on the Gort na Bro Roundabout via the Retail Park access road.

Once incident on the roundabout, 40% of these flows will exit onto the eastbound Gort na Bro link, 50% will exit onto the westbound Gort Siar link and 10% will exit onto the northbound Gort na Bro link.

##### *Inbound traffic*

All inbound traffic will enter the proposed development via the Retail Park access Road.

Of these exiting flows, 60% enter via the eastbound Gort na Bro link, 30% enter via the Gort Siar link and 10% via the northbound Gort na Bro link.

#### Evening peak

##### *Outbound traffic*

All outbound trips generated by the proposed development will be incident on the Gort na Bro Roundabout via the Retail Park access road.

Once incident on the roundabout, 50% of these flows will exit onto the eastbound Gort na Bro link, 40% will exit onto the westbound Gort Siar link and 10% will exit onto the northbound Gort na Bro link.

##### *Inbound traffic*

All inbound traffic will enter the proposed development via the Retail Park access Road.

Of these exiting flows, 40% enter via the eastbound Gort na Bro link, 50% enter via the Gort Siar link and 10% via the northbound Gort na Bro link.

### 3.5 **TRIP ASSIGNMENT**

The flows for the proposed day-of-opening of the development in 2019 are constructed by factoring 2017 surveyed flows within the local road network by 2%; the NRA growth rate which converts the 2017 observed flows to 2019 day-of-opening predicted flows, based on medium growth rates proposed within the NRA document.

For the day-of-opening 'with development' scenario, the generated flows detailed within section 3.3 above are superimposed on the factored 2019 network flows at the roundabout.

### **3.6 GENERAL COMMENT ON TRIP GENERATION FIGURES**

The evening peak hour flows are 40% greater than the morning peak hour values, as would be expected given the significant retail element proposed for the candidate site.

Given that the network evening peak hour volumes are 5% higher than the network morning peak flows, the evening peak will be the critical period of assessment for the Gort na Bro roundabout, as this is the time frame during which it will be most heavily loaded.

Notwithstanding this, the morning peak hour remains a period during which significant volumes are incident on the roundabout. Therefore, both peak hours will be analysed within this traffic and transport assessment.

## **4 ANALYSIS OF THE GORT NA BRO ROUNDABOUT**

### **4.1 INTRODUCTION**

The weekday morning and evening peak hour analyses for the critical roundabout junction is carried out for the following three scenarios:

- The existing situation - based on flows as detailed within the May 2017 survey - morning and evening peak
- Assumed year of opening (2019) - without the development in place - morning and evening peak
- Assumed year of opening (2019) - with the development in place - morning and evening peak

### **4.2 RELEVANT DIMENSIONS OF GORT NA BRO ROUNDABOUT**

Based on the surveyed dimensions for the roundabout, as detailed within Figure 8, the following design parameters critical to the following analysis apply:

Arm A - Gort na Bro (East)

Approach half width: 5.1 metres  
Entry width: 3.65 metres  
Effective flare width: 20.0 metres  
Entry radius: 20 metres  
Entry angle: 30°

Arm B – An Logan (South)

Approach half width: 4.5 metres  
Entry width: 3.65 metres  
Effective flare width: 10.0 metres  
Entry radius: 20 metres  
Entry angle: 30°

Arm C - Gort Siar (West)  
Approach half width: 6.2 metres  
Entry width: 3.65 metres  
Effective flare width: 20.0 metres  
Entry radius: 20 metres  
Entry angle: 30°

Arm D - Galway Retail Access (North-west)  
Approach half width: 5.1 metres  
Entry width: 3.65 metres  
Effective flare width: 20.0 metres  
Entry radius: 20 metres  
Entry angle: 30°

Arm E – Gort na Bro (North)  
Approach half width: 5.1 metres  
Entry width: 3.65 metres  
Effective flare width: 20.0 metres  
Entry radius: 20 metres  
Entry angle: 30°

The Inscribed Circle Diameter (ICD) is measured at 47 metres.

The performance of the roundabout for the three relevant scenarios are calculated using ARCADY software. The detailed output is provided within Appendix 2.

#### **4.3 SCENARIO 1 - ANALYSIS OF RATIOS OF FLOW TO CAPACITY (RFC'S), QUEUE LENGTHS AND DELAYS (2017, EXISTING SITUATION)**

The flows, capacities, ratios of flow to capacity (RFC) and queue lengths for the four 15-minute period within the weekday morning and evening peaks on the five critical movements at the roundabout junction, for the existing situation (2017), are detailed immediately below within Tables 4-1 and 4-2 respectively:



<b>Weekday AM 2017 (existing flows)</b>				
<b>0800-0815</b>	<b>Flow (veh/min)</b>	<b>Cap. (veh/min)</b>	<b>RFC (-)</b>	<b>Max queue (vehicles)</b>
Gort na Bro (east)	4.70	23.79	0.20	0.2
An Logan (south)	0.90	18.80	0.05	0.1
Gort Siar (west)	12.5	26.04	0.48	0.9
Retail Access (north-west)	0.50	16.79	0.03	0.0
Gort na Bro (north)	2.10	17.27	0.12	0.1
<b>0815-0830</b>	<b>Flow (veh/min)</b>	<b>Cap. (veh/min)</b>	<b>RFC (-)</b>	<b>Max queue (vehicles)</b>
Gort na Bro (east)	6.90	23.79	0.29	0.4
An Logan (south)	0.50	17.61	0.03	0.0
Gort Siar (west)	8.90	25.79	0.35	0.5
Retail Access (north-west)	0.70	18.82	0.04	0.0
Gort na Bro (north)	2.10	19.13	0.11	0.1
<b>0830-0845</b>	<b>Flow (veh/min)</b>	<b>Cap. (veh/min)</b>	<b>RFC (-)</b>	<b>Max queue (veh/lane)</b>
Gort na Bro (east)	8.10	23.88	0.34	0.5
An Logan (south)	0.50	17.05	0.03	0.0
Gort Siar (west)	8.30	25.56	0.33	0.5
Retail Access (north-west)	0.80	19.12	0.04	0.0
Gort na Bro (north)	1.70	19.39	0.09	0.1
<b>0845-0900</b>	<b>Flow (veh/min)</b>	<b>Cap. (veh/min)</b>	<b>RFC (-)</b>	<b>Max queue (veh/lane)</b>
Gort na Bro (east)	9.10	23.76	0.38	0.6
An Logan (south)	0.70	16.41	0.04	0.0
Gort Siar (west)	7.80	25.23	0.31	0.4
Retail Access (north-west)	1.30	19.27	0.07	0.1
Gort na Bro (north)	2.10	19.31	0.11	0.1

Table 4-1: ratios of flow to capacity and queue lengths for each 15-minute interval during the existing (2017) morning peak hour

<b>Weekday PM 2017 (existing flows)</b>				
<b>1700-1715</b>	<b>Flow (veh/min)</b>	<b>Cap. (veh/min)</b>	<b>RFC (-)</b>	<b>Max queue (vehicles)</b>
Gort na Bro (east)	10.10	23.02	0.44	0.8
An Logan (south)	0.20	15.28	0.01	0.0
Gort Siar (west)	6.10	25.48	0.24	0.3
Retail Access (north-west)	4.30	20.88	0.21	0.3
Gort na Bro (north)	1.60	19.17	0.08	0.1
<b>1715-1730</b>	<b>Flow (veh/min)</b>	<b>Cap. (veh/min)</b>	<b>RFC (-)</b>	<b>Max queue (vehicles)</b>
Gort na Bro (east)	9.70	23.33	0.42	0.7
An Logan (south)	0.30	15.74	0.02	0.0
Gort Siar (west)	5.70	25.53	0.22	0.3
Retail Access (north-west)	3.60	21.06	0.17	0.2
Gort na Bro (north)	1.10	19.70	0.06	0.1
<b>1730-1745</b>	<b>Flow (veh/min)</b>	<b>Cap. (veh/min)</b>	<b>RFC (-)</b>	<b>Max queue (veh/lane)</b>
Gort na Bro (east)	11.20	23.50	0.48	0.9
An Logan (south)	0.20	15.08	0.01	0.0
Gort Siar (west)	5.00	25.30	0.20	0.2
Retail Access (north-west)	2.70	21.42	0.13	0.1
Gort na Bro (north)	1.00	20.54	0.05	0.1
<b>1745-1800</b>	<b>Flow (veh/min)</b>	<b>Cap. (veh/min)</b>	<b>RFC (-)</b>	<b>Max queue (veh/lane)</b>
Gort na Bro (east)	10.00	23.33	0.43	0.8
An Logan (south)	0.20	15.58	0.01	0.0
Gort Siar (west)	6.90	25.50	0.27	0.4
Retail Access (north-west)	2.90	20.45	0.14	0.2
Gort na Bro (north)	1.30	19.57	0.07	0.1

Table 4-2: ratios of flow to capacity and queue lengths for each 15-minute interval during the existing (2017) morning peak hour

One can see from the above analyses that the roundabout junction at present operates efficiently, with an overall maximum ratio of flow to capacity of 48% for both the weekday morning and evening peaks.

#### **4.4 SCENARIO 2 - ANALYSIS OF RATIOS OF FLOW TO CAPACITY (RFC'S), QUEUE LENGTHS AND DELAYS (2019, WITHOUT DEVELOPMENT IN PLACE)**

The flows, capacities, ratios of flow to capacity (RFC) and queue lengths for the four 15-minute period within the weekday morning and evening peaks on the five critical movements at the roundabout junction, for the proposed day of opening (2019) without the development in place, are detailed immediately below within Tables 4-3 and 4-4 respectively:

<b>Weekday AM 2019 (day of opening flows. development not in place)</b>				
<b>0800-0815</b>	<b>Flow (veh/min)</b>	<b>Cap. (veh/min)</b>	<b>RFC (-)</b>	<b>Max queue (vehicles)</b>
Gort na Bro (east)	4.80	23.77	0.20	0.3
An Logan (south)	0.90	18.73	0.05	0.1
Gort Siar (west)	12.80	26.00	0.49	1.0
Retail Access (north-west)	0.50	16.62	0.03	0.0
Gort na Bro (north)	2.20	17.11	0.13	0.1
<b>0815-0830</b>	<b>Flow (veh/min)</b>	<b>Cap. (veh/min)</b>	<b>RFC (-)</b>	<b>Max queue (vehicles)</b>
Gort na Bro (east)	7.10	23.77	0.30	0.4
An Logan (south)	0.50	17.49	0.03	0.0
Gort Siar (west)	9.10	25.73	0.35	0.6
Retail Access (north-west)	0.70	18.70	0.04	0.0
Gort na Bro (north)	2.20	19.02	0.12	0.1
<b>0830-0845</b>	<b>Flow (veh/min)</b>	<b>Cap. (veh/min)</b>	<b>RFC (-)</b>	<b>Max queue (veh/lane)</b>
Gort na Bro (east)	8.30	23.86	0.35	0.5
An Logan (south)	0.50	16.92	0.03	0.0
Gort Siar (west)	8.50	25.49	0.33	0.5
Retail Access (north-west)	0.80	19.00	0.04	0.0
Gort na Bro (north)	1.80	19.29	0.09	0.1
<b>0845-0900</b>	<b>Flow (veh/min)</b>	<b>Cap. (veh/min)</b>	<b>RFC (-)</b>	<b>Max queue (veh/lane)</b>
Gort na Bro (east)	9.30	23.77	0.39	0.6
An Logan (south)	0.70	16.31	0.04	0.0
Gort Siar (west)	8.00	25.17	0.32	0.5
Retail Access (north-west)	1.30	19.15	0.07	0.1
Gort na Bro (north)	2.10	19.20	0.11	0.1

Table 4-3: ratios of flow to capacity and queue lengths for each 15-minute interval during the existing (2017) morning peak hour



<b>Weekday PM 2019 (day of opening flows. development not in place)</b>				
<b>1700-1715</b>	<b>Flow (veh/min)</b>	<b>Cap. (veh/min)</b>	<b>RFC (-)</b>	<b>Max queue (vehicles)</b>
Gort na Bro (east)	10.30	23.01	0.45	0.8
An Logan (south)	0.20	15.17	0.01	0.0
Gort Siar (west)	6.20	25.43	0.24	0.3
Retail Access (north-west)	4.40	20.83	0.21	0.3
Gort na Bro (north)				0.1
<b>1715-1730</b>	<b>Flow (veh/min)</b>	<b>Cap. (veh/min)</b>	<b>RFC (-)</b>	<b>Max queue (vehicles)</b>
Gort na Bro (east)	9.90	23.27	0.43	0.7
An Logan (south)	0.30	15.58	0.02	0.0
Gort Siar (west)	5.80	25.47	0.23	0.3
Retail Access (north-west)	3.70	21.01	0.18	0.2
Gort na Bro (north)	1.20	19.60	0.06	0.1
<b>1730-1745</b>	<b>Flow (veh/min)</b>	<b>Cap. (veh/min)</b>	<b>RFC (-)</b>	<b>Max queue (veh/lane)</b>
Gort na Bro (east)	11.40	23.49	0.49	0.9
An Logan (south)	0.20	14.96	0.01	0.0
Gort Siar (west)	5.10	25.24	0.20	0.3
Retail Access (north-west)	2.80	21.36	0.13	0.2
Gort na Bro (north)	1.00	20.44	0.05	0.1
<b>1745-1800</b>	<b>Flow (veh/min)</b>	<b>Cap. (veh/min)</b>	<b>RFC (-)</b>	<b>Max queue (veh/lane)</b>
Gort na Bro (east)	10.20	23.33	0.44	0.8
An Logan (south)	0.20	15.47	0.01	0.0
Gort Siar (west)	7.00	25.45	0.28	0.4
Retail Access (north-west)	2.90	20.40	0.14	0.2
Gort na Bro (north)	1.30	19.52	0.07	0.1

Table 4-4: ratios of flow to capacity and queue lengths for each 15-minute interval during the existing (2017) morning peak hour

One can see from the above analyses that, in 2019 (the projected opening year for the proposed development), without the development in place, the roundabout junction will continue to operate efficiently, with an overall maximum ratio of flow to capacity of 49% for both the weekday morning and evening peaks, an increase of 1% on existing maximum RFC's. This reflects the low network flow increases predicted for County Galway in the 2017 to 2019 period.

#### **4.5 SCENARIO 3 - ANALYSIS OF RATIOS OF FLOW TO CAPACITY (RFC'S), QUEUE LENGTHS AND DELAYS (2019, WITH DEVELOPMENT IN PLACE)**

The flows, capacities, ratios of flow to capacity (RFC) and queue lengths for the four 15-minute period within the weekday morning and evening peaks on the five critical movements at the roundabout junction, for the proposed day of opening (2019) with the development in place, are detailed immediately below within Tables 4-5 and 4-6 respectively:

	<b>Weekday AM 2019 (day of opening flows. development in place)</b>			
<b>0800-0815</b>	<b>Flow (veh/min)</b>	<b>Cap. (veh/min)</b>	<b>RFC (-)</b>	<b>Max queue (vehicles)</b>
Gort na Bro (east)	5.70	23.32	0.24	0.3
An Logan (south)	0.90	17.83	0.05	0.1
Gort Siar (west)	13.90	25.39	0.55	1.2
Retail Access (north-west)	1.90	16.64	0.11	0.1
Gort na Bro (north)	2.40	16.48	0.15	0.2
<b>0815-0830</b>	<b>Flow (veh/min)</b>	<b>Cap. (veh/min)</b>	<b>RFC (-)</b>	<b>Max queue (vehicles)</b>
Gort na Bro (east)	8.00	23.31	0.34	0.5
An Logan (south)	0.50	16.56	0.03	0.0
Gort Siar (west)	10.20	24.97	0.41	0.7
Retail Access (north-west)	2.20	18.58	0.12	0.1
Gort na Bro (north)	2.40	18.11	0.13	0.2
<b>0830-0845</b>	<b>Flow (veh/min)</b>	<b>Cap. (veh/min)</b>	<b>RFC (-)</b>	<b>Max queue (veh/lane)</b>
Gort na Bro (east)	9.20	23.44	0.39	0.5
An Logan (south)	0.50	16.03	0.03	0.0
Gort Siar (west)	9.60	24.68	0.39	0.6
Retail Access (north-west)	2.30	18.89	0.12	0.1
Gort na Bro (north)	2.00	18.36	0.11	0.1
<b>0845-0900</b>	<b>Flow (veh/min)</b>	<b>Cap. (veh/min)</b>	<b>RFC (-)</b>	<b>Max queue (veh/lane)</b>
Gort na Bro (east)	10.20	23.30	0.44	0.8
An Logan (south)	0.70	15.37	0.05	0.0
Gort Siar (west)	9.10	24.28	0.38	0.6
Retail Access (north-west)	2.80	19.07	0.15	0.2
Gort na Bro (north)	2.30	18.27	0.13	0.1

Table 4-5: ratios of flow to capacity and queue lengths for each 15-minute interval during the existing (2017) morning peak hour

<b>Weekday PM 2019 (day of opening flows. development in place)</b>				
<b>1700-1715</b>	<b>Flow (veh/min)</b>	<b>Cap. (veh/min)</b>	<b>RFC (-)</b>	<b>Max queue (vehicles)</b>
Gort na Bro (east)	11.50	21.95	0.52	1.1
An Logan (south)	0.20	13.52	0.02	0.0
Gort Siar (west)	7.20	24.59	0.29	0.4
Retail Access (north-west)	7.30	20.82	0.35	0.5
Gort na Bro (north)	1.90	17.59	0.11	0.1
<b>1715-1730</b>	<b>Flow (veh/min)</b>	<b>Cap. (veh/min)</b>	<b>RFC (-)</b>	<b>Max queue (vehicles)</b>
Gort na Bro (east)	11.10	22.32	0.50	1.0
An Logan (south)	0.30	14.03	0.02	0.0
Gort Siar (west)	6.80	24.66	0.28	0.4
Retail Access (north-west)	6.60	20.99	0.32	0.5
Gort na Bro (north)	1.40	18.08	0.08	0.1
<b>1730-1745</b>	<b>Flow (veh/min)</b>	<b>Cap. (veh/min)</b>	<b>RFC (-)</b>	<b>Max queue (veh/lane)</b>
Gort na Bro (east)	12.60	22.55	0.56	1.2
An Logan (south)	0.20	13.42	0.02	0.0
Gort Siar (west)	6.10	24.36	0.25	0.3
Retail Access (north-west)	5.70	21.30	0.27	0.4
Gort na Bro (north)	1.30	18.85	0.07	0.1
<b>1745-1800</b>	<b>Flow (veh/min)</b>	<b>Cap. (veh/min)</b>	<b>RFC (-)</b>	<b>Max queue (veh/lane)</b>
Gort na Bro (east)	11.40	22.43	0.51	1.0
An Logan (south)	0.20	13.95	0.01	0.0
Gort Siar (west)	8.00	24.62	0.33	0.5
Retail Access (north-west)	5.80	20.45	0.28	0.4
Gort na Bro (north)	1.50	18.08	0.08	0.1

Table 4-6: ratios of flow to capacity and queue lengths for each 15-minute interval during the existing (2017) morning peak hour

In 2019 (the projected opening year for the proposed development), with the development in place and fully operational, the roundabout junction will continue to operate efficiently, with an overall maximum ratio of flow to capacity of 55% and 56% for the weekday morning and evening peak respectively, an increase of 6% (morning peak) and 7% (evening peak) relative to the values for the 'without development' scenario in 2019. This reflects the 20% (morning peak) and 25% (evening peak) increase on network flows resulting from the proposed mixed-use development.

#### **4.6 OVERALL COMMENT ON THE PERFORMANCE OF THE GORT NA BRO ROUNDABOUT JUNCTION**

While the predicted generated flows result in a significant increase in incident flows at the roundabout junction, the resulting incident flows have been demonstrated to be well within the capacity of each approach by the projected year of opening of the development in 2019.

In terms of the design year in 2029, 10 years after the year of opening, assuming an annual increase in traffic of 1%, It is clear



that, if the existing road network is in place, the Gort na Bro roundabout will continue to operate efficiently on all approaches.

If the measures outlined in the Galway Transport Strategy are implemented by 2029, most notably the N6 Galway city by-pass and the enhancement of bus and cycle facilities, it is predicted that flows on links such as the Western Distributor Road will decrease by significantly more than 10%. In this situation, even with revised junction forms in place, overall reduction in incident volumes due to their diversion to the N6 bypass link will result in reduced congestion and journey times for commuters passing through the Gort na Bro roundabout at peak times.

## **5 PARKING PROVISION ON SITE**

### **5.1 CAR PARKING**

It is proposed to provide 151 No. car parking spaces in total at the site, 129 No. in the basement and 22 No. at ground level.

This equates exactly with the quantum agreed for the largewr scale previous application.

Given the multi-purpose nature of the development, there is expected to be a number of trips covering multiple uses which may ease car parking demand within the district centre and also traffic flows (see mobility management plan as detailed in section 6). For example it is likely that both the coffee shop and gym will be frequented mainly by users of the other on-site facilities. This approach was agreed with GCC.

### **5.2 CYCLE PARKING**

The Galway City Development Plan requires 1 No. cycle parking space for every 4 No. car parking spaces.

Based on the car parking provision of 151 No. spaces, this equates to a provision of 38 No. cycle parking spaces.

116 No. cycle parking spaces are provided within the proposed development, three times the development plan requirement.

This provision is seen as consistent with the proposed enhancement of cycle routes for commuters along the Western Distributor link into Galway city, as detailed within the Galway Transport Strategy.

## **6 MOBILITY MANAGEMENT PLAN**

### **6.1 PURPOSE OF PLAN**

The intention of this report is to present a review of the existing transport options at the location of the proposed mixed-use development and to provide direction for the future occupier of the development on ways to most effectively achieve an improved modal split for the journey to work, thus minimising the

traffic impacts and encouraging of the use other modes such as bus, cycling and walking.

All targets for modal shift to sustainable transport modes at the candidate site is seen in the context of the Galway Transport Strategy, whose core aim is to reduce congestion in the city area by implementing measures which reduce use of the private car and promote the increased use of more sustainable modes.

## **6.2 CONTENTS OF THE MOBILITY MANAGEMENT PLAN**

In accordance with the July 2002 DTO Advice Note on Mobility Management Plans, this report will address the following items:

- An outline of the existing and proposed public transport services serving the site of the proposed development
- An outline of the existing and proposed pedestrian and cycle routes serving the site of the proposed development
- An outline of measures proposed in order to encourage and facilitate the use of non-car based travel to and from the proposed development.

This report is a statement of the broad objectives in respect of Mobility Management for the site as a whole. The plan sets out possible targets and objectives along with the mechanisms including both hard and soft measures to support modal shift, which could be put in place to support the plan. These will be further revised as the proposed mixed-use development is occupied and more specific staff & employer details and requirements can be determined.

Section 6.3 details the modal splits for the candidate site on its day of opening.

Section 6.4 details the existing and proposed public transport services serving the site of the proposed development

Section 6.5 details the existing and proposed pedestrian and cycle routes serving the site of the proposed development

Section 6.6 summarises the changes in modal shifts envisaged as a result of the recommendations within the Galway Transport Strategy, and commits the occupier of the proposed mixed-use development to aim for modal shifts consistent with the strategy's targets

Section 6.7 contains an outline of measures proposed in order to further encourage and facilitate the use of non-car based travel to and from the proposed development for workers at the candidate site.

Section 6.8 details the role of the mobility co-ordinator at the proposed mixed-use development.

### 6.3 MODAL SPLITS FOR CANDIDATE SITE ON DAY OF OPENING

Table 6.1 below details the modal splits predicted for the candidate site on its proposed day of opening. These figures are based on typical values from the TRICS database for retail outlets (excluding food), which comprises 85% of the total development in terms of area.

Mode	%
Private car users (single occupant)	59
Private car users (multiple occupant)	21
Pedestrians	17
Cyclists	2
Public transport users	1
Total person trips	100

Table 6-1: Modal splits for proposed mixed-use development on day of opening

These figures indicate a significant reliance on the private car, with 80% of trips private vehicle-based and 20% using public transport / soft modes.

These figures are comparable with those detailed within the Galway Transport Strategy, based on the 2012 Household Travel Survey detailed within Table 6-2 below:

Mode	%
Private car/van users	77
Pedestrians	19
Cyclists	1
Public transport users	3
Total person trips	100

Table 6-2: Modal splits for Galway City and County (National Household Travel Survey, 2012)

The two sets of figures are comparable, showing that the trip generation figures detailed for the proposed development within this report are based on modal share entirely consistent with the modal splits as currently apply in the Galway city and county area.

### 6.4 EXISTING AND PROPOSED PUBLIC TRANSPORT FACILITIES SERVING THE PROPOSED DEVELOPMENT

#### 6.4.1 Existing

Figure 9 details the 11 No. existing bus services serving Galway city, with frequencies varying from 15 minutes to 1 hour. Figure 9 also details the one section of bus lane in the Galway city area, located east of the candidate site.

Figure 10 details of the 412 bus route, which passes along the Western Distributor Road, close to the candidate site.

#### **6.4.2 Proposed**

The Galway Transport Strategy proposes 5 No. radial bus routes:

*Green Route* - Knocknacarra to city centre via Seamus Quirke Road and Dublin Road

*Red Route* – Knocknacarra to city centre via Salthill and Ballybrit

*Blue Route* – Clybaun Road to city centre

*Yellow Route* – Dangan to city centre

*Brown Route* – Bearna to city centre

All five routes are shown within Figure 3.

The Green and Red routes pass along the Western Distributor Road adjacent to the candidate site.

Figure 11 indicates the bus priority lanes envisaged under the Galway Transport Strategy. One can see that a main priority lane is delineated along the Western Distributor Road / Gort na Bro / Gort Siar link.

Development of this bus priority system will involve conversion of the Gort na Bro roundabout to a 4-arm signalised junction, with the Knocknacarra District Centre accessed via a separate priority junction to the east.

### **6.5 PEDESTRIAN AND CYCLE ROUTES SERVING THE PROPOSED DEVELOPMENT**

#### **6.5.1 Existing**

The existing cycle network remains limited, with numerous gaps across the network between current facilities.

In terms of the walking environment, particularly relating to the access to Knocknacarra District Centre, a roundabout is quite a hostile environment for pedestrians. However, within the city area in general, Galway city, because of its scale, is a compact and walkable city. The existing high modal share for pedestrians is testament to this.

#### **6.5.2 Proposed**

The proposed cycle network improvements envisaged within the Galway Transport Strategy are detailed within Figure 4.

The proposed cycle network is composed of three tiers, primary, secondary and feeder routes.

One can see that a primary cycle route is proposed for the Western Distributor Road.



These primary routes are seen as providing a 'trunk' cycle network, aiding convenient and safe links for medium-distance radial commuter and leisure journeys.

For the walking facilities, the Galway Transport Strategy aims to ensure that the needs of pedestrians are fully considered in the design of all new facilities, including the revision of junction layouts.

In addition, the east-west pedestrian route through the candidate site will increase pedestrian access at a local level.

The proposed conversion of the Gort na Bro roundabout to a signalised junction within the Galway Transport Strategy is seen as making this junction more pedestrian-friendly, aimed at increasing access to the Knocknacarra District Centre for pedestrians.

## **6.6 MODAL SHIFT TO SUSTAINABLE MODES ENVISAGED UNDER GALWAY TRANSPORT STRATEGY**

The Galway Transport Strategy modelled 7 No. scenarios when assessing its effect on both modal shift and percentage reduction in car usage for trip to work:

*Scenario 1:* improvements in walking and cycling facilities along existing links plus delivery of enhanced public transport network

*Scenario 2:* as scenario 1 plus provision of additional walking and cycling links and increased priority for buses

*Scenario 3:* as scenario 2 plus enhanced orbital and cross-city bus services

*Scenario 4:* as scenario 2, but with the provision of an LRT route through city centre

This, 1 to 4 were based on enhanced sustainable modes

Scenario 4 was predicted to produce a modal shift to sustainable modes of 15.9%, with scenarios 2 and 3 producing a shift of 12.9% and 12.4% respectively. Scenarios 2, 3 and 4 also resulted in decreases in city centre traffic of between 12.4 and 14.5%.

Scenarios 5, 6 and 7 were then introduced, combining the emerging preferred public transport / soft mode solution (involving radial bus route enhancements as detailed earlier in this section) plus variations of the proposed N6 link:

*Scenario 5:* emerging preferred public transport solution plus proposed N6 link up to N84

*Scenario 6:* emerging preferred public transport solution plus proposed N6 link up to N59

*Scenario 7:* emerging preferred public transport solution plus proposed N6 link up to R336 Bearnna Road (preferred solution)

Scenario 7 was predicted to result in a decrease in city centre traffic of 18.3% and a shift to sustainable modes of 9.9%.

On the assumption that, by the design year of the proposed development, ten years after opening, the Galway Transport Strategy will be substantially implemented, with consequent modal shifts to sustainable modes resulting, it is the aim of this report to detail measures to be undertaken by the mobility co-ordinator which will ensure that these shifts take place for travellers to and from the candidate site, in particular for those employed at the proposed development.

## **6.7 ACHIEVING FUTURE TARGET MODAL SPLITS FOR WORKERS AT THE CANDIDATE SITE**

### **6.7.1 Introduction**

A number of the proposals listed are easy and inexpensive to implement. Other measures require initial co-operation and co-ordination both within and between organisations or require an initial investment where this outlay is greatly outweighed by the subsequent benefits both to commuters and the environment. Staff performance and general morale are both dependent to a great extent on their general state of health and fitness. The profile of their journey to work can be a significantly beneficial factor in this regard.

### **6.7.2 Car-based Travel**

The following measures will help both to generally discourage use of the private car for the journey to work and to maximise the use made of the limited on-site spaces available:

#### *Reducing or eliminating car subsidies*

Many companies provide company cars, car leases and car loads, thus giving the personal company car a perceived status among fellow workers. Office employers should make company cars available only to those for whom the car is essential for work purposes and who may not even be based at the offices and may visit them infrequently.

The provision of car allowances should also be discouraged, with preference given to subsidies encouraging the use of public transport modes.

#### *More Efficient Car Usage*

Car sharing schemes can result in this value being pushed up from 1.2 nearer to 2. The personnel department at the proposed office / retail / gym / creche developments could operate such a scheme, with the benefits accruing from it explicitly listed. A regularly updated car-sharing database listing those wishing to use the pool and the locations from which they commute should be instituted, with priority car parking assigned to these vehicles.

#### *Management of Car Park Spaces*

The spaces should be fairly distributed by department, rank and need in order to avoid staff speculatively bringing their car to work. Staff might be guaranteed a space 1 or 2 times a week only in order to encourage them to use public transport links on the other commuting days.

### **6.7.3 Rail and Bus Based Travel**

#### *Public Transport Information*

It is vital that timetable information is available to the workforce at the development in order to encourage maximum usage of the public transport system. Bus, timetables should be posted on the office notice boards and / or the company web site.

### **6.7.4 Cycling**

The implementation of the Galway Transport Strategy will make cycling a likely favoured transport option for a significant proportion of the workforce.

#### *Good quality bike storage facilities*

In line with current planning policy, secure, covered and well-lit storage facilities will be provided within the proposed development. These facilities are provided within the submitted plans which indicate that 116 storage spaces will be provided on site.

#### *Good Quality Changing facilities for cyclists*

The availability of properly heated and maintained washing facilities is central to the viability of cycling as a mode of travel to work. The developer has undertaken to provide such facilities.

#### *Promoting the health benefits of cycling*

The employer at the proposed development should promote the health and fitness benefits of cycling and its general viability as a method of getting to work cheaply and quickly. In addition, plans of the available on-site facilities for cyclists should be posted on notice boards throughout the office.

### **6.7.5 Walking**

As with cycling, the employer at the proposed development should promote the health and fitness benefits of cycling and its general viability as a method of getting to work.

## **6.8 ROLE OF THE MOBILITY CO-ORDINATOR FOR THE OFFICE DEVELOPMENT**

### **6.8.1 Mobility Plan Administration**

The application is founded on reducing use of the private car by all visitors and workers at the proposed development where appropriate.

It is the applicant's intention that a Mobility Management Plan Co-ordinator be appointed to administer, implement, monitor

and review mobility management issues within the proposed development. The co-ordinator will also liaise with the local authority, public transport companies and facility managers on issues relevant to the maximisation by commuters of non-car based journeys to work.

## **6.8.2 Duties of the Mobility Co-Ordinator**

### *General*

There are a range of measures that will be undertaken by facility managers in order to aid in the reduction of car-based journeys to work.

The co-ordinator will have a vital role in encouraging and enabling companies on the candidate site to adopt these recommendations. These recommendations are detailed under the following headings:

- Promoting the environmental and health benefits of their travel choices
- Cycling
- Walking
- Work practices
- Bus based travel

### *Environmental and health benefits of travel choices*

It will be the duty of the co-ordinator to make occupants / workers / customers aware of the environmental and health consequences of their travel choices. Various media should be employed in order to communicate this message. These could include a newsletter and a mobility website, providing information on issues such as available public transport services, where to buy a bike and a list of worker colleagues who might potentially car-share.

### *Cycling*

As well as delivering cycle friendly facilities within the candidate site through facilitating the provision of cycle parking, showers and changing rooms for workers, the co-ordinator can further promote the use of this mode of travel using other measures such as the setting-up of a cycle users group so that experienced cyclists within the workforce can help encourage newcomers to the mode of travel. The co-ordinator can also help by keeping tool kits and spare parts on site for cyclists to avail of. The web site and newsletter could also be an aid to encouraging the mode of travel by encouraging the health benefits and potential time savings involved. Also, the co-ordinator can keep in contact with the local authority to monitor the progress in implementation of the proposed cycle track network in the locality.

It would also be possible for the employers at the proposed office development to agree a group bicycle insurance



scheme for staff at preferential rates in order to maximise its use as a mode of travel to work.

Also, the employers at the proposed development should subsidise the cycling mode by purchasing an initial stock of bicycles to loan to employees. Such a scheme would not be expensive and would have the added benefit of raising awareness of it as a mode of travel and generally encouraging cycle use.

#### *Walking*

As with cycling, the co-ordinator should promote the health and fitness benefits of walking and its general viability as a method of getting to work. The co-ordinator can also liaise with the local authority on work being done in the vicinity of the candidate site to make the local road network more pedestrian friendly.

#### *Work Practices*

Certain initiatives could be implemented by the employers at the proposed development to encourage staff, where possible and where appropriate, to choose more sustainable modes of transport such as the introduction of flexi-time working, allowing cyclists and walkers to make their journey during hours of daylight.

#### *Rail and bus based travel*

The co-ordinator will promote a public transport culture among staff and visitors to the candidate site. The co-ordinator can use the newsletter and website to provide information on public transport, in particular timetable information, fares, bus stop locations, route planning and the provision of annual and monthly public transport tickets for employees, carrying tax benefits for both employers and employees.

## **7 OVERALL CONCLUSIONS**

The traffic assessment within this report demonstrates that the critical transport link for the proposal, the Gort na Bro Roundabout, at present operates efficiently, and will continue to do so on the proposed day of opening in 2019 with the development in place and fully operational.

By the design year, ten years after the day of opening of the proposed development, assuming the implementation of both the road and public transport / soft mode improvements detailed within the Galway Transport Strategy, network flows in the vicinity of the candidate site are predicted to reduce substantially, as more commuters use modes of transport other than the private car and substantial vehicular traffic is diverted to the proposed N6 bypass.

The day of opening in 2019 is thus seen as the critical operational time frame, before implementation of any of the above improvements. The analysis within this report has demonstrated that all arms on the roundabout will operate within capacity on both morning and evening peaks with the road network in its present configuration and the proposed development fully operational.

The report also demonstrates that the implementation of the Galway Transport Strategy will ensure that the modal split for cycling and public transport usage will substantially increase by the development's Design Year, ten years after opening. A mobility management co-ordinator at the proposed development will help ensure that the predicted increase in sustainable modes and accompanying decrease in private car usage predicted to result in the Galway city area from the implementation of the Strategy will be mirrored at the candidate site.



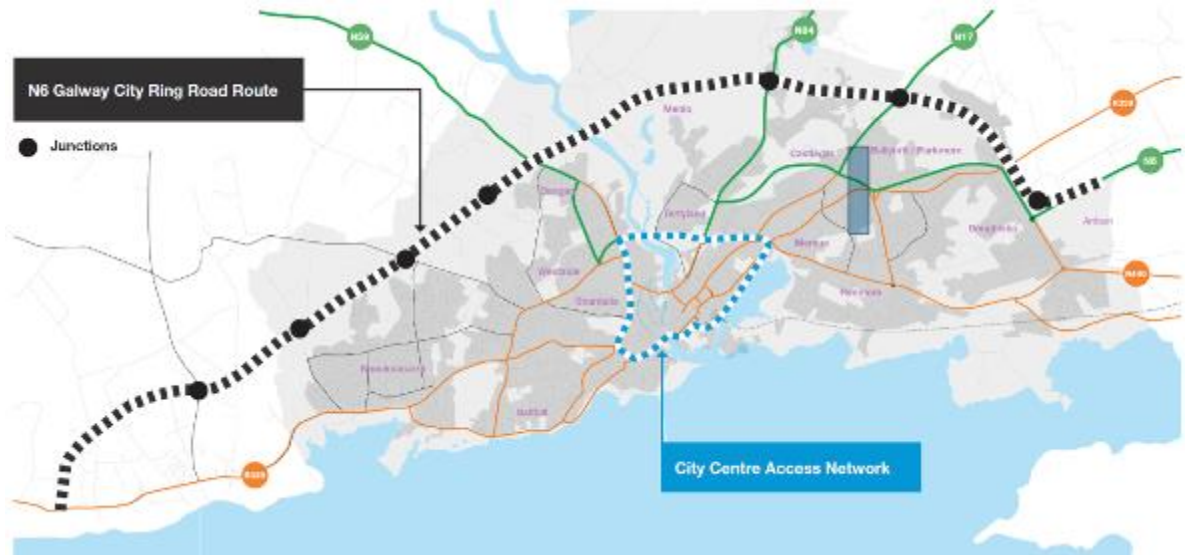


Figure 2: Proposed N6 re-alignment





Figure 3: Proposed bus routes

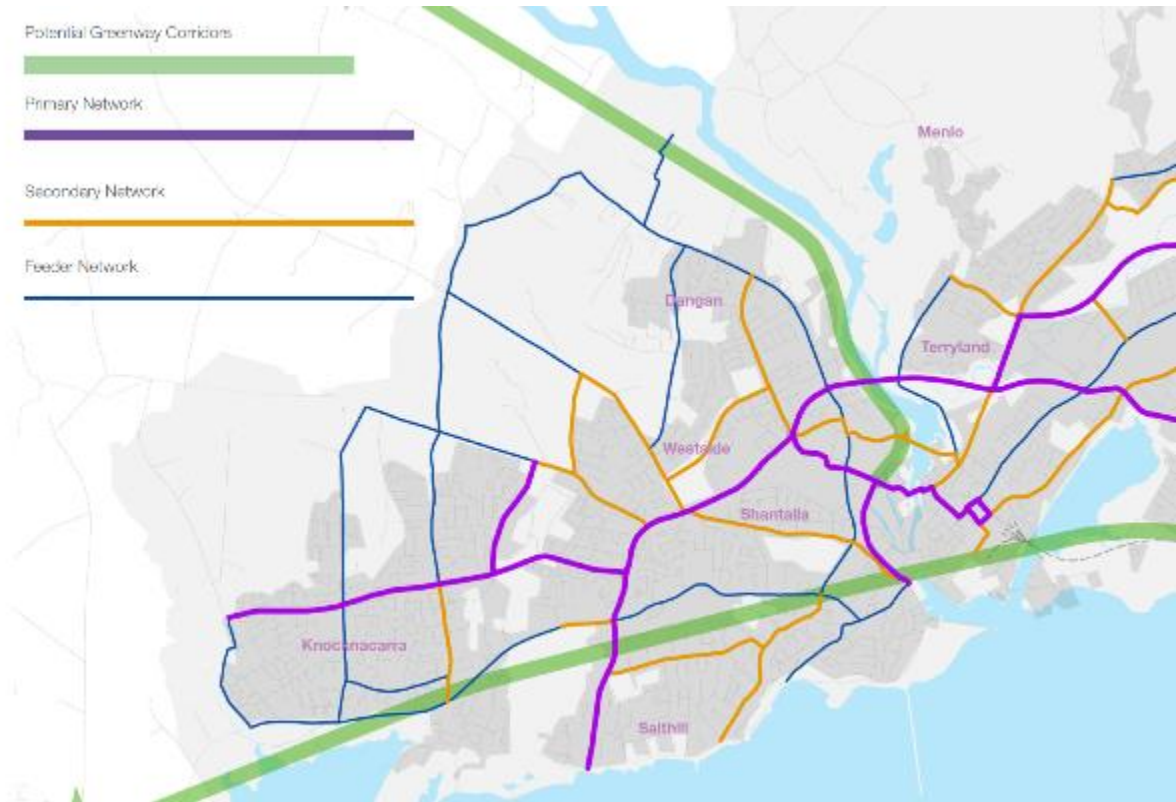


Figure 4: Proposed cycle network



Figure 5: Location of proposed development relative to Gort na Bro roundabout.



Figure 6: Location of Gort na Bro roundabout relative to main origin and destination of traffic in the Galway City Area



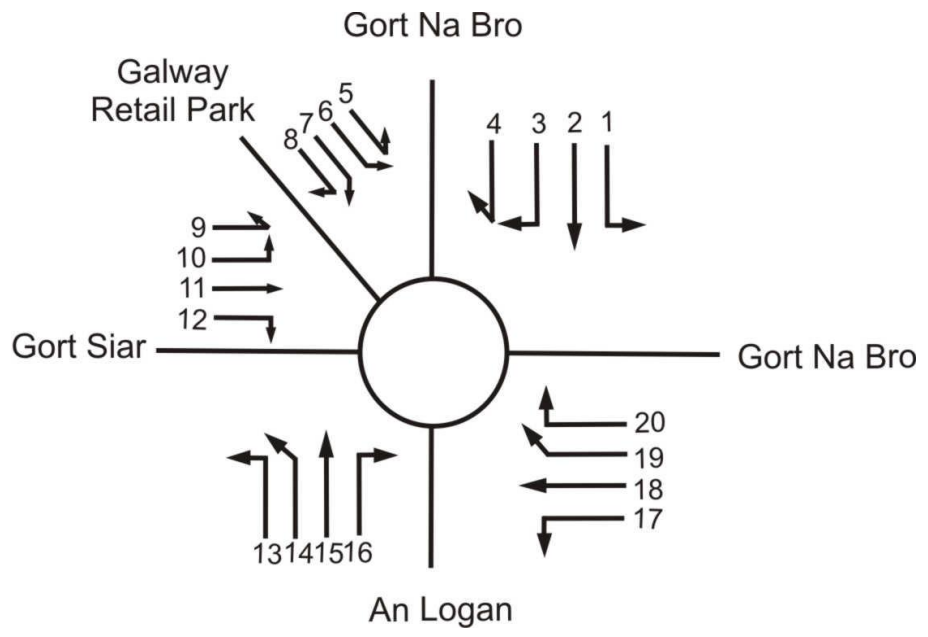


Figure 7: 19 No. flows measured within 23<sup>rd</sup> May traffic survey

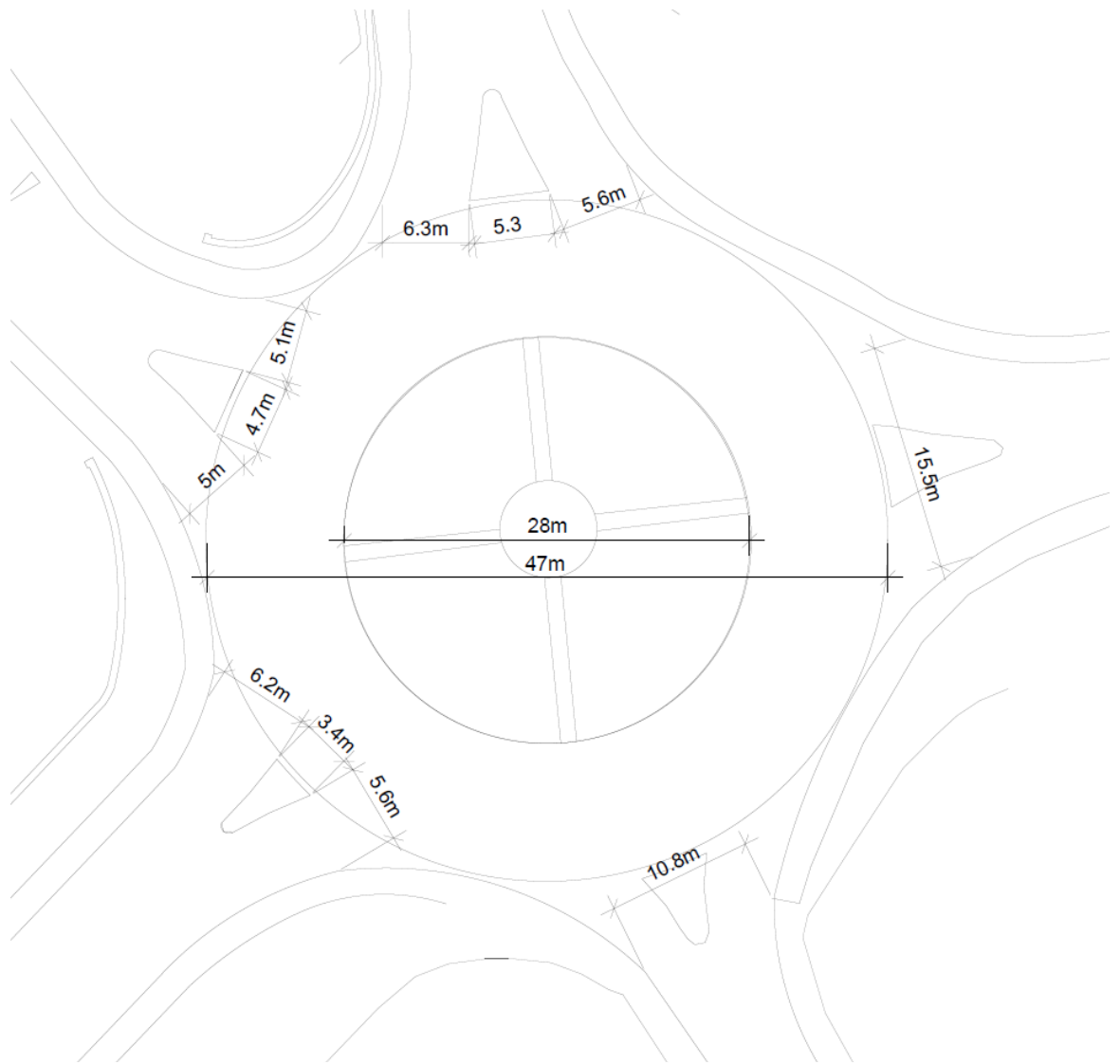


Figure 8: Survey information from Gort na Bro roundabout



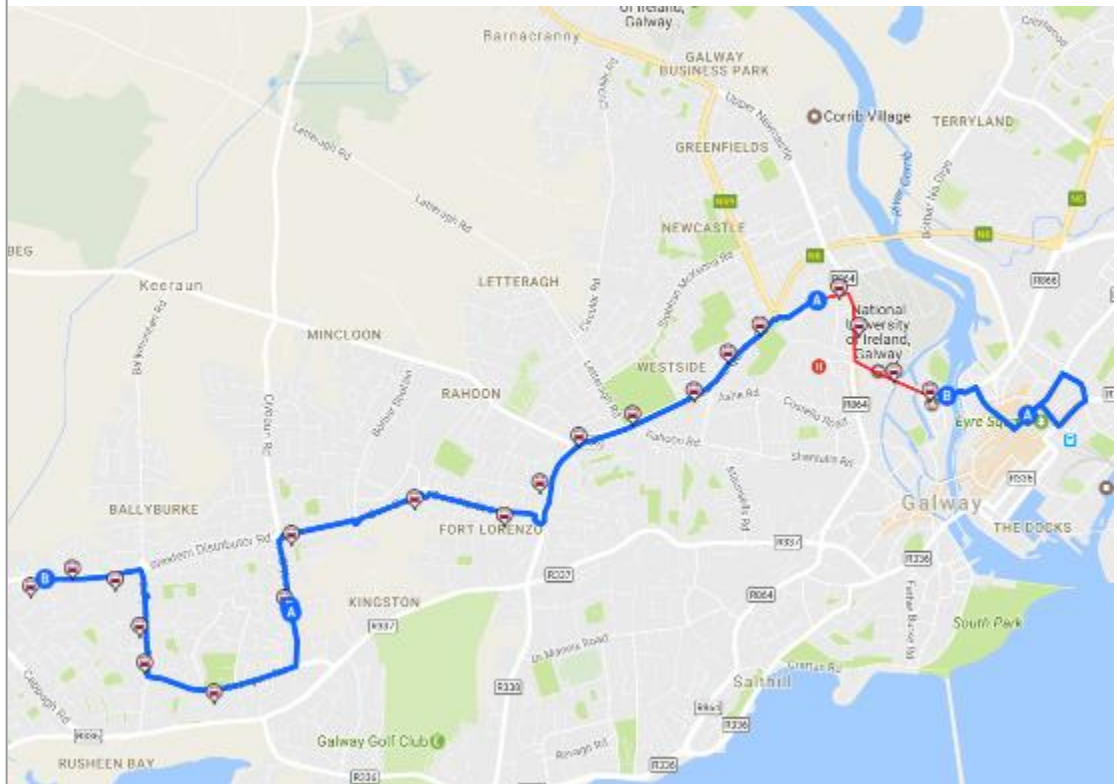


Figure 10: Existing Route 412 along Western Distributor Road

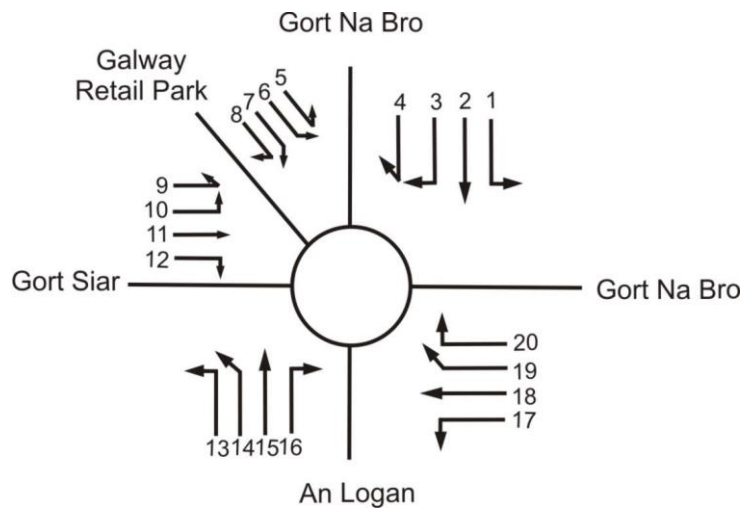




APPENDIX 1: Traffic Survey, Tuesday 25<sup>th</sup> May, 2017

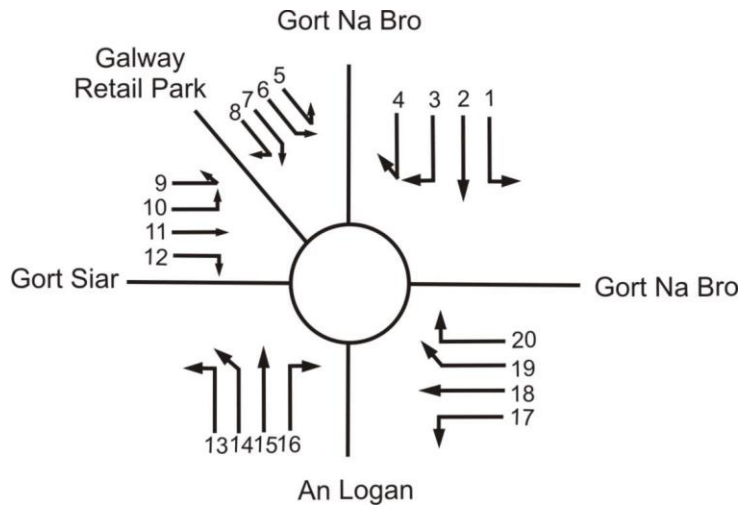
TIME	MOVEMENT 1						MOVEMENT 2						MOVEMENT 3						MOVEMENT 4								
	CAR	LGV	OGV1	OGV2	BUS	TOT	PCU	CAR	LGV	OGV1	OGV2	BUS	TOT	PCU	CAR	LGV	OGV1	OGV2	BUS	TOT	PCU	CAR	LGV	OGV1	OGV2	BUS	TOT
07:00	5	1	0	0	0	6	6	0	0	0	0	0	0	0	3	1	0	0	0	4	4	0	0	0	0	0	0
07:15	6	0	0	0	0	6	6	1	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0
07:30	5	2	0	0	0	7	7	0	0	0	0	0	0	0	3	0	0	0	0	3	3	0	0	0	0	0	0
07:45	14	0	0	0	0	14	14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>H/TOT</b>	<b>30</b>	<b>3</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>33</b>	<b>33</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>1</b>	<b>6</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>7</b>	<b>7</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
08:00	26	1	1	0	0	28	29	0	0	0	0	0	0	0	2	0	1	0	0	3	4	0	0	0	0	0	0
08:15	30	0	0	0	0	30	30	0	0	0	0	0	0	0	2	0	0	0	0	2	2	0	0	0	0	0	0
08:30	14	1	0	0	0	15	15	1	0	0	0	0	1	1	9	1	0	0	0	10	10	0	0	0	0	0	0
08:45	18	1	0	0	0	19	19	1	0	0	0	0	1	1	9	0	0	0	0	9	9	2	0	0	0	0	2
<b>H/TOT</b>	<b>88</b>	<b>3</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>92</b>	<b>93</b>	<b>2</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>2</b>	<b>22</b>	<b>1</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>24</b>	<b>25</b>	<b>2</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>2</b>
09:00	3	0	0	0	0	3	3	0	0	0	0	0	0	0	7	1	0	0	0	8	8	4	0	0	0	0	4
09:15	3	2	0	0	0	5	5	0	0	0	0	0	0	0	2	2	0	0	0	4	4	3	0	0	0	0	3
09:30	4	0	0	0	0	4	4	0	0	0	0	0	0	0	4	0	0	0	0	4	4	0	0	0	0	0	0
09:45	4	1	0	0	0	5	5	0	0	0	0	0	0	0	2	1	0	0	0	3	3	3	0	0	0	0	3
<b>H/TOT</b>	<b>14</b>	<b>3</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>17</b>	<b>17</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>15</b>	<b>4</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>19</b>	<b>19</b>	<b>10</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>10</b>
10:00	1	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	2
10:15	3	0	0	0	0	3	3	0	0	0	0	0	0	0	2	3	0	0	0	5	5	1	0	0	0	0	1
10:30	5	0	0	0	0	5	5	0	0	1	0	0	1	2	0	0	0	0	0	0	0	1	0	0	0	0	1
10:45	2	0	0	0	0	2	2	0	0	0	0	0	0	0	1	1	0	0	0	2	2	0	0	0	0	0	0
<b>H/TOT</b>	<b>11</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>11</b>	<b>11</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>7</b>	<b>7</b>	<b>4</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>4</b>
11:00	5	0	0	0	0	5	5	0	0	0	0	0	0	0	2	0	0	0	0	2	2	2	0	0	0	0	2
11:15	3	1	0	0	0	4	4	0	0	0	0	0	0	0	4	0	0	0	0	4	4	0	0	0	0	0	0
11:30	6	0	0	0	1	7	8	0	0	0	0	0	0	0	5	0	0	0	0	5	5	2	0	0	0	0	2
11:45	7	1	0	0	0	8	8	0	0	0	0	0	0	0	5	0	0	0	0	5	5	3	1	0	0	0	4
<b>H/TOT</b>	<b>21</b>	<b>2</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>24</b>	<b>25</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>16</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>16</b>	<b>16</b>	<b>7</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>8</b>
12:00	5	0	0	0	0	5	5	0	0	0	0	0	0	0	3	0	0	0	0	3	3	4	0	0	0	0	4
12:15	3	2	0	0	0	5	5	0	0	0	0	0	0	0	6	0	0	0	0	6	6	4	0	0	0	0	4
12:30	5	0	0	0	0	5	5	1	0	0	0	0	1	1	4	1	0	0	0	5	5	0	2	0	0	0	2
12:45	4	0	0	0	0	4	4	0	0	0	0	0	0	0	7	0	0	0	0	7	7	1	0	0	0	0	1
<b>H/TOT</b>	<b>17</b>	<b>2</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>19</b>	<b>19</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>1</b>	<b>20</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>21</b>	<b>21</b>	<b>9</b>	<b>2</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>11</b>

Movements 1, 2, 3, 4, 7AM to 1PM time frame



TIME	MOVEMENT 5							MOVEMENT 6							MOVEMENT 7							MOVEMENT 8						
	CAR	LGV	OGV1	OGV2	BUS	TOT	PCU	CAR	LGV	OGV1	OGV2	BUS	TOT	PCU	CAR	LGV	OGV1	OGV2	BUS	TOT	PCU	CAR	LGV	OGV1	OGV2	BUS	TOT	PCU
07:00	0	0	0	0	0	0	0	1	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0		
07:15	0	0	0	0	0	0	0	0	1	2	0	1	4	6	0	0	0	0	0	0	0	0	0	0	0	0		
07:30	0	0	0	0	0	0	0	0	0	1	0	1	2	4	0	0	0	0	0	0	0	0	0	0	0	0		
07:45	0	0	0	0	0	0	0	5	0	0	1	1	7	9	0	0	0	0	0	0	0	0	2	0	0	2		
<b>H/TOT</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>6</b>	<b>1</b>	<b>3</b>	<b>1</b>	<b>3</b>	<b>14</b>	<b>20</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>0</b>	<b>0</b>	<b>2</b>			
08:00	0	0	0	0	0	0	0	7	0	0	0	0	7	7	0	0	0	0	0	0	0	0	0	0	0	0		
08:15	0	0	0	0	0	0	0	8	0	0	0	1	9	10	0	0	0	0	0	0	0	1	0	0	1	1		
08:30	0	0	0	0	0	0	0	7	1	0	0	1	9	10	0	0	0	0	0	0	0	2	0	0	2	2		
08:45	2	1	0	0	0	3	3	6	2	1	0	1	10	12	0	0	0	0	0	0	0	4	1	0	5	5		
<b>H/TOT</b>	<b>2</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>3</b>	<b>3</b>	<b>28</b>	<b>3</b>	<b>1</b>	<b>0</b>	<b>3</b>	<b>35</b>	<b>39</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>7</b>	<b>1</b>	<b>0</b>	<b>8</b>	<b>8</b>			
09:00	1	0	0	0	0	1	1	10	3	0	0	0	13	13	0	0	0	0	0	0	0	3	0	0	3	3		
09:15	1	0	0	0	0	1	1	11	1	0	2	1	15	19	0	0	0	0	0	0	0	3	0	0	3	3		
09:30	1	0	0	0	0	1	1	15	1	0	0	1	17	18	0	0	0	0	0	0	0	3	0	0	3	3		
09:45	2	0	0	0	0	2	2	7	5	0	1	1	14	16	0	0	0	0	0	0	0	2	0	0	2	2		
<b>H/TOT</b>	<b>5</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>5</b>	<b>5</b>	<b>43</b>	<b>10</b>	<b>0</b>	<b>3</b>	<b>3</b>	<b>59</b>	<b>66</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>11</b>	<b>0</b>	<b>0</b>	<b>11</b>	<b>11</b>			
10:00	1	1	0	0	0	2	2	20	0	3	0	0	23	25	0	0	0	0	0	0	0	2	1	0	3	3		
10:15	4	1	0	0	0	5	5	18	3	0	1	2	24	27	1	0	0	0	0	1	1	1	0	0	1	1		
10:30	3	0	0	0	0	3	3	11	1	0	1	1	14	16	1	1	0	0	0	2	2	5	0	0	5	5		
10:45	1	0	0	0	0	1	1	24	2	1	0	0	27	28	0	0	0	0	0	0	0	3	1	0	4	4		
<b>H/TOT</b>	<b>9</b>	<b>2</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>11</b>	<b>11</b>	<b>73</b>	<b>6</b>	<b>4</b>	<b>2</b>	<b>3</b>	<b>88</b>	<b>96</b>	<b>2</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>3</b>	<b>3</b>	<b>11</b>	<b>2</b>	<b>0</b>	<b>13</b>	<b>13</b>		
11:00	1	1	0	0	0	2	2	16	1	0	0	1	18	19	0	0	0	0	0	0	0	8	1	0	9	9		
11:15	0	0	0	0	0	0	0	21	4	0	0	1	26	27	1	0	0	0	0	1	1	5	0	0	5	5		
11:30	1	0	0	0	0	1	1	24	2	1	0	1	28	30	0	0	0	0	0	0	0	9	0	0	9	9		
11:45	1	0	0	0	0	1	1	24	1	0	0	0	25	25	1	0	0	0	0	1	1	8	0	0	8	8		
<b>H/TOT</b>	<b>3</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>4</b>	<b>4</b>	<b>85</b>	<b>8</b>	<b>1</b>	<b>0</b>	<b>3</b>	<b>97</b>	<b>101</b>	<b>2</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>2</b>	<b>30</b>	<b>1</b>	<b>0</b>	<b>31</b>	<b>31</b>			
12:00	2	0	0	0	0	2	2	33	0	0	0	1	34	35	0	0	0	0	0	0	0	11	1	0	12	12		
12:15	5	1	0	0	0	6	6	25	1	0	0	1	27	28	0	0	0	0	0	0	0	8	2	0	10	10		
12:30	1	1	0	0	0	2	2	33	3	0	0	1	37	38	1	0	0	0	0	1	1	13	0	0	13	13		
12:45	0	0	0	0	0	0	0	25	1	0	0	0	26	26	0	0	0	0	0	0	0	6	1	0	7	7		
<b>H/TOT</b>	<b>8</b>	<b>2</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>10</b>	<b>10</b>	<b>116</b>	<b>5</b>	<b>0</b>	<b>0</b>	<b>3</b>	<b>124</b>	<b>127</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>1</b>	<b>38</b>	<b>4</b>	<b>0</b>	<b>42</b>	<b>42</b>			

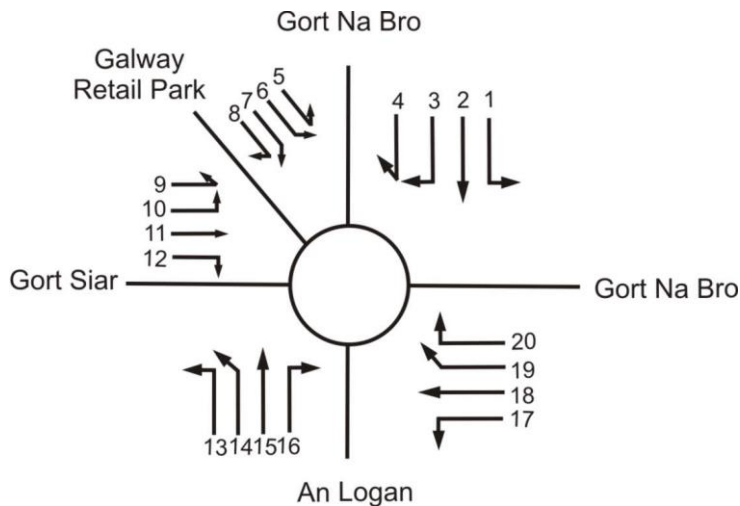
Movements 5, 6, 7, 8, 7AM to 1PM time frame





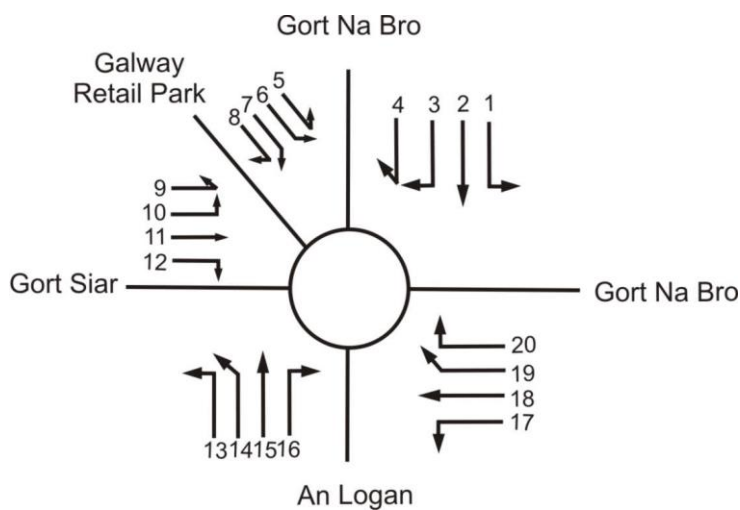
TIME	MOVEMENT 9							MOVEMENT 10							MOVEMENT 11							MOVEMENT 12						
	CAR	LGV	OGV1	OGV2	BUS	TOT	PCU	CAR	LGV	OGV1	OGV2	BUS	TOT	PCU	CAR	LGV	OGV1	OGV2	BUS	TOT	PCU	CAR	LGV	OGV1	OGV2	BUS	TOT	PCU
07:00	0	0	0	0	0	0	0	4	2	0	0	0	6	6	67	4	0	0	1	72	73	0	0	0	0	0	0	0
07:15	0	0	0	0	0	0	0	9	0	0	0	1	10	11	111	13	2	0	0	126	127	0	0	0	0	0	0	0
07:30	0	0	0	0	0	0	0	5	2	0	0	0	7	7	101	9	0	0	0	110	110	0	0	0	0	0	0	0
07:45	3	0	0	0	0	3	3	5	5	1	0	0	11	12	113	7	0	0	0	120	120	0	0	0	0	0	0	0
<b>H/TOT</b>	<b>3</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>3</b>	<b>3</b>	<b>23</b>	<b>9</b>	<b>1</b>	<b>0</b>	<b>1</b>	<b>34</b>	<b>36</b>	<b>392</b>	<b>33</b>	<b>2</b>	<b>0</b>	<b>1</b>	<b>428</b>	<b>430</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
08:00	4	0	0	0	0	4	4	5	3	0	0	0	8	8	164	6	0	0	3	173	176	0	0	0	0	0	0	0
08:15	2	0	0	0	0	2	2	10	0	0	0	0	10	10	106	10	1	0	2	119	122	0	0	0	0	0	0	0
08:30	4	0	0	1	0	5	6	8	0	1	0	0	9	10	90	8	2	0	3	103	107	2	0	0	0	0	2	2
08:45	7	0	0	0	0	7	7	12	1	0	0	0	13	13	90	5	0	0	0	95	95	2	0	0	0	0	2	2
<b>H/TOT</b>	<b>17</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>18</b>	<b>19</b>	<b>35</b>	<b>4</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>40</b>	<b>41</b>	<b>450</b>	<b>29</b>	<b>3</b>	<b>0</b>	<b>8</b>	<b>490</b>	<b>500</b>	<b>4</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>4</b>	<b>4</b>
09:00	4	0	0	0	0	4	4	13	1	0	0	0	14	14	99	6	0	0	7	112	119	2	0	0	0	0	2	2
09:15	5	0	0	0	0	5	5	6	0	0	0	0	6	6	92	12	1	0	0	105	106	1	0	0	0	0	1	1
09:30	7	1	0	0	0	8	8	3	0	0	0	0	3	3	61	5	0	0	1	67	68	1	0	0	0	0	1	1
09:45	3	1	0	0	0	4	4	9	0	0	0	0	9	9	72	8	1	0	1	82	84	0	0	0	0	0	0	0
<b>H/TOT</b>	<b>19</b>	<b>2</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>21</b>	<b>21</b>	<b>31</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>32</b>	<b>32</b>	<b>324</b>	<b>31</b>	<b>2</b>	<b>0</b>	<b>9</b>	<b>366</b>	<b>376</b>	<b>4</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>4</b>	<b>4</b>
10:00	6	1	0	0	0	7	7	6	1	0	0	1	8	9	66	10	0	0	2	78	80	1	1	0	0	0	2	2
10:15	3	0	0	0	0	3	3	5	3	0	0	0	8	8	72	4	1	1	0	78	80	0	0	0	0	0	0	0
10:30	10	1	0	0	0	11	11	5	3	0	0	0	8	8	51	3	2	0	2	58	61	0	0	0	0	0	0	0
10:45	7	1	0	0	0	8	8	7	0	0	0	0	7	7	56	6	0	0	0	62	62	0	0	0	0	0	0	0
<b>H/TOT</b>	<b>26</b>	<b>3</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>29</b>	<b>29</b>	<b>23</b>	<b>7</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>31</b>	<b>32</b>	<b>245</b>	<b>23</b>	<b>3</b>	<b>1</b>	<b>4</b>	<b>276</b>	<b>283</b>	<b>1</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>2</b>
11:00	9	1	0	0	0	10	10	7	2	0	0	0	9	9	58	9	1	1	2	71	75	0	0	0	0	0	0	0
11:15	3	0	0	0	0	3	3	7	0	0	0	0	7	7	60	5	0	0	0	65	65	1	0	0	0	0	1	1
11:30	6	0	0	0	0	6	6	7	0	1	0	0	8	9	66	8	2	1	1	78	81	0	0	0	0	0	0	0
11:45	10	0	0	0	0	10	10	7	0	0	0	1	8	9	50	5	1	1	1	58	61	0	0	0	0	0	0	0
<b>H/TOT</b>	<b>28</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>29</b>	<b>29</b>	<b>28</b>	<b>2</b>	<b>1</b>	<b>0</b>	<b>1</b>	<b>32</b>	<b>34</b>	<b>234</b>	<b>27</b>	<b>4</b>	<b>3</b>	<b>4</b>	<b>272</b>	<b>282</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>1</b>
12:00	14	0	0	0	0	14	14	6	0	0	0	0	6	6	66	5	0	0	1	72	73	2	0	0	0	0	2	2
12:15	5	1	0	0	0	6	6	2	0	1	0	0	3	4	54	2	0	0	0	56	56	1	0	0	0	0	1	1
12:30	8	1	0	0	0	9	9	9	0	0	0	0	9	9	62	11	0	0	1	74	75	0	0	0	0	0	0	0
12:45	6	0	0	0	0	6	6	12	0	1	0	0	13	14	63	3	0	0	0	66	66	0	0	0	0	0	0	0
<b>H/TOT</b>	<b>33</b>	<b>2</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>35</b>	<b>35</b>	<b>29</b>	<b>0</b>	<b>2</b>	<b>0</b>	<b>0</b>	<b>31</b>	<b>32</b>	<b>245</b>	<b>21</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>268</b>	<b>270</b>	<b>3</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>3</b>	<b>3</b>

Movements 9, 10, 11, 12, 7AM to 1PM time frame



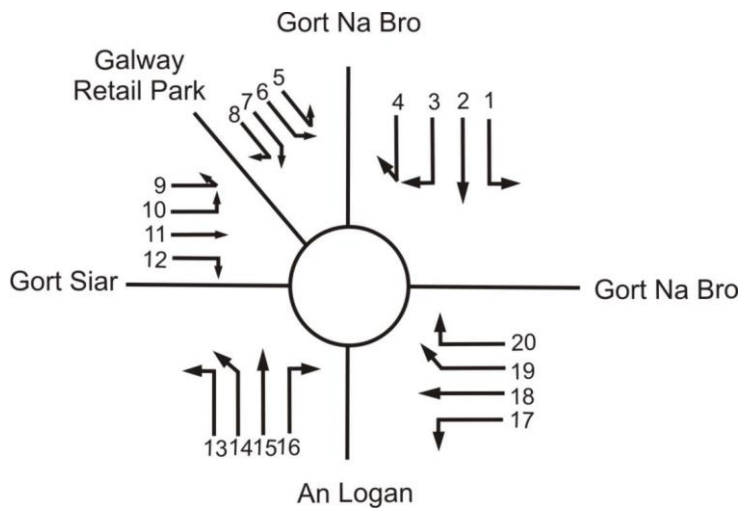
TIME	MOVEMENT 13						MOVEMENT 14						MOVEMENT 15						MOVEMENT 16									
	CAR	LGV	OGV1	OGV2	BUS	TOT	PCU	CAR	LGV	OGV1	OGV2	BUS	TOT	PCU	CAR	LGV	OGV1	OGV2	BUS	TOT	PCU	CAR	LGV	OGV1	OGV2	BUS	TOT	PCU
07:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	3	3
07:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	2	2
07:30	2	0	0	0	0	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	3	3
07:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	4	4
<b>H/TOT</b>	<b>2</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>2</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>12</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>12</b>	<b>12</b>
08:00	2	2	0	0	0	4	4	0	0	0	0	0	0	0	1	0	1	0	0	2	3	6	1	0	0	0	7	7
08:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	1	0	0	0	7	7
08:30	5	0	0	0	0	5	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	3	3
08:45	1	0	1	0	0	2	3	4	0	0	0	0	4	4	0	0	0	0	0	0	0	4	0	0	0	0	4	4
<b>H/TOT</b>	<b>8</b>	<b>2</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>11</b>	<b>12</b>	<b>4</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>4</b>	<b>4</b>	<b>1</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>3</b>	<b>19</b>	<b>2</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>21</b>	<b>21</b>	
09:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	2	2
09:15	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	1	2	0	0	0	0	2	2	
09:30	1	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	1
09:45	1	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>H/TOT</b>	<b>2</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>2</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>1</b>	<b>5</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>5</b>	<b>5</b>	
10:00	1	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:15	0	0	0	0	0	0	0	1	0	0	0	1	1	1	0	0	1	0	0	1	2	0	0	0	0	0	0	0
10:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	1	0	0	3	4
10:45	1	0	0	0	0	1	1	2	0	0	0	2	2	2	0	0	0	0	0	0	0	0	1	0	0	0	1	1
<b>H/TOT</b>	<b>2</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>2</b>	<b>3</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>3</b>	<b>3</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>2</b>	<b>2</b>	<b>1</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>4</b>	<b>5</b>	
11:00	1	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	2	2
11:15	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	2	3	0	0	0	0	0	0	0	0
11:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	2	2
11:45	0	1	0	0	0	1	1	1	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>H/TOT</b>	<b>1</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>2</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>3</b>	<b>2</b>	<b>2</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>4</b>	<b>4</b>	
12:00	1	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:15	0	0	0	0	0	0	0	1	1	0	0	2	2	2	0	1	0	0	1	1	0	0	0	0	0	0	0	0
12:30	2	0	0	0	0	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	1
12:45	1	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	1	0	1	2	0	0	0	0	0	0	0	0
<b>H/TOT</b>	<b>4</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>4</b>	<b>4</b>	<b>1</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>2</b>	<b>0</b>	<b>1</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>3</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>1</b>	

Movements 13, 14, 15, 16, 7AM to 1PM time frame



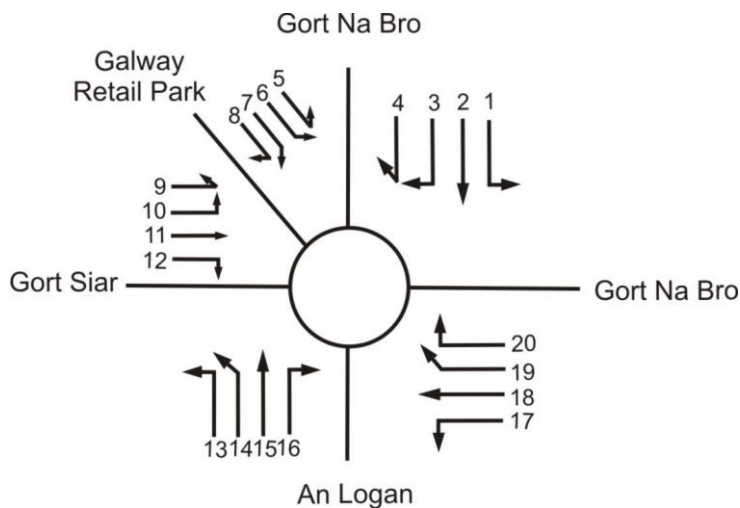
TIME	MOVEMENT 17						PCU	MOVEMENT 18						PCU	MOVEMENT 19						PCU	MOVEMENT 20						PCU
	CAR	LGV	OGV1	OGV2	BUS	TOT		CAR	LGV	OGV1	OGV2	BUS	TOT		CAR	LGV	OGV1	OGV2	BUS	TOT		CAR	LGV	OGV1	OGV2	BUS	TOT	
07:00	0	0	0	0	0	0	0	12	3	0	0	0	15	15	3	0	1	0	1	5	7	1	2	0	0	0	3	3
07:15	1	0	0	0	0	1	1	16	3	1	1	0	21	23	1	1	0	0	1	3	4	4	2	0	0	0	6	6
07:30	0	0	0	0	0	0	0	27	5	2	0	0	34	35	7	0	1	1	1	10	13	4	1	0	0	0	5	5
07:45	1	0	1	0	0	2	3	30	6	2	0	1	39	41	15	3	0	0	0	18	18	6	1	0	0	0	7	7
<b>H/TOT</b>	<b>2</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>3</b>	<b>4</b>	<b>85</b>	<b>17</b>	<b>5</b>	<b>1</b>	<b>1</b>	<b>109</b>	<b>114</b>	<b>26</b>	<b>4</b>	<b>2</b>	<b>1</b>	<b>3</b>	<b>36</b>	<b>41</b>	<b>15</b>	<b>6</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>21</b>	<b>21</b>
08:00	0	1	0	0	0	1	1	43	7	2	0	0	52	53	6	2	0	0	1	9	10	3	3	0	0	0	6	6
08:15	2	0	0	0	0	2	2	57	4	1	0	5	67	73	16	3	1	0	1	21	23	7	0	0	0	0	7	7
08:30	1	0	0	0	0	1	1	69	9	2	1	0	81	83	28	0	0	0	0	28	28	8	0	1	0	0	9	10
08:45	2	0	1	0	0	3	4	58	7	4	0	1	70	73	40	0	2	2	2	46	52	9	0	0	0	0	9	9
<b>H/TOT</b>	<b>5</b>	<b>1</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>7</b>	<b>8</b>	<b>227</b>	<b>27</b>	<b>9</b>	<b>1</b>	<b>6</b>	<b>270</b>	<b>282</b>	<b>90</b>	<b>5</b>	<b>3</b>	<b>2</b>	<b>4</b>	<b>104</b>	<b>112</b>	<b>27</b>	<b>3</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>31</b>	<b>32</b>
09:00	0	0	0	0	0	0	0	46	3	1	0	1	51	53	26	1	0	0	1	28	29	11	0	0	0	0	11	11
09:15	0	0	0	0	0	0	0	35	5	0	0	1	41	42	18	0	0	0	1	19	20	2	0	0	0	0	2	2
09:30	0	0	0	0	0	0	0	47	3	2	0	3	55	59	30	5	2	1	1	39	42	3	0	0	0	0	3	3
09:45	0	0	0	0	0	0	0	30	10	1	0	2	43	46	35	3	0	0	1	39	40	2	0	0	0	0	2	2
<b>H/TOT</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>158</b>	<b>21</b>	<b>4</b>	<b>0</b>	<b>7</b>	<b>190</b>	<b>199</b>	<b>109</b>	<b>9</b>	<b>2</b>	<b>1</b>	<b>4</b>	<b>125</b>	<b>131</b>	<b>18</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>18</b>	<b>18</b>
10:00	1	0	0	0	0	1	1	28	6	0	1	0	35	36	17	2	0	0	0	19	19	2	0	0	0	0	2	2
10:15	0	0	1	0	0	1	2	37	5	1	1	1	45	48	16	4	0	0	2	22	24	1	0	0	0	0	1	1
10:30	1	0	0	0	0	1	1	19	6	0	0	1	26	27	36	2	1	0	1	40	42	4	0	0	0	0	4	4
10:45	3	0	0	0	0	3	3	46	8	1	0	1	56	58	35	6	0	1	1	43	45	0	1	0	0	0	1	1
<b>H/TOT</b>	<b>5</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>6</b>	<b>7</b>	<b>130</b>	<b>25</b>	<b>2</b>	<b>2</b>	<b>3</b>	<b>162</b>	<b>169</b>	<b>104</b>	<b>14</b>	<b>1</b>	<b>1</b>	<b>4</b>	<b>124</b>	<b>130</b>	<b>7</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>8</b>	<b>8</b>
11:00	1	0	1	0	0	2	3	47	5	3	0	0	55	57	26	0	0	0	1	27	28	5	0	0	0	0	5	5
11:15	3	0	0	0	0	3	3	43	5	1	0	2	51	54	25	2	1	0	0	28	29	1	1	1	0	0	3	4
11:30	0	1	0	0	0	1	1	51	5	1	0	1	58	60	32	2	0	0	1	35	36	0	1	1	0	0	2	3
11:45	1	0	0	0	0	1	1	70	7	1	0	0	78	79	34	6	0	0	1	41	42	3	0	0	0	0	3	3
<b>H/TOT</b>	<b>5</b>	<b>1</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>7</b>	<b>8</b>	<b>211</b>	<b>22</b>	<b>6</b>	<b>0</b>	<b>3</b>	<b>242</b>	<b>248</b>	<b>117</b>	<b>10</b>	<b>1</b>	<b>0</b>	<b>3</b>	<b>131</b>	<b>135</b>	<b>9</b>	<b>2</b>	<b>2</b>	<b>0</b>	<b>0</b>	<b>13</b>	<b>14</b>
12:00	0	0	0	0	0	0	0	53	10	2	0	0	65	66	29	1	0	0	1	31	32	5	0	0	0	0	5	5
12:15	0	2	0	0	0	2	2	44	9	0	0	2	55	57	38	3	0	0	0	41	41	2	0	0	0	0	2	2
12:30	2	0	0	0	0	2	2	53	6	1	0	1	61	63	38	1	0	0	1	40	41	2	0	0	0	0	2	2
12:45	1	0	1	0	0	2	3	60	5	0	0	1	66	67	40	3	1	0	0	44	45	7	0	0	0	0	7	7
<b>H/TOT</b>	<b>3</b>	<b>2</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>6</b>	<b>7</b>	<b>210</b>	<b>30</b>	<b>3</b>	<b>0</b>	<b>4</b>	<b>247</b>	<b>253</b>	<b>145</b>	<b>8</b>	<b>1</b>	<b>0</b>	<b>2</b>	<b>156</b>	<b>159</b>	<b>16</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>16</b>	<b>16</b>

Movements 17, 18, 19, 20, 7AM to 1PM time frame



TIME	MOVEMENT 1						MOVEMENT 2						MOVEMENT 3						MOVEMENT 4									
	CAR	LGV	OGV1	OGV2	BUS	TOT	PCU	CAR	LGV	OGV1	OGV2	BUS	TOT	PCU	CAR	LGV	OGV1	OGV2	BUS	TOT	PCU	CAR	LGV	OGV1	OGV2	BUS	TOT	PCU
13:00	8	0	1	0	0	9	10	0	0	0	0	0	0	0	5	1	0	0	0	6	6	1	0	0	0	1	1	
13:15	9	0	0	0	0	9	9	0	0	0	0	0	0	0	3	0	0	0	0	3	3	8	0	0	0	0	8	8
13:30	6	0	0	0	0	6	6	0	0	0	0	0	0	0	3	0	0	0	0	3	3	2	1	0	0	0	3	3
13:45	6	0	0	0	0	6	6	0	0	0	0	0	0	0	4	0	0	0	0	4	4	1	0	0	0	0	1	1
<b>H/TOT</b>	<b>29</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>30</b>	<b>31</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>15</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>16</b>	<b>16</b>	<b>12</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>13</b>	<b>13</b>
14:00	9	0	0	0	0	9	9	0	1	0	0	0	1	1	3	0	1	0	0	4	5	2	0	0	0	0	2	2
14:15	10	1	1	0	0	12	13	1	0	0	0	0	1	1	7	1	0	0	0	8	8	1	0	1	0	0	2	3
14:30	12	2	0	0	0	14	14	1	0	0	0	0	1	1	6	0	0	0	0	6	6	2	0	0	0	0	2	2
14:45	0	1	0	0	0	1	1	0	0	0	0	0	0	0	5	0	0	0	0	5	5	3	1	0	0	0	4	4
<b>H/TOT</b>	<b>31</b>	<b>4</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>36</b>	<b>37</b>	<b>2</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>3</b>	<b>3</b>	<b>21</b>	<b>1</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>23</b>	<b>24</b>	<b>8</b>	<b>1</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>10</b>	<b>11</b>
15:00	6	0	0	0	1	7	8	0	0	0	0	0	0	0	5	0	0	0	0	5	5	6	0	0	0	0	6	6
15:15	4	0	0	1	0	5	6	0	0	0	0	0	0	0	3	0	0	0	0	3	3	1	0	0	0	0	1	1
15:30	5	0	0	0	0	5	5	0	0	0	0	0	0	0	2	1	0	0	0	3	3	2	0	0	0	0	2	2
15:45	8	0	0	0	0	8	8	0	0	0	0	0	0	0	8	0	0	0	0	8	8	3	0	0	0	0	3	3
<b>H/TOT</b>	<b>23</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>1</b>	<b>25</b>	<b>27</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>18</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>19</b>	<b>19</b>	<b>12</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>12</b>	<b>12</b>
16:00	8	2	0	0	0	10	10	0	0	0	0	0	0	0	5	1	0	0	0	6	6	2	0	0	0	0	2	2
16:15	4	0	0	0	1	5	6	0	0	0	0	0	0	0	9	1	1	0	0	11	12	1	1	0	0	0	2	2
16:30	6	1	0	0	0	7	7	0	0	0	0	0	0	0	12	0	0	0	0	12	12	3	0	0	0	0	3	3
16:45	6	0	0	0	0	6	6	0	0	0	0	0	0	0	3	0	0	0	0	3	3	2	0	0	0	0	2	2
<b>H/TOT</b>	<b>24</b>	<b>3</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>28</b>	<b>29</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>29</b>	<b>2</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>32</b>	<b>33</b>	<b>8</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>9</b>	<b>9</b>
17:00	7	0	0	0	0	7	7	1	0	0	0	0	1	1	11	0	0	0	0	11	11	5	0	0	0	0	5	5
17:15	4	0	0	0	1	5	6	0	0	0	0	0	0	0	8	0	0	0	0	8	8	3	0	0	0	0	3	3
17:30	6	0	0	0	0	6	6	0	0	0	0	0	0	0	5	0	0	0	0	5	5	4	0	0	0	0	4	4
17:45	8	0	0	0	0	8	8	1	0	0	0	0	1	1	5	0	0	0	0	5	5	5	0	0	0	0	5	5
<b>H/TOT</b>	<b>25</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>26</b>	<b>27</b>	<b>2</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>2</b>	<b>29</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>29</b>	<b>29</b>	<b>17</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>17</b>	<b>17</b>
18:00	2	1	0	0	0	3	3	0	0	0	0	0	0	0	7	2	0	0	0	9	9	4	0	0	0	0	4	4
18:15	3	0	0	0	0	3	3	0	0	0	0	0	0	0	7	0	0	0	0	7	7	3	0	0	0	0	3	3
18:30	7	0	0	0	0	7	7	0	0	0	0	0	0	0	6	1	0	0	0	7	7	4	0	0	0	0	4	4
18:45	8	1	0	0	0	9	9	0	0	0	0	0	0	0	9	1	0	0	0	10	10	4	0	0	0	0	4	4
<b>H/TOT</b>	<b>20</b>	<b>2</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>22</b>	<b>22</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>29</b>	<b>4</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>33</b>	<b>33</b>	<b>15</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>15</b>	<b>15</b>
<b>P/TOT</b>	<b>333</b>	<b>22</b>	<b>3</b>	<b>1</b>	<b>4</b>	<b>363</b>	<b>370</b>	<b>8</b>	<b>1</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>10</b>	<b>11</b>	<b>223</b>	<b>20</b>	<b>3</b>	<b>0</b>	<b>0</b>	<b>246</b>	<b>248</b>	<b>104</b>	<b>6</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>111</b>	<b>112</b>

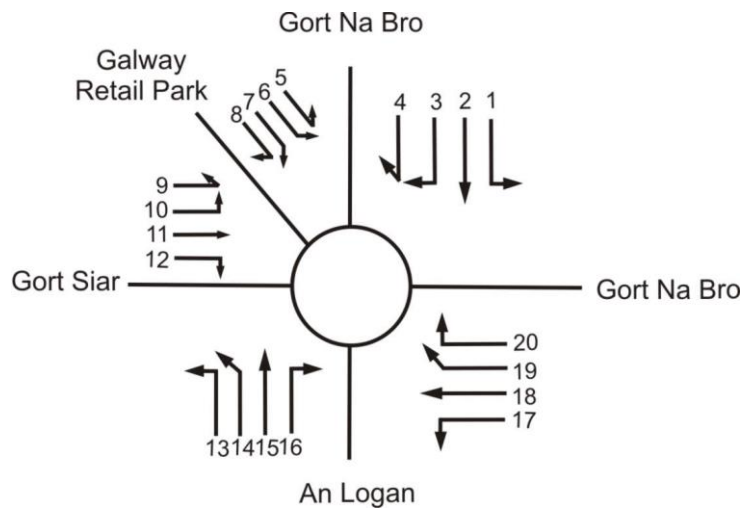
Movements 1, 2, 3, 4, 1PM to 7PM time frame





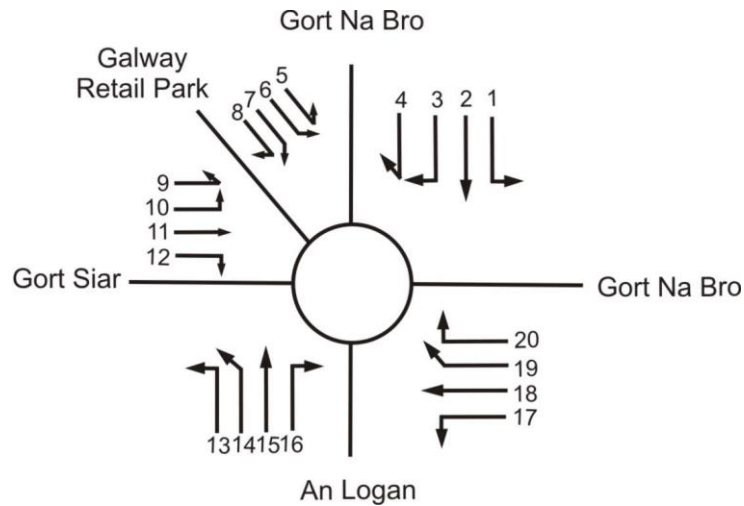
TIME	MOVEMENT 5						MOVEMENT 6						MOVEMENT 7						MOVEMENT 8									
	CAR	LGV	OGV1	OGV2	BUS	TOT	PCU	CAR	LGV	OGV1	OGV2	BUS	TOT	PCU	CAR	LGV	OGV1	OGV2	BUS	TOT	PCU	CAR	LGV	OGV1	OGV2	BUS	TOT	PCU
13:00	1	0	0	0	0	1	1	41	2	0	0	1	44	45	0	0	0	0	0	0	0	9	1	0	0	0	10	10
13:15	2	1	0	0	0	3	3	25	2	0	0	1	28	29	0	0	0	0	0	0	0	4	1	0	0	0	5	5
13:30	2	1	0	0	0	3	3	37	0	0	0	1	38	39	2	0	0	0	0	0	2	2	8	0	0	0	8	8
13:45	4	0	0	0	0	4	4	41	2	0	1	0	44	45	0	0	0	0	0	0	0	7	0	0	0	0	7	7
<b>H/TOT</b>	<b>9</b>	<b>2</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>11</b>	<b>11</b>	<b>144</b>	<b>6</b>	<b>0</b>	<b>1</b>	<b>3</b>	<b>154</b>	<b>158</b>	<b>2</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>2</b>	<b>28</b>	<b>2</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>30</b>	<b>30</b>
14:00	4	0	0	0	0	4	4	28	2	1	0	1	32	34	0	0	0	0	0	0	0	8	0	0	0	0	8	8
14:15	3	0	0	0	0	3	3	29	0	0	0	1	30	31	1	0	0	0	0	0	1	1	7	0	0	0	7	7
14:30	3	0	0	0	0	3	3	17	2	0	0	1	20	21	0	0	0	0	0	0	0	8	0	0	0	0	8	8
14:45	1	0	0	0	0	1	1	17	3	0	0	0	20	20	0	0	0	0	0	0	0	5	0	0	0	0	5	5
<b>H/TOT</b>	<b>11</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>11</b>	<b>11</b>	<b>91</b>	<b>7</b>	<b>1</b>	<b>0</b>	<b>3</b>	<b>102</b>	<b>106</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>1</b>	<b>28</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>28</b>	<b>28</b>
15:00	5	0	1	0	0	6	7	30	1	0	0	1	32	33	0	0	0	0	0	0	0	6	0	0	0	0	6	6
15:15	0	0	0	0	0	0	0	22	0	0	0	1	23	24	0	0	0	0	0	0	0	10	0	0	0	0	10	10
15:30	8	0	0	0	0	8	8	23	0	0	0	1	24	25	1	0	0	0	0	0	1	1	10	1	0	0	11	11
15:45	2	2	0	0	0	4	4	23	1	0	0	0	24	24	0	0	0	0	0	0	0	10	0	0	0	1	11	12
<b>H/TOT</b>	<b>15</b>	<b>2</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>18</b>	<b>19</b>	<b>98</b>	<b>2</b>	<b>0</b>	<b>0</b>	<b>3</b>	<b>103</b>	<b>106</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>1</b>	<b>36</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>38</b>	<b>39</b>
16:00	4	0	0	0	0	4	4	36	2	0	0	0	38	38	1	0	0	0	0	0	1	1	11	0	0	0	11	11
16:15	2	0	0	0	0	2	2	21	3	0	0	1	25	26	0	1	0	0	0	0	1	1	8	0	0	0	8	8
16:30	0	0	0	0	0	0	0	25	0	0	0	1	26	27	0	0	0	0	0	0	0	8	1	1	0	0	10	11
16:45	4	1	0	0	0	5	5	27	0	0	0	1	28	29	0	0	0	0	0	0	0	11	0	0	0	0	11	11
<b>H/TOT</b>	<b>10</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>11</b>	<b>11</b>	<b>109</b>	<b>5</b>	<b>0</b>	<b>0</b>	<b>3</b>	<b>117</b>	<b>120</b>	<b>1</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>2</b>	<b>38</b>	<b>1</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>40</b>	<b>41</b>
17:00	3	0	0	0	0	3	3	38	1	0	0	0	39	39	3	0	0	0	0	0	3	3	16	4	0	0	20	20
17:15	4	0	0	0	0	4	4	34	3	0	0	1	38	39	0	0	0	0	0	0	0	11	0	0	0	0	11	11
17:30	4	0	0	0	0	4	4	21	3	0	0	1	25	26	1	0	0	0	0	0	1	1	10	0	0	0	10	10
17:45	2	0	0	0	0	2	2	23	2	0	0	1	26	27	1	0	0	0	0	0	1	1	13	0	0	0	13	13
<b>H/TOT</b>	<b>13</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>13</b>	<b>13</b>	<b>116</b>	<b>9</b>	<b>0</b>	<b>0</b>	<b>3</b>	<b>128</b>	<b>131</b>	<b>5</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>5</b>	<b>5</b>	<b>50</b>	<b>4</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>54</b>	<b>54</b>
18:00	1	0	0	0	0	1	1	32	3	0	0	0	35	35	3	0	0	0	0	0	3	3	14	1	0	0	15	15
18:15	1	0	0	0	0	1	1	25	3	0	0	1	29	30	0	0	0	0	0	0	0	10	0	0	0	0	10	10
18:30	3	0	0	0	0	3	3	24	1	0	0	0	25	25	0	1	0	0	0	0	1	1	4	1	0	0	5	5
18:45	1	0	0	0	0	1	1	21	1	0	0	1	23	24	0	0	0	0	0	0	0	5	0	0	0	0	5	5
<b>H/TOT</b>	<b>6</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>6</b>	<b>6</b>	<b>102</b>	<b>8</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>112</b>	<b>114</b>	<b>3</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>4</b>	<b>4</b>	<b>33</b>	<b>2</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>35</b>	<b>35</b>
<b>P/TOT</b>	<b>91</b>	<b>11</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>103</b>	<b>104</b>	<b>1011</b>	<b>70</b>	<b>10</b>	<b>7</b>	<b>35</b>	<b>1133</b>	<b>1182</b>	<b>18</b>	<b>3</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>21</b>	<b>21</b>	<b>312</b>	<b>18</b>	<b>1</b>	<b>0</b>	<b>1</b>	<b>332</b>	<b>334</b>

Movements 5, 6, 7, 8, 1PM to 7PM time frame



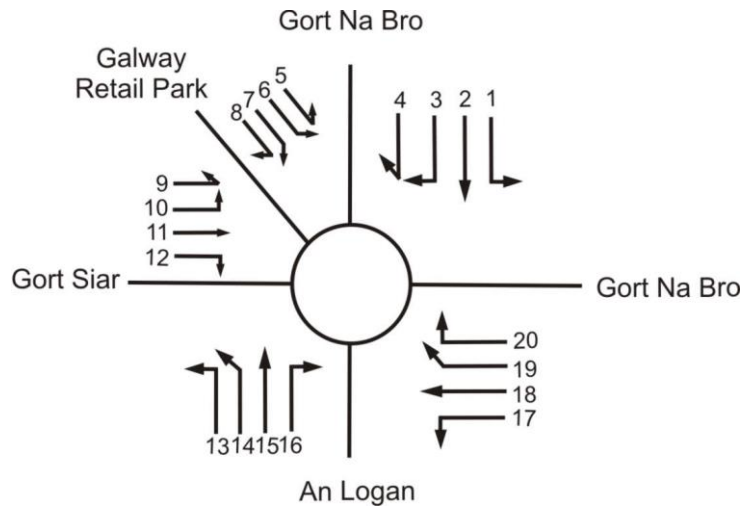
TIME	MOVEMENT 9						MOVEMENT 10						MOVEMENT 11						MOVEMENT 12								
	CAR	LGV	OGV1	OGV2	BUS	TOT	PCU	CAR	LGV	OGV1	OGV2	BUS	TOT	PCU	CAR	LGV	OGV1	OGV2	BUS	TOT	PCU	CAR	LGV	OGV1	OGV2	BUS	TOT
13:00	10	2	0	0	0	12	12	14	2	0	0	0	16	16	68	6	2	0	3	79	83	1	0	0	0	1	1
13:15	4	1	0	0	0	5	5	4	1	0	0	0	5	5	56	5	1	0	1	63	65	0	0	0	0	0	0
13:30	11	0	0	0	1	12	13	14	1	0	0	0	15	15	74	7	0	0	1	82	83	2	0	0	0	0	2
13:45	8	0	0	0	0	8	8	9	3	0	0	0	12	12	64	5	0	0	1	70	71	0	0	0	0	0	0
<b>H/TOT</b>	<b>33</b>	<b>3</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>37</b>	<b>38</b>	<b>41</b>	<b>7</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>48</b>	<b>48</b>	<b>262</b>	<b>23</b>	<b>3</b>	<b>0</b>	<b>6</b>	<b>294</b>	<b>302</b>	<b>3</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>3</b>	<b>3</b>
14:00	4	2	0	0	0	6	6	14	1	0	0	0	15	15	62	6	1	0	3	72	76	0	0	0	0	0	0
14:15	12	1	0	0	0	13	13	5	0	0	0	0	5	5	69	6	2	0	1	78	80	0	0	0	0	0	0
14:30	11	0	0	0	1	12	13	11	1	0	0	0	12	12	66	7	0	0	2	75	77	3	0	0	0	0	3
14:45	8	0	0	0	0	8	8	9	2	0	0	0	11	11	64	5	0	0	1	70	71	0	0	0	0	0	0
<b>H/TOT</b>	<b>35</b>	<b>3</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>39</b>	<b>40</b>	<b>39</b>	<b>4</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>43</b>	<b>43</b>	<b>261</b>	<b>24</b>	<b>3</b>	<b>0</b>	<b>7</b>	<b>295</b>	<b>304</b>	<b>3</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>3</b>	<b>3</b>
15:00	14	0	0	0	0	14	14	3	0	0	0	0	3	3	89	7	1	0	1	98	100	1	0	0	0	0	1
15:15	8	0	1	0	0	9	10	6	0	0	0	0	6	6	80	7	0	0	0	87	87	0	0	0	0	0	0
15:30	8	0	0	0	0	8	8	11	1	0	0	0	12	12	83	8	0	1	2	94	97	2	0	0	0	0	2
15:45	4	1	0	0	0	5	5	11	0	0	0	1	12	13	88	4	0	0	1	93	94	1	0	0	0	0	1
<b>H/TOT</b>	<b>34</b>	<b>1</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>36</b>	<b>37</b>	<b>31</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>33</b>	<b>34</b>	<b>340</b>	<b>26</b>	<b>1</b>	<b>1</b>	<b>4</b>	<b>372</b>	<b>378</b>	<b>4</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>4</b>	<b>4</b>
16:00	6	0	0	0	0	6	6	9	2	0	0	0	11	11	82	9	2	0	1	94	96	0	0	0	0	0	0
16:15	9	1	0	0	0	10	10	6	0	0	0	1	7	8	65	6	4	0	1	76	79	0	0	0	0	0	0
16:30	4	0	0	0	0	4	4	9	1	0	0	0	10	10	68	5	1	1	3	78	83	1	0	0	0	0	1
16:45	2	0	0	0	0	2	2	6	0	0	0	0	6	6	72	6	0	0	2	80	82	1	0	0	0	0	1
<b>H/TOT</b>	<b>21</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>22</b>	<b>22</b>	<b>30</b>	<b>3</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>34</b>	<b>35</b>	<b>287</b>	<b>26</b>	<b>7</b>	<b>1</b>	<b>7</b>	<b>328</b>	<b>340</b>	<b>2</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>2</b>
17:00	5	1	0	0	0	6	6	6	0	1	0	0	7	8	68	3	2	0	2	75	78	0	0	0	0	0	0
17:15	9	0	0	0	0	9	9	8	1	0	0	0	9	9	53	9	0	0	1	63	64	4	0	0	0	0	4
17:30	8	0	1	0	0	9	10	10	0	0	0	0	10	10	54	2	0	0	0	56	56	0	0	0	0	0	0
17:45	3	0	0	0	0	3	3	11	3	1	0	0	15	16	79	4	0	0	0	83	83	2	0	0	0	0	2
<b>H/TOT</b>	<b>25</b>	<b>1</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>27</b>	<b>28</b>	<b>35</b>	<b>4</b>	<b>2</b>	<b>0</b>	<b>0</b>	<b>41</b>	<b>42</b>	<b>254</b>	<b>18</b>	<b>2</b>	<b>0</b>	<b>3</b>	<b>277</b>	<b>281</b>	<b>6</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>6</b>	<b>6</b>
18:00	7	0	0	0	0	7	7	11	2	0	0	0	13	13	68	9	2	0	0	79	80	1	0	0	0	0	1
18:15	3	0	0	0	1	4	5	11	0	0	0	0	11	11	58	3	1	0	0	62	63	1	0	0	0	0	1
18:30	4	0	0	0	0	4	4	11	0	0	0	0	11	11	66	4	0	0	0	70	70	0	0	0	0	0	0
18:45	12	1	0	0	0	13	13	10	1	0	0	0	11	11	72	4	1	0	0	77	78	0	0	0	0	0	0
<b>H/TOT</b>	<b>26</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>28</b>	<b>29</b>	<b>43</b>	<b>3</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>46</b>	<b>46</b>	<b>264</b>	<b>20</b>	<b>4</b>	<b>0</b>	<b>0</b>	<b>288</b>	<b>290</b>	<b>2</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>2</b>
<b>P/TOT</b>	<b>300</b>	<b>18</b>	<b>2</b>	<b>1</b>	<b>3</b>	<b>324</b>	<b>329</b>	<b>388</b>	<b>45</b>	<b>7</b>	<b>0</b>	<b>5</b>	<b>445</b>	<b>454</b>	<b>3558</b>	<b>301</b>	<b>34</b>	<b>6</b>	<b>55</b>	<b>3954</b>	<b>4034</b>	<b>33</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>34</b>	<b>34</b>

Movements 9, 10, 11, 12, 1PM to 7PM time frame



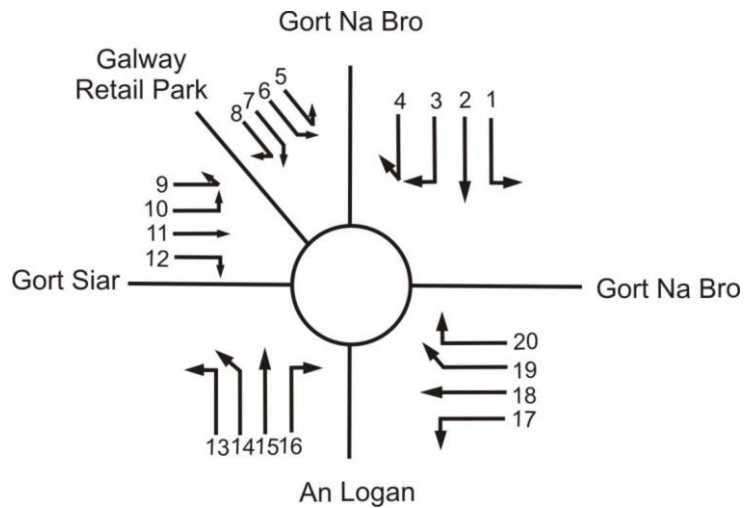
TIME	MOVEMENT 13						MOVEMENT 14						MOVEMENT 15						MOVEMENT 16									
	CAR	LGV	OGV1	OGV2	BUS	TOT	PCU	CAR	LGV	OGV1	OGV2	BUS	TOT	PCU	CAR	LGV	OGV1	OGV2	BUS	TOT	PCU	CAR	LGV	OGV1	OGV2	BUS	TOT	PCU
13:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	1	1	0	0	0	1	1	
13:15	1	0	0	0	0	1	1	1	0	0	0	0	1	1	0	0	0	0	0	0	0	1	1	0	0	0	2	2
13:30	3	0	0	0	0	3	3	2	0	0	0	0	2	2	0	0	0	0	0	0	0	1	0	0	0	0	1	1
13:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>H/TOT</b>	<b>4</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>4</b>	<b>4</b>	<b>3</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>3</b>	<b>3</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>1</b>	<b>3</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>4</b>	<b>4</b>
14:00	3	0	0	0	0	3	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14:15	1	0	0	0	0	1	1	1	0	0	0	0	1	1	1	1	0	0	0	2	2	1	0	0	0	0	1	1
14:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	1	3	0	0	0	0	3	3
14:45	2	0	0	0	0	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>H/TOT</b>	<b>6</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>6</b>	<b>6</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>1</b>	<b>2</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>3</b>	<b>3</b>	<b>4</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>4</b>	<b>4</b>	
15:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	1
15:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	2	2
15:30	2	0	0	0	0	2	2	1	0	0	0	0	1	1	0	0	0	0	0	0	0	2	0	0	0	0	2	2
15:45	1	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	2	2
<b>H/TOT</b>	<b>3</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>3</b>	<b>3</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>7</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>7</b>	<b>7</b>	
16:00	1	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	2	2
16:15	1	0	0	0	0	1	1	1	0	0	0	0	1	1	0	0	0	0	0	0	0	3	1	0	0	0	4	4
16:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	1
16:45	1	0	0	0	0	1	1	1	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>H/TOT</b>	<b>3</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>3</b>	<b>3</b>	<b>2</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>2</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>6</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>7</b>	<b>7</b>	
17:00	1	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	2	2
17:15	1	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	1	0	0	0	4	4
17:30	1	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	2	2
17:45	1	0	0	0	0	1	1	2	0	0	0	0	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>H/TOT</b>	<b>4</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>4</b>	<b>4</b>	<b>2</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>2</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>7</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>8</b>	<b>8</b>	
18:00	3	0	0	0	0	3	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	1
18:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	1
18:30	0	0	0	0	0	0	0	0	0	1	0	0	1	2	0	0	0	0	0	0	0	2	0	0	0	0	2	2
18:45	1	0	0	0	0	1	1	2	0	0	0	0	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>H/TOT</b>	<b>4</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>4</b>	<b>4</b>	<b>2</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>3</b>	<b>4</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>4</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>4</b>	<b>4</b>	
<b>P/TOT</b>	<b>43</b>	<b>3</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>47</b>	<b>48</b>	<b>20</b>	<b>1</b>	<b>1</b>	<b>0</b>	<b>22</b>	<b>23</b>	<b>6</b>	<b>2</b>	<b>4</b>	<b>0</b>	<b>0</b>	<b>12</b>	<b>14</b>	<b>72</b>	<b>8</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>81</b>	<b>82</b>	

Movements 13, 14, 15, 16, 1PM to 7PM time frame



TIME	MOVEMENT 17						TOT	PCU	MOVEMENT 18						TOT	PCU	MOVEMENT 19						TOT	PCU	MOVEMENT 20						TOT	PCU
	CAR	LGV	OGV1	OGV2	BUS	TOT			CAR	LGV	OGV1	OGV2	BUS	TOT			CAR	LGV	OGV1	OGV2	BUS	TOT			CAR	LGV	OGV1	OGV2	BUS	TOT		
13:00	0	0	0	0	0	0	0	67	3	0	0	1	71	72	38	4	0	0	1	43	44	3	1	0	0	0	4	4				
13:15	0	0	0	0	0	0	0	52	6	1	0	1	60	62	50	3	0	1	1	55	57	0	0	0	0	0	0	0				
13:30	2	0	0	0	0	2	2	58	3	3	0	0	64	66	33	1	0	0	1	35	36	5	0	0	0	0	5	5				
13:45	0	0	0	0	0	0	0	45	4	0	0	1	50	51	40	0	0	0	1	41	42	10	1	1	0	0	12	13				
<b>H/TOT</b>	<b>2</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>2</b>	<b>222</b>	<b>16</b>	<b>4</b>	<b>0</b>	<b>3</b>	<b>245</b>	<b>250</b>	<b>161</b>	<b>8</b>	<b>0</b>	<b>1</b>	<b>4</b>	<b>174</b>	<b>179</b>	<b>18</b>	<b>2</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>21</b>	<b>22</b>				
14:00	1	0	0	0	0	1	1	44	4	0	1	1	50	52	43	1	0	0	0	44	44	2	1	1	0	0	4	5				
14:15	2	0	0	0	0	2	2	54	2	1	0	4	61	66	24	0	0	0	1	25	26	6	0	0	0	0	6	6				
14:30	1	0	0	0	0	1	1	56	7	1	0	1	65	67	30	5	0	0	1	36	37	6	0	0	0	0	6	6				
14:45	2	0	0	0	0	2	2	88	1	0	1	2	92	95	39	2	0	0	1	42	43	6	1	0	1	0	8	9				
<b>H/TOT</b>	<b>6</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>6</b>	<b>6</b>	<b>242</b>	<b>14</b>	<b>2</b>	<b>2</b>	<b>8</b>	<b>268</b>	<b>280</b>	<b>136</b>	<b>8</b>	<b>0</b>	<b>0</b>	<b>3</b>	<b>147</b>	<b>150</b>	<b>20</b>	<b>2</b>	<b>1</b>	<b>1</b>	<b>0</b>	<b>24</b>	<b>26</b>				
15:00	1	1	0	0	0	2	2	47	9	1	1	0	58	60	33	2	0	0	0	35	35	3	0	0	0	0	3	3				
15:15	4	0	0	0	0	4	4	54	4	1	0	3	62	66	42	1	0	0	2	45	47	3	0	0	0	0	3	3				
15:30	4	0	0	0	0	4	4	77	5	0	0	0	82	82	41	0	0	0	0	41	41	10	0	0	0	0	10	10				
15:45	3	0	0	0	0	3	3	65	2	0	0	1	68	69	30	4	0	0	1	35	36	4	0	0	0	0	4	4				
<b>H/TOT</b>	<b>12</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>13</b>	<b>13</b>	<b>243</b>	<b>20</b>	<b>2</b>	<b>1</b>	<b>4</b>	<b>270</b>	<b>276</b>	<b>146</b>	<b>7</b>	<b>0</b>	<b>0</b>	<b>3</b>	<b>156</b>	<b>159</b>	<b>20</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>20</b>	<b>20</b>				
16:00	0	0	0	0	0	0	0	91	4	0	0	2	97	99	44	3	0	0	1	48	49	11	0	0	0	0	11	11				
16:15	1	0	0	0	0	1	1	92	3	1	0	1	97	99	41	3	0	0	0	44	44	9	0	0	0	0	9	9				
16:30	1	0	0	0	0	1	1	88	4	2	1	3	98	103	35	1	0	0	1	37	38	6	1	0	0	0	7	7				
16:45	4	0	0	0	0	4	4	89	7	0	0	1	97	98	35	3	0	0	1	39	40	6	0	0	0	0	6	6				
<b>H/TOT</b>	<b>6</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>6</b>	<b>6</b>	<b>360</b>	<b>18</b>	<b>3</b>	<b>1</b>	<b>7</b>	<b>389</b>	<b>399</b>	<b>155</b>	<b>10</b>	<b>0</b>	<b>0</b>	<b>3</b>	<b>168</b>	<b>171</b>	<b>32</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>33</b>	<b>33</b>				
17:00	2	0	0	0	0	2	2	97	7	0	0	0	104	104	34	4	0	0	1	39	40	6	0	0	0	0	6	6				
17:15	2	0	0	0	0	2	2	94	6	0	0	1	101	102	33	3	0	0	0	36	36	5	0	0	0	0	5	5				
17:30	5	0	0	0	0	5	5	96	6	0	0	0	102	102	52	1	0	0	1	54	55	6	0	0	0	0	6	6				
17:45	2	0	0	0	0	2	2	108	3	1	0	1	113	115	27	0	0	0	1	28	29	5	0	0	0	0	5	5				
<b>H/TOT</b>	<b>11</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>11</b>	<b>11</b>	<b>395</b>	<b>22</b>	<b>1</b>	<b>0</b>	<b>2</b>	<b>420</b>	<b>423</b>	<b>146</b>	<b>8</b>	<b>0</b>	<b>0</b>	<b>3</b>	<b>157</b>	<b>160</b>	<b>22</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>22</b>	<b>22</b>				
18:00	5	0	0	0	0	5	5	88	9	0	0	1	98	99	38	0	0	0	1	39	40	9	0	0	0	0	9	9				
18:15	0	0	0	0	0	0	0	89	3	0	0	2	94	96	26	1	0	0	0	27	27	9	0	0	0	0	9	9				
18:30	1	1	1	0	0	3	4	92	3	1	0	0	96	97	25	2	0	0	1	28	29	10	0	0	0	0	10	10				
18:45	1	0	0	0	0	1	1	69	3	0	0	1	73	74	30	1	0	0	0	31	31	5	0	1	0	0	6	7				
<b>H/TOT</b>	<b>7</b>	<b>1</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>9</b>	<b>10</b>	<b>338</b>	<b>18</b>	<b>1</b>	<b>0</b>	<b>4</b>	<b>361</b>	<b>366</b>	<b>119</b>	<b>4</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>125</b>	<b>127</b>	<b>33</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>34</b>	<b>35</b>				
<b>P/TOT</b>	<b>64</b>	<b>6</b>	<b>6</b>	<b>0</b>	<b>0</b>	<b>76</b>	<b>79</b>	<b>2821</b>	<b>250</b>	<b>42</b>	<b>8</b>	<b>52</b>	<b>3173</b>	<b>3256</b>	<b>1454</b>	<b>95</b>	<b>10</b>	<b>6</b>	<b>38</b>	<b>1603</b>	<b>1654</b>	<b>237</b>	<b>17</b>	<b>6</b>	<b>1</b>	<b>0</b>	<b>261</b>	<b>265</b>				

Movements 17, 18, 19, 20, 1PM to 7PM time frame





APPENDIX 2: OSCADY results for three scenarios, AM and PM peak

I	TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)	AVERAGE DELAY PER ARRIVING VEHICLE (MIN)	I
I	08.00-08.15										I
I	ARM A	4.70	23.79	0.198	--	0.0	0.2	3.6	-	0.052	I
I	ARM B	0.90	18.80	0.048	--	0.0	0.1	0.7	-	0.056	I
I	ARM C	12.50	26.04	0.480	--	0.0	0.9	13.3	-	0.073	I
I	ARM D	0.50	16.79	0.030	--	0.0	0.0	0.4	-	0.061	I
I	ARM E	2.10	17.27	0.122	--	0.0	0.1	2.0	-	0.066	I
I											I
I	08.15-08.30										I
I	ARM A	6.90	23.79	0.290	--	0.2	0.4	6.0	-	0.059	I
I	ARM B	0.50	17.61	0.028	--	0.1	0.0	0.4	-	0.058	I
I	ARM C	8.90	25.79	0.345	--	0.9	0.5	8.1	-	0.059	I
I	ARM D	0.70	18.82	0.037	--	0.0	0.0	0.6	-	0.055	I
I	ARM E	2.10	19.13	0.110	--	0.1	0.1	1.9	-	0.059	I
I											I
I	08.30-08.45										I
I	ARM A	8.10	23.88	0.339	--	0.4	0.5	7.5	-	0.063	I
I	ARM B	0.50	17.05	0.029	--	0.0	0.0	0.4	-	0.060	I
I	ARM C	8.30	25.56	0.325	--	0.5	0.5	7.3	-	0.058	I
I	ARM D	0.80	19.12	0.042	--	0.0	0.0	0.6	-	0.055	I
I	ARM E	1.70	19.39	0.088	--	0.1	0.1	1.5	-	0.057	I
I											I
I	08.45-09.00										I
I	ARM A	9.10	23.76	0.383	--	0.5	0.6	9.1	-	0.068	I
I	ARM B	0.70	16.41	0.043	--	0.0	0.0	0.7	-	0.064	I
I	ARM C	7.80	25.23	0.309	--	0.5	0.4	6.8	-	0.057	I
I	ARM D	1.30	19.27	0.067	--	0.0	0.1	1.1	-	0.056	I
I	ARM E	2.10	19.31	0.109	--	0.1	0.1	1.8	-	0.058	I

Existing situation AM peak

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)	AVERAGE DELAY PER ARRIVING VEHICLE (MIN)
17.00-17.15									
ARM A	10.10	23.02	0.439	--	0.0	0.8	11.2	--	0.077
ARM B	0.20	15.28	0.013	--	0.0	0.0	0.2	--	0.066
ARM C	6.10	25.48	0.239	--	0.0	0.3	4.6	--	0.051
ARM D	4.30	20.88	0.206	--	0.0	0.3	3.8	--	0.060
ARM E	1.60	19.17	0.083	--	0.0	0.1	1.3	--	0.057

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)	AVERAGE DELAY PER ARRIVING VEHICLE (MIN)
17.15-17.30									
ARM A	9.70	23.33	0.416	--	0.8	0.7	10.9	--	0.073
ARM B	0.30	15.74	0.019	--	0.0	0.0	0.3	--	0.065
ARM C	5.70	25.53	0.223	--	0.3	0.3	4.4	--	0.050
ARM D	3.60	21.06	0.171	--	0.3	0.2	3.1	--	0.057
ARM E	1.10	19.70	0.056	--	0.1	0.1	0.9	--	0.054

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)	AVERAGE DELAY PER ARRIVING VEHICLE (MIN)
17.30-17.45									
ARM A	11.20	23.50	0.477	--	0.7	0.9	13.2	--	0.081
ARM B	0.20	15.08	0.013	--	0.0	0.0	0.2	--	0.067
ARM C	5.00	25.30	0.198	--	0.3	0.2	3.8	--	0.049
ARM D	2.70	21.42	0.126	--	0.2	0.1	2.2	--	0.053
ARM E	1.00	20.54	0.049	--	0.1	0.1	0.8	--	0.051

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)	AVERAGE DELAY PER ARRIVING VEHICLE (MIN)
17.45-18.00									
ARM A	10.00	23.33	0.429	--	0.9	0.8	11.6	--	0.075
ARM B	0.20	15.58	0.013	--	0.0	0.0	0.2	--	0.065
ARM C	6.90	25.50	0.271	--	0.2	0.4	5.4	--	0.054
ARM D	2.90	20.45	0.142	--	0.1	0.2	2.4	--	0.057
ARM E	1.30	19.57	0.066	--	0.1	0.1	1.0	--	0.055

Existing situation, PM peak

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)	AVERAGE DELAY PER ARRIVING VEHICLE (MIN)
08.00-08.15									
ARM A	4.80	23.77	0.202	--	0.0	0.3	3.7	--	0.053
ARM B	0.90	18.73	0.048	--	0.0	0.1	0.7	--	0.056
ARM C	12.80	26.00	0.492	--	0.0	1.0	13.9	--	0.075
ARM D	0.50	16.62	0.030	--	0.0	0.0	0.5	--	0.062
ARM E	2.20	17.11	0.129	--	0.0	0.1	2.2	--	0.067
08.15-08.30									
ARM A	7.10	23.77	0.299	--	0.3	0.4	6.2	--	0.060
ARM B	0.50	17.49	0.029	--	0.1	0.0	0.5	--	0.059
ARM C	9.10	25.73	0.354	--	1.0	0.6	8.4	--	0.060
ARM D	0.70	18.70	0.037	--	0.0	0.0	0.6	--	0.056
ARM E	2.20	19.02	0.116	--	0.1	0.1	2.0	--	0.059
08.30-08.45									
ARM A	8.30	23.86	0.348	--	0.4	0.5	7.8	--	0.064
ARM B	0.50	16.92	0.030	--	0.0	0.0	0.5	--	0.061
ARM C	8.50	25.49	0.333	--	0.6	0.5	7.6	--	0.059
ARM D	0.80	19.00	0.042	--	0.0	0.0	0.7	--	0.055
ARM E	1.80	19.29	0.093	--	0.1	0.1	1.6	--	0.057
08.45-09.00									
ARM A	9.30	23.77	0.391	--	0.5	0.6	9.4	--	0.069
ARM B	0.70	16.31	0.043	--	0.0	0.0	0.7	--	0.064
ARM C	8.00	25.17	0.318	--	0.5	0.5	7.1	--	0.058
ARM D	1.30	19.15	0.068	--	0.0	0.1	1.1	--	0.056
ARM E	2.10	19.20	0.109	--	0.1	0.1	1.8	--	0.058

2019, without development in place, AM peak



TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)	AVERAGE DELAY PER ARRIVING VEHICLE (MIN)
17.00-17.15									
ARM A	10.30	23.01	0.448	--	0.0	0.8	11.6	-	0.078
ARM B	0.20	15.17	0.013	--	0.0	0.0	0.2	-	0.067
ARM C	6.20	25.43	0.244	--	0.0	0.3	4.7	-	0.052
ARM D	4.40	20.83	0.211	--	0.0	0.3	3.9	-	0.061
ARM E	1.60	19.07	0.084	--	0.0	0.1	1.3	-	0.057
17.15-17.30									
ARM A	9.90	23.27	0.425	--	0.8	0.7	11.3	-	0.075
ARM B	0.30	15.58	0.019	--	0.0	0.0	0.3	-	0.065
ARM C	5.80	25.47	0.228	--	0.3	0.3	4.5	-	0.051
ARM D	3.70	21.01	0.176	--	0.3	0.2	3.3	-	0.058
ARM E	1.20	19.60	0.061	--	0.1	0.1	1.0	-	0.054
17.30-17.45									
ARM A	11.40	23.49	0.485	--	0.7	0.9	13.7	-	0.082
ARM B	0.20	14.96	0.013	--	0.0	0.0	0.2	-	0.068
ARM C	5.10	25.24	0.202	--	0.3	0.3	3.9	-	0.050
ARM D	2.80	21.36	0.131	--	0.2	0.2	2.3	-	0.054
ARM E	1.00	20.44	0.049	--	0.1	0.1	0.8	-	0.051
17.45-18.00									
ARM A	10.20	23.33	0.437	--	0.9	0.8	12.0	-	0.076
ARM B	0.20	15.47	0.013	--	0.0	0.0	0.2	-	0.065
ARM C	7.00	25.45	0.275	--	0.3	0.4	5.6	-	0.054
ARM D	2.90	20.40	0.142	--	0.2	0.2	2.5	-	0.057
ARM E	1.30	19.52	0.067	--	0.1	0.1	1.1	-	0.055

2019, without development in place, PM peak

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)	AVERAGE DELAY PER ARRIVING VEHICLE (MIN)
08.00-08.15									
ARM A	5.70	23.32	0.244	--	0.0	0.3	4.7	-	0.057
ARM B	0.90	17.83	0.050	--	0.0	0.1	0.8	-	0.059
ARM C	13.90	25.39	0.547	--	0.0	1.2	17.2	-	0.086
ARM D	1.90	16.64	0.114	--	0.0	0.1	1.9	-	0.068
ARM E	2.40	16.48	0.146	--	0.0	0.2	2.5	-	0.071
08.15-08.30									
ARM A	8.00	23.31	0.343	--	0.3	0.5	7.6	-	0.065
ARM B	0.50	16.56	0.030	--	0.1	0.0	0.5	-	0.062
ARM C	10.20	24.97	0.408	--	1.2	0.7	10.7	-	0.068
ARM D	2.20	18.58	0.118	--	0.1	0.1	2.0	-	0.061
ARM E	2.40	18.11	0.133	--	0.2	0.2	2.3	-	0.064
08.30-08.45									
ARM A	9.20	23.44	0.392	--	0.5	0.6	9.4	-	0.070
ARM B	0.50	16.03	0.031	--	0.0	0.0	0.5	-	0.064
ARM C	9.60	24.68	0.389	--	0.7	0.6	9.7	-	0.066
ARM D	2.30	18.89	0.122	--	0.1	0.1	2.1	-	0.060
ARM E	2.00	18.36	0.109	--	0.2	0.1	1.9	-	0.061
08.45-09.00									
ARM A	10.20	23.30	0.438	--	0.6	0.8	11.4	-	0.076
ARM B	0.70	15.37	0.046	--	0.0	0.0	0.7	-	0.068
ARM C	9.10	24.28	0.375	--	0.6	0.6	9.1	-	0.066
ARM D	2.80	19.07	0.147	--	0.1	0.2	2.5	-	0.061
ARM E	2.30	18.27	0.126	--	0.1	0.1	2.1	-	0.063

2019, with development in place, AM peak

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)	AVERAGE DELAY PER ARRIVING VEHICLE (MIN)
17.00-17.15									
ARM A	11.50	21.95	0.524	--	0.0	1.1	15.6	--	0.094
ARM B	0.20	13.52	0.015	--	0.0	0.0	0.2	--	0.075
ARM C	7.20	24.59	0.293	--	0.0	0.4	6.0	--	0.057
ARM D	7.30	20.82	0.351	--	0.0	0.5	7.8	--	0.074
ARM E	1.90	17.59	0.108	--	0.0	0.1	1.8	--	0.064
17.15-17.30									
ARM A	11.10	22.32	0.497	--	1.1	1.0	15.2	--	0.089
ARM B	0.30	14.03	0.021	--	0.0	0.0	0.3	--	0.073
ARM C	6.80	24.66	0.276	--	0.4	0.4	5.8	--	0.056
ARM D	6.60	20.99	0.315	--	0.5	0.5	7.0	--	0.070
ARM E	1.40	18.08	0.077	--	0.1	0.1	1.3	--	0.060
17.30-17.45									
ARM A	12.60	22.55	0.559	--	1.0	1.2	18.2	--	0.100
ARM B	0.20	13.42	0.015	--	0.0	0.0	0.2	--	0.076
ARM C	6.10	24.36	0.250	--	0.4	0.3	5.1	--	0.055
ARM D	5.70	21.30	0.268	--	0.5	0.4	5.6	--	0.064
ARM E	1.30	18.85	0.069	--	0.1	0.1	1.1	--	0.057
17.45-18.00									
ARM A	11.40	22.43	0.508	--	1.2	1.0	16.1	--	0.091
ARM B	0.20	13.95	0.014	--	0.0	0.0	0.2	--	0.073
ARM C	8.00	24.62	0.325	--	0.3	0.5	7.0	--	0.060
ARM D	5.80	20.45	0.284	--	0.4	0.4	5.8	--	0.068
ARM E	1.50	18.08	0.083	--	0.1	0.1	1.3	--	0.060

2019, with development in place, PM peak

# Appendix B. Travel Information Pack

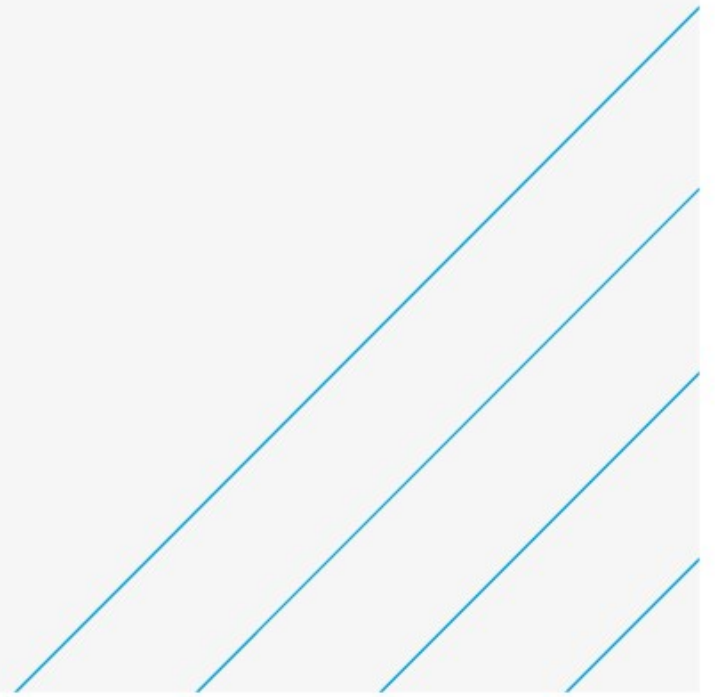


# Knocknacarra District Centre

Travel Information Pack

Glenveagh Living

October 2019



# Notice

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This document has 12 pages including the cover.

## Document history

Revision	Purpose description	Originated	Checked	Reviewed	Authorised	Date
Rev 0.0	Information	KG	KG	KG	SC	09.10.2019
Rev 1.0	Information	KG	SC	SC	SC	30.10.2019

## Client signoff

Client	Glenveagh Living
Project	Knocknacarra District Centre
Job number	5168265
Client signature / date	

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# Knocknacarra District Centre Information Pack



# 1. Welcome to Knocknacarra District Centre

This Travel Information Pack has been provided to inform you of the local transport opportunities currently available and those which will become available over the next few years.

Knocknacarra District Centre is located in Knocknacarra, Ragoon, one of the western suburbs of Galway City. The existing Gateway Retail Park forms Phase 1 of this development and operates predominantly as a retail facility. There is a number of key local services such as schools and leisure facilities within its immediate vicinity. Furthermore, additional facilities are proposed as part of Phase 2 (currently under construction) and Phase 3 (proposed as part of this application) like restaurants and cafes, creches and community facility

Knocknacarra District Centre offers real travel choice by foot, bicycle and public transport. Some of which are outlined below.

- Public Transport Bus routes connecting to city centre and Salthill.
- Local services within Knocknacarra District Centre and bus stops located within 10 minutes' walk;
- Local services at 'Westside' located within 10 minutes' cycle
- Primary and Secondary Schools located within 10 minutes' cycle
- National University of Ireland Galway located within 20 minutes' cycle
- University Hospital Galway located within 20 minutes' cycle.

Details on walking and cycling times and associated distances are given in the following sections of this Pack. In addition information on bus routes and services are also provided for.

## 2. Travel by Foot

It is recommended that adults aged 19-64 take part in at least 30 minutes aerobic activity five times a week. Taking part in such forms of aerobic activity as walking dramatically reduces the risk of developing heart disease, diabetes and obesity. It can also reduce blood pressure and strengthen muscle and bone density while being beneficial to mental wellbeing.

Walking is one of the simplest and most reliable forms of travel. Below are a list of benefits that can be attributed to frequent walking activity.

### Benefits of Walking

- Cheapest form of travel;
- Increases cardiovascular capacity;
- Reduces the risk of heart disease and obesity;
- Strengthens bone density and muscular strength;
- Increases co-ordination and motor functions;
- Avoids parking hassle;
- Removes stresses of driving;
- Improves mood and mental wellbeing.

Approximate walking times and distances to surrounding facilities are illustrated in Figure 2-1. These walking times are broken into increments of 5 minutes ranging up to 20 minutes.

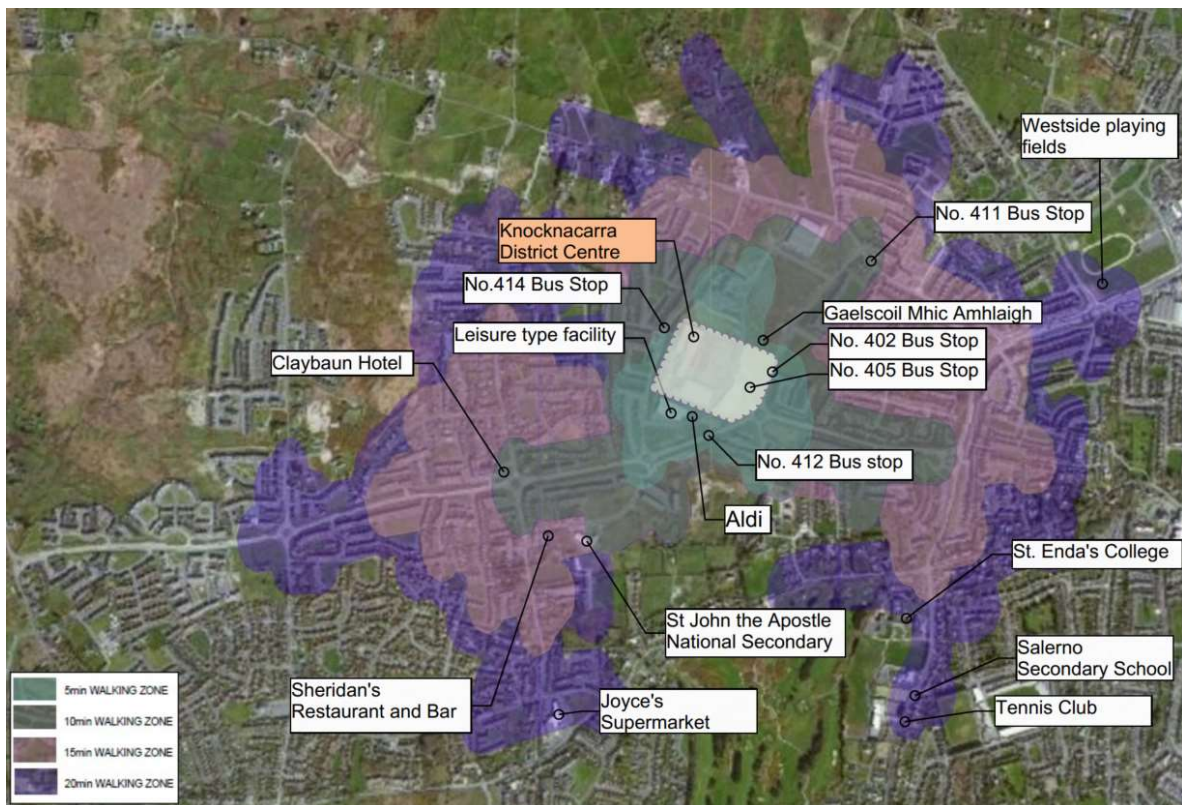


Figure 2-1 Walking times and distances to key local facilities

### 3. Travel by Bicycle

Cycling is one of the fastest forms of travel within urban environments, which also providing an economic and independent form of transport. The recommended daily 30 minutes of aerobic exercise can also be achieved through cycling. The benefits of this aerobic activity are similar to that obtained through walking.

Incorporating cycling into a daily routine can build an exercise regime into that daily routine, eliminating the need for gym memberships. Below is a list of benefits that can be attributed to frequent walking activity.

#### Benefits of Cycling

- Fastest form of transport in urban environments;
- Economic form of travel;
- Incorporates exercise into daily routines;
- Low impact form of exercise;
- Avoids parking hassle;
- Removes stresses of driving;
- Improves mood and mental wellbeing.

Approximate cycling times and distances to surrounding facilities are illustrated in Figure 3-1. These cycling times are broken into increments of 10 minutes ranging up to 40 minutes.

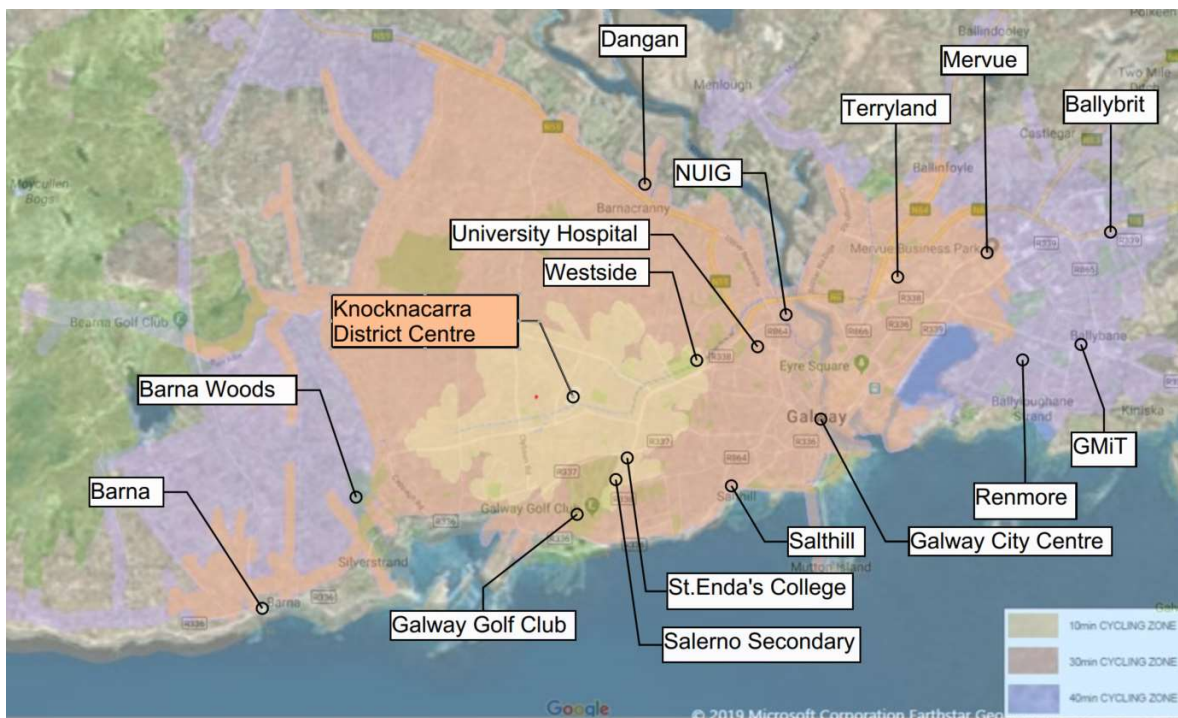


Figure 3-1 Cycling times and distances to key local facilities

# 4. Travel by Bus

The current public transport provision includes number of routes that service the general area. The key routes for the site are the 402, 405, 410, 411, 412, 414 services. Of these routes 405, 412 and 411 are within a 10-minute walk of the development. These services combined provide 7 No. of buses every hour during peak times. The Table 4-1 below summarises the bus routes, with relevant information on the route they take, the nearest bus stop to the development and how long it approximately takes to walk to the bus stop.

**Table 4-1 Bus Services**

Bus	Route	Nearest Bus Stop	Walking Distance Mins	Frequency
405	Between Eyre Square and the Gateway Retail Park	Existing Gateway Link Road	1	20 to 25 mins weekday
412	From the Cathedral through University and Hospital to Knocknacarra	Western Distributor Road	5	30 mins Mon – Sat. 60 mins night time and Sun.
411	From Henry St to Knocknacarra	Rahoon Road	8	30 mins Mon – Sat. 60 mins night time and Sun.
414	Between Cathedral, Knocknacarra and Barna	Bothar Stiofain	5	3 services daily
410	Connects lower and upper Knocknacarra with university and hospital and finishes at Eyre Square	Western Distributor Road	20	60 mins Mon to Fri
402	From Merlin Park Hospital through GMIT to Knocknacarra	Kingston Road (via Millers Lane /L-5000)	20	30 mins Mon – Sat. 60 mins night time and Sun.

There are ongoing changes to the bus routes within this area as the NTA rationalise routes, the above schedule for the bus services in the area was prepared in October 2019.

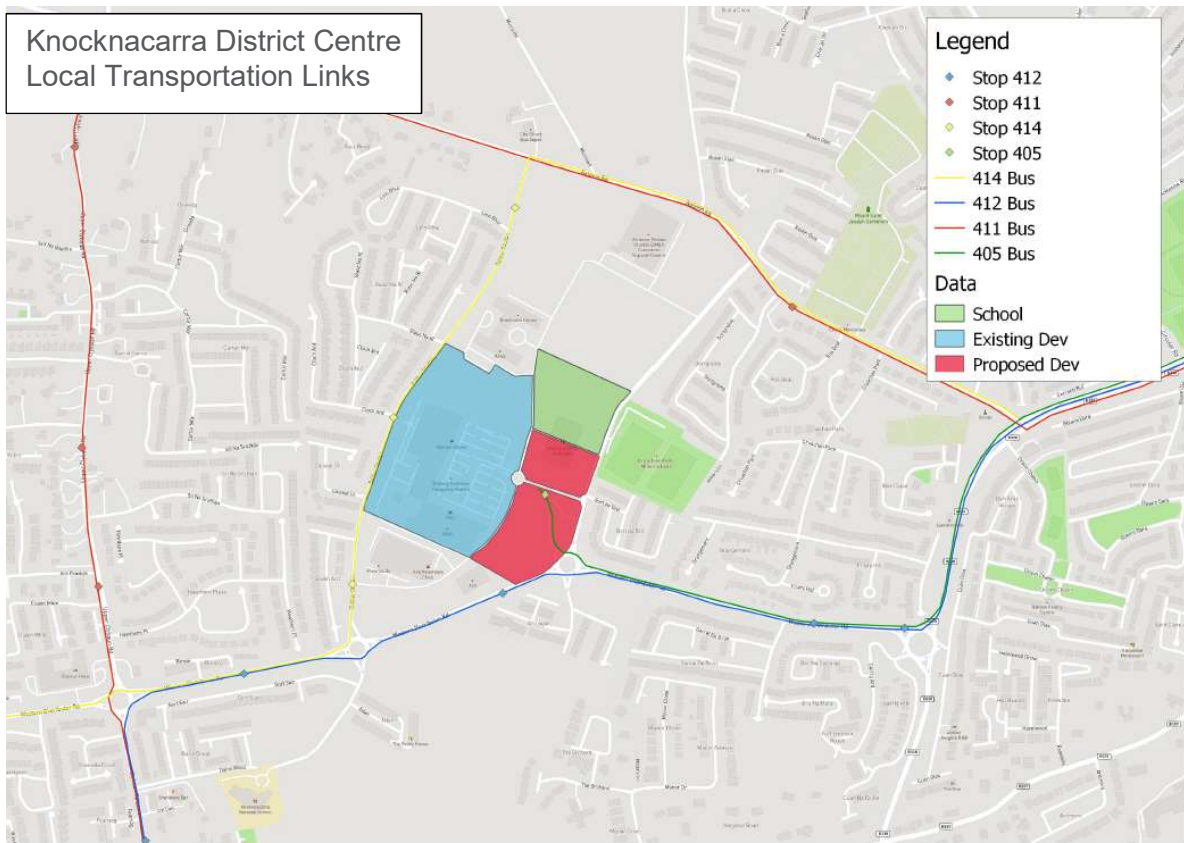
Below are a list of benefits that can be attributed to taking the bus instead of the car.

Benefits of Bus Travel	
<ul style="list-style-type: none"> <li>Scheduled regular services;</li> <li>Safer form of travel;</li> <li>Economic form of travel</li> <li>Reduces traffic congestion;</li> </ul>	<ul style="list-style-type: none"> <li>Increases mobility;</li> <li>Avoids parking hassle</li> <li>Removes stress of driving.</li> </ul>

Local bus routes and stops are illustrated in Figure 4-1 below.

[Grab your reader’s attention with a great quote from the document or use this space to emphasize a key point. To place this text box anywhere on the page, just drag it.]





**Figure 4-1 Local bus routes and stops**

## 5. Did you know

The following is a summary of a number of services and incentive schemes supported by the Government to encourage more frequent travel by sustainable means. Please refer to Chapter 6 for links to more detailed information.

### Leap Card

Leap Card is convenient way to pay for public transport. It eliminates the need to carry change for fares. Fares are generally 30% cheaper than single cash tickets.

TFI Leap Cards can be topped up using ticket machines available at selected stations and at Payzone Leap agents around the city. Alternatively users can download the Leap Top-up App onto a NFC-enabled Android phone and top up directly from their phone.



### Tax Saver

The Tax Saver Commuter Ticket Scheme is an incentive for workers to use public transport as a means of travel to and from work.

The employer and employees enter into a contract agreeing to participate with each other. The employer then then applies to the selected travel provider for commuter tickets for employees. In providing employees with commuter tickets the employer saves on PRSI payments. Employees also benefit from reductions in income tax, PRSI, and USC.

Employees receive tickets as part of their salary packages, in lieu of any cash bonus or as benefit in kind. Savings arise from tickets not being subject to tax, PRSI or USC.

### Bike to Work

The bike to work scheme is a tax incentive scheme which aims to encourage cycling to and from work by employees. Under the scheme the employer pays for the bicycles and equipment up to a value of €1000. The employee then pays this sum back over a period of 12 months through a salary sacrifice arrangement. The employee is not liable for any tax, USC or PRSI payable on the repayments. This scheme can be availed of once every 5 years.



## 6. Find Out More

### Further Information Links

#### Transport for Ireland: [www.transportforireland.ie](http://www.transportforireland.ie)

Services available online include;

- Journey Planner;
- Real time passenger information;
- Interactive maps;
- Taxi Fare estimator;
- Cycling route planner.



The Transport for Ireland smartphone app, includes the services listed above.

#### Galway Transport: [www.galwaytransport.info](http://www.galwaytransport.info)

Services available online include;

- Timetables;
- Route planner;
- Fare information.



The Dublin Bus smartphone app, includes the services listed above.

#### Bike to Work Scheme: [www.biketowork.ie](http://www.biketowork.ie)

Information available on the online includes;

- Information about bike to work schemes;
- Savings estimator;
- Store locator.



#### Leap Card: [www.leapcard.ie](http://www.leapcard.ie)

Information available on the online includes;

- Information on using Leap Cards;
- Purchasing information;
- Online top ups:



The Leap Card smartphone is also available. Leap Card balances can be topped up and checked with compatible smartphones using this app.

TaxSaver: [www.taxsaver.ie](http://www.taxsaver.ie)

Information available online includes;

- Information explaining tax saver schemes;
- Savings calculator;
- Ticket information;
- Online registration.





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# Appendix F. Road Safety Audit

# Knocknacarra District Centre

Stage 1 Road Safety Audit

Glenveagh Living

January 2019

# Notice

This document and its contents have been prepared and are intended solely for Glenveagh Living information and use in relation to proposed development at Knocknacarra District Centre Stage 1 Road Safety Audit. WS Atkins International Limited assumes no responsibility to any other party in respect of or arising out of or in connection with this document and/or its contents.

## Document history

Revision	Purpose description	Originated	Checked	Reviewed	Authorised	Date
Rev 0	Draft	CMcA	CMcA	MD	MD	18.01.19
Rev A	Issued	CMcA	CMcA	MD	MD	23.01.19

## Client signoff

Client	Glenveagh Living
Project	Knocknacarra District Centre
Job number	5168265
Client signature / date	



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# 1. Introduction

## 1.1. Background

This report describes the findings of a Stage 1 Road Safety Audit associated with the proposed development at Knocknacarra District Centre in Knocknacarra, Ragoon, Co. Galway.

The Audit has been completed by Atkins on behalf of Glenveagh Living.

## 1.2. Site Inspection

The site inspection was carried out on the 16th January 2018 by the Audit Team.

Weather conditions during the site inspection were Dry and 4°; road surfaces were wet.

## 1.3. The Team

The Road Safety Audit Team members were as follows:

- Team Leader: Martin Deegan BEng (Hons) MSc CEng MICE
- Team Member: Catherine McAndrew BA (Hons)

## 1.4. The Design

The following drawings were examined as part of the Stage 1 Road Safety Audit process:

**Table 1-1 – Design Team Drawing List**

Drawing Number	Drawing Title	Revision
5168265-ATK-HT-SK-1007	Road Layout	A

The Phase 3 of the Knocknacarra District Centre – Urban Design Report, January 2019 was also provided to the Audit Team for inspection.

## 1.5. Compliance

This Road Safety Audit has been carried out in accordance with the procedures and scope set out in TII publication number **GE-STY-01024 - Road Safety Audit**.

As part of the road safety audit process, the Audit Team have examined only those issues within the design which relate directly to road safety.

The road safety audit process is not a design check, therefore verification or compliance with design standards or any other criteria have not formed part of the audit process.

All of the problems described in this report are considered by the Audit Team to require action in order to improve the safety of the scheme and minimise the risk of collision occurrence.

## 2. Road Safety Issues Identified

### 2.1. Problem: Lane Alignment Through Junction

**Location:** Proposed Junction Gort Na Bró

The straight-ahead movements through north and east of the proposed junction do not align. This could result in driver confusion with possible side swipe collisions.

#### **Recommendation**

The Design Team should review junction form to improve the alignment for straight-ahead traffic movements i.e. minimise the swerve manoeuvres.

### 2.2. Problem: Pedestrian Facilities at the Junction

**Location:** Proposed Junction Gort Na Bró

Pedestrian facilities are shown solely on the western arm of the proposed junction. This provides no safe crossing for pedestrian/cyclists on the remaining three arms. This could result in conflict between general road traffic with vulnerable road users.

#### **Recommendation**

The Design Team should provide uniform and consistent crossing facilities serving all arms of the proposed junction.

### 2.3. Problem: Right Turning Lane Provision

**Location:** Proposed Junction Gort Na Bró

Right turning traffic into the Gort na Bró residential estate could restrict straight ahead traffic. This could result in delays to straight ahead traffic and or rear end shunts.

#### **Recommendation**

To mitigate this risk, the Design Team should develop an appropriate signal phasing plan and design the lane allocations on all junction arms to support it.

### 2.4. Problem: Inconsistent Road Width

**Location:** Proposed Link Road Between Roundabout & Gort Na Bró

The kerb line on the southern side of the link road appears irregular (or faceted) and the kerb line does not appear to align with the street centre line. Motorists will be forced to adjust their driving line to avoid striking the kerb. This increases the risk of motorists colliding with other road users.

#### **Recommendation**

The Design Team should review the kerb line to provide a flowing horizontal alignment and consistent carriageway cross section.

## 2.5. Problem: Uncontrolled Crossings

**Location:** Throughout Scheme

The proposed uncontrolled crossings appear to be of varied design and inconsistent with the character of the existing zebra crossings (which were not referenced on the drawing) within the project roads. This could lead driver confusion and increase likelihood of collisions between vehicles and vulnerable road users at the crossing points.

### **Recommendation**

The Design Team should amend the uncontrolled crossings to match the existing zebra crossings within the project roads.

## 2.6. Problem: Existing Roundabout Crossing

**Location:** Existing Roundabout to Retail Park

The existing four arm roundabout has an uncontrolled crossing on the western arm, the markings are worn and partially visible. The proposed design includes additional uncontrolled crossings on the three remaining arms at varying distance from roundabout entry/exit point. This could lead driver confusion and increase likelihood of collisions between vehicles and vulnerable road users at the crossing points.

### **Recommendation**

To ensure greater legibility for drivers and safe crossing conditions for vulnerable road users, the Design Team should rationalise the uncontrolled crossings on all arms of the roundabout. They should also ensure continuity in design and consistency in layout is maintained between existing and proposed crossings (refer to the previous problem also).

## 2.7. Problem: Landscaping May Obscure Visibility

**Location:** Throughout Scheme

The proposed landscaping may block forward visibility to crossings and sightlines at junctions. This could increase likelihood of collisions between vehicles and vulnerable road users at the crossing points.

### **Recommendation**

The Design Team should ensure proposed planting does not impact negatively upon visibility. Where landscaping is required, planting should be restricted to low growth species which do not exceed the lower limit for drivers' eye height when left untended (drivers' eye height being noted as 1.05 metres).



### 3. Audit Team Statement

We certify that we have examined the drawings and documents listed in Chapter 1 of this Report.

The Road Safety Audit has been carried out with the sole purpose of identifying any features of the design which could be removed or modified in order to improve the road safety aspects of the scheme.

The problems identified herein have been noted in the Report together with their associated recommendations for road safety improvements. We (the Audit Team) propose that these recommendations should be studied with a view to implementation.

No one on the Audit Team has been otherwise involved with the design of the measures audited.

#### Road Safety Audit Team

**Martin Deegan**

Audit Team Leader  
Road Safety Engineering Team

Signed:




**ATKINS**

Date: 23<sup>rd</sup> January 2019

**Catherine McAndrew**

Audit Team Member  
Road Safety Engineering Team

Signed:



**ATKINS**

Date: 23<sup>rd</sup> January 2019

## 4. Designers Response

The Designer should prepare an Audit Response for each of the recommendations using the Road Safety Audit Feedback Form attached in Appendix A.

When completed, this form should be signed by the Designer and returned to the Audit Team.

Please return the completed Road Safety Audit Feedback Form attached in Appendix A to:

Road Safety Engineering Team,  
Atkins,  
Atkins House,  
150 Airside Business Park,  
Swords,  
Co Dublin,  
Ireland.

Tel: 00 353 (0)1 810 8000

Email: [martin.deegen@atkinsglobal.com](mailto:martin.deegen@atkinsglobal.com)

The Audit Team will consider the Designers response and reply indicating acceptance or otherwise of the Designers response to each recommendation.

Where the Designer and the Audit Team cannot agree on an appropriate means of addressing an underlying safety issue identified as part of the audit process, an Exception Report must be prepared by the Designer on each disputed item in the audit report.

# Appendix A. Road Safety Audit Feedback Form

**Scheme:** Gateway Urban Village Knocknacarra


**Audit Stage:** Stage 1 Road Safety Audit

**Date Audit Completed:** 23<sup>rd</sup> January 2019

	To be completed by the Designer			To be completed by the Audit Team
Paragraph No. in Safety Audit Report	Problem accepted (yes/no)	Recommended measure accepted (yes/no)	Alternative measures (describe)	Alternative Measures accepted by Auditors (yes/no)
2.1	Y	N	Proposed alternative measures to provide traffic signals with relevant phasing. Each junction arm will have own traffic phase to make sure there is no conflict for vehicles.	Yes.
2.2	Y	Y	Problem accepted and amended. Please see Figure 3.	Noted
2.3	Y	Y	Problem accepted. There will be traffic signals provided with relevant phasing. Right turn and straight ahead will have own traffic phase to make sure vehicles moving without delays.	Noted
2.4	Y	Y	Problem accepted and amended. Please see Figure 4.	Noted
2.5	Y	Y	Problem accepted. There will be consistency provided for the scheme uncontrolled crossings.	Noted
2.6	Y	Y/N	Problem accepted however we have provided the crossing point as per TII/ DRUMS guidelines and they are placed after the flare has finished on the roundabout. We believe that this approach provides the consistency to design that the Auditor is looking for. The type and style of all crossings will be consistent with adjacent crossings.	Yes.
2.7	Y	Y	Problem accepted. There will be no planting within the visibility splays that encroaches on sight lines. Any planting within these areas will be kept below 0.6m.	Noted

**Signed by the Designer:** 

**Date:** 30.01.2019

**Signed by the Audit Team Leader:** 

**Date:** 29.03.2019

**Signed by the Employer:** 

**Date:** 05.11.2019

Figure 1. Network Layout Diagram

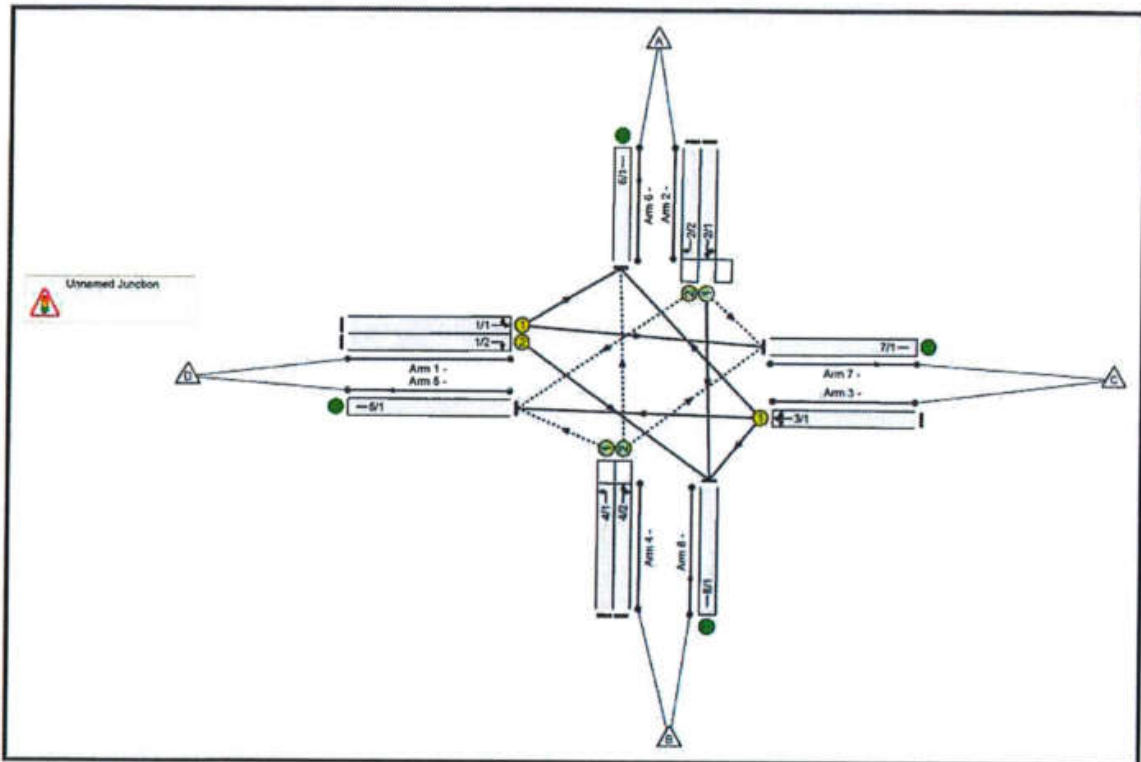
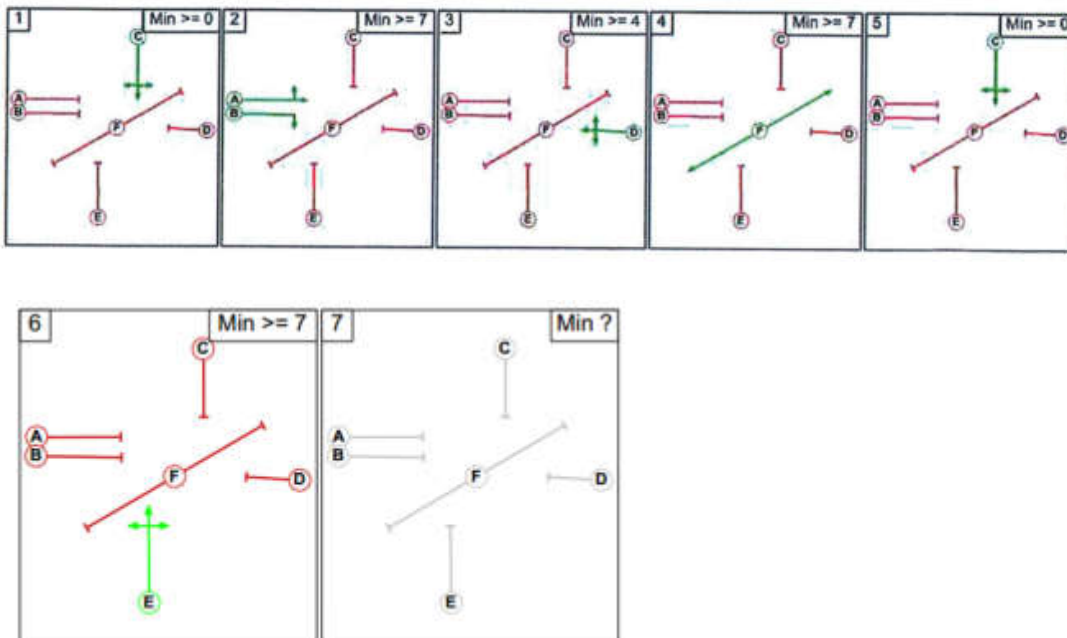
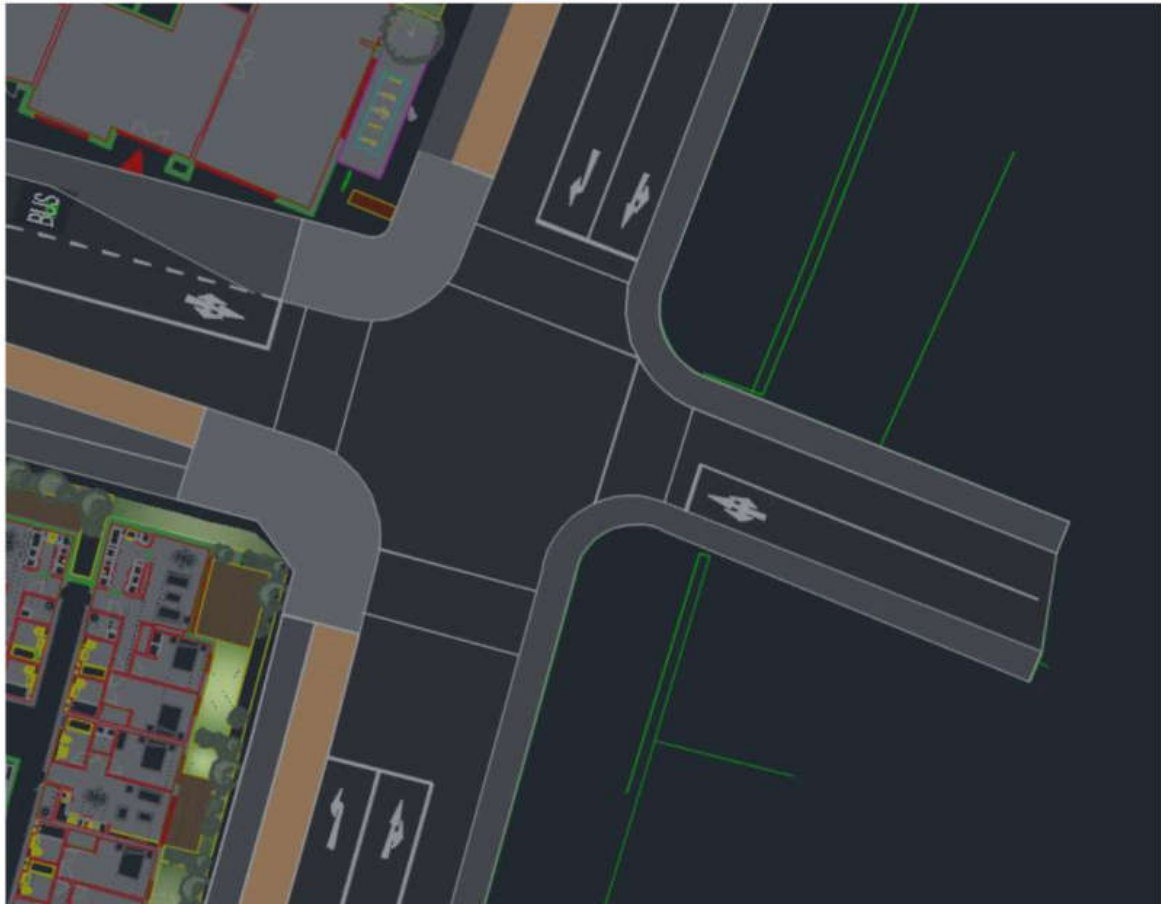


Figure 2. Stage Diagram





**Figure 3. Locations of pedestrian crossing the proposed junction**



**Figure 4. Amended kerb line**



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Fax +353 21 4290360

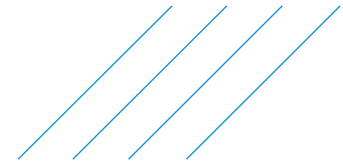
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**email: [info.ie@atkinsglobal.com](mailto:info.ie@atkinsglobal.com)**

[www.atkinsireland.ie](http://www.atkinsireland.ie)

# Appendix G. Parking Report



# Residential Parking

## Technical Report

Project:	Knocknacarra District Centre		
Subject:	Residential Parking Management		
Author:	Kasia Garvey	Atkins No.:	5168265DG0044
Date:	09/10/2019	Icepac No.:	
Rev:	3	Project No.:	5168265
Distribution:	Representing:		

## 1. Introduction

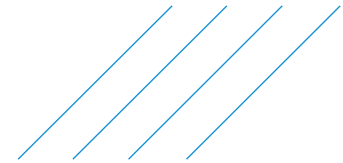
Atkins were requested by Glenveagh Living to provide a parking management strategy for the residential aspect of the proposed development in Knocknacarra District Centre, Ragoon, Galway. The proposed development is mixed use and includes:

- 332 new residential units;
- Commercial floor space of 2,667 square metres;
- 266 number of residential car parking spaces and provision of realigned road between Gort na Bró and Gateway Retail Park Road; and
- Community development, shared communal and private open space, site landscaping and all associated development works.

## 2. Objective of the Technical Note

The proposed development is part of the wider development of this area which includes the operational Phase 1 Gateway Retail Park, Phase 2 currently under construction and Future District Centre Use Site, see Figure 1 for location details. This area when fully developed will enhance the neighbourhood and its environs. It will become an urban village for proposed and existing residences.





**Figure 1 – Proposed development location plan**

There are currently 315 No. ground floor parking spaces and 409 No. basement parking spaces serving the retail development Phase 1 with one access point through the mini roundabout at the entrance to the Gateway Retail Park. On completion of Phase 2, there will be a total of 333 No. parking spaces at ground floor and 563 No. parking spaces in the basement area. There will be a second access point to the basement carpark via a new ramp located off the Local Road across from the Gaelscoil Mhic Amhlaigh School.

There is a large unused void space within the Phase 2 basement. This area has been made available to the proposed development for residential parking needs. Additionally, two areas have been identified within the ground floor plan of the development for residential parking, a ground floor carpark area in the podium between blocks E and F and a parking bay along the Local Road in the Plaza area. The residential parking requirements for the proposed development will be met by the combination of these three areas. Figure 2 below illustrates the proposed parking locations within the site with associated pedestrian and vehicular access points.

The main pedestrian routes on the completion of the proposed development are shown in Figure 3 below. The Phase 2 development proposes a new pedestrian link connecting Bothar Stiofain through the Phase 2 carpark and along the Gaelscoil Mhic Amhlaigh to Millers Lane. This pedestrian link will be utilised by the residents of the proposed development to access the underground carpark. See Figure 3 above for pedestrian link network on the completion of the proposed development.

The purpose of this document is to set out where residential parking is being provided and how this will be managed to ensure that the residential parking is not utilised by others within the development.

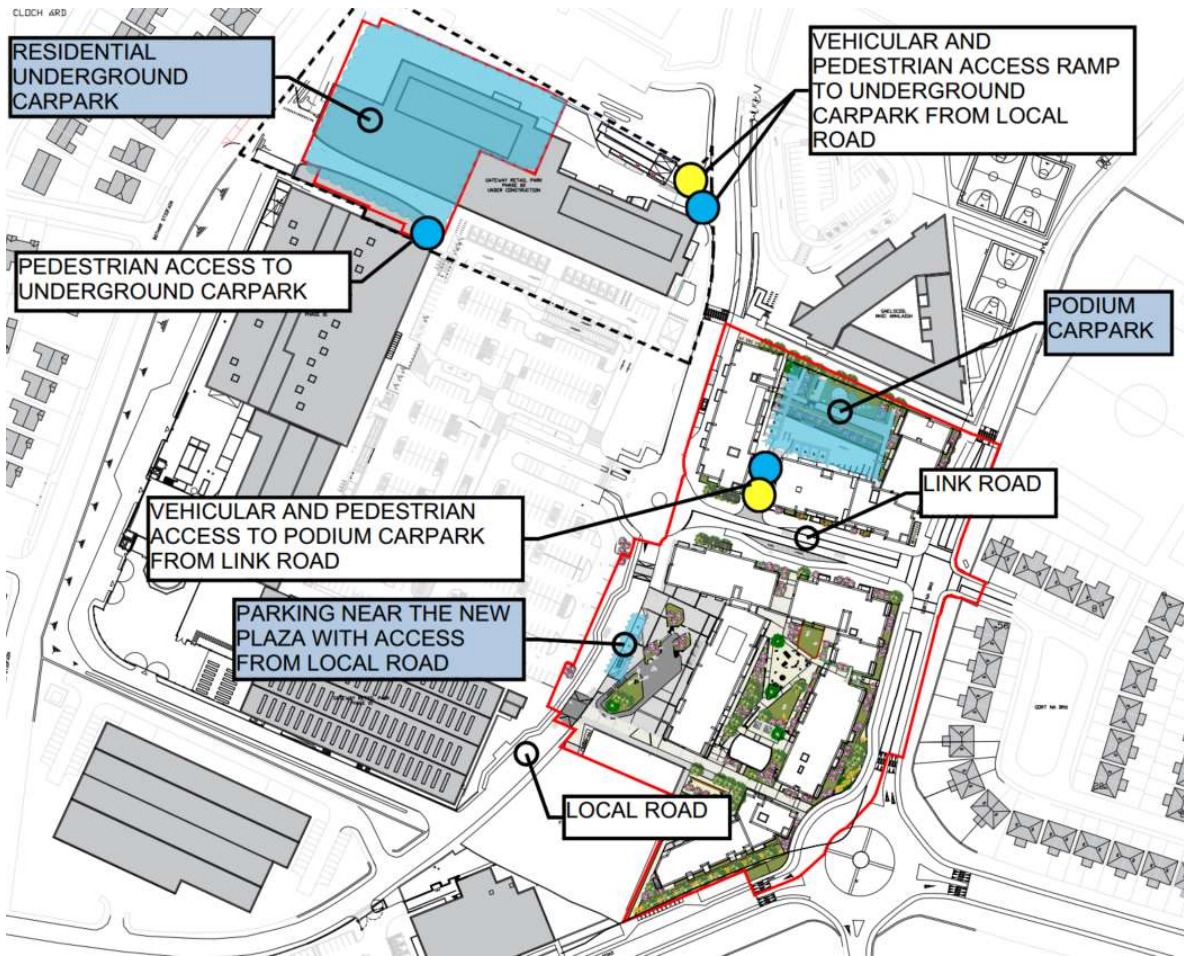
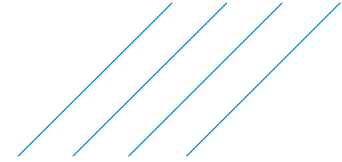


Figure 2 – Proposed residential parking location and access



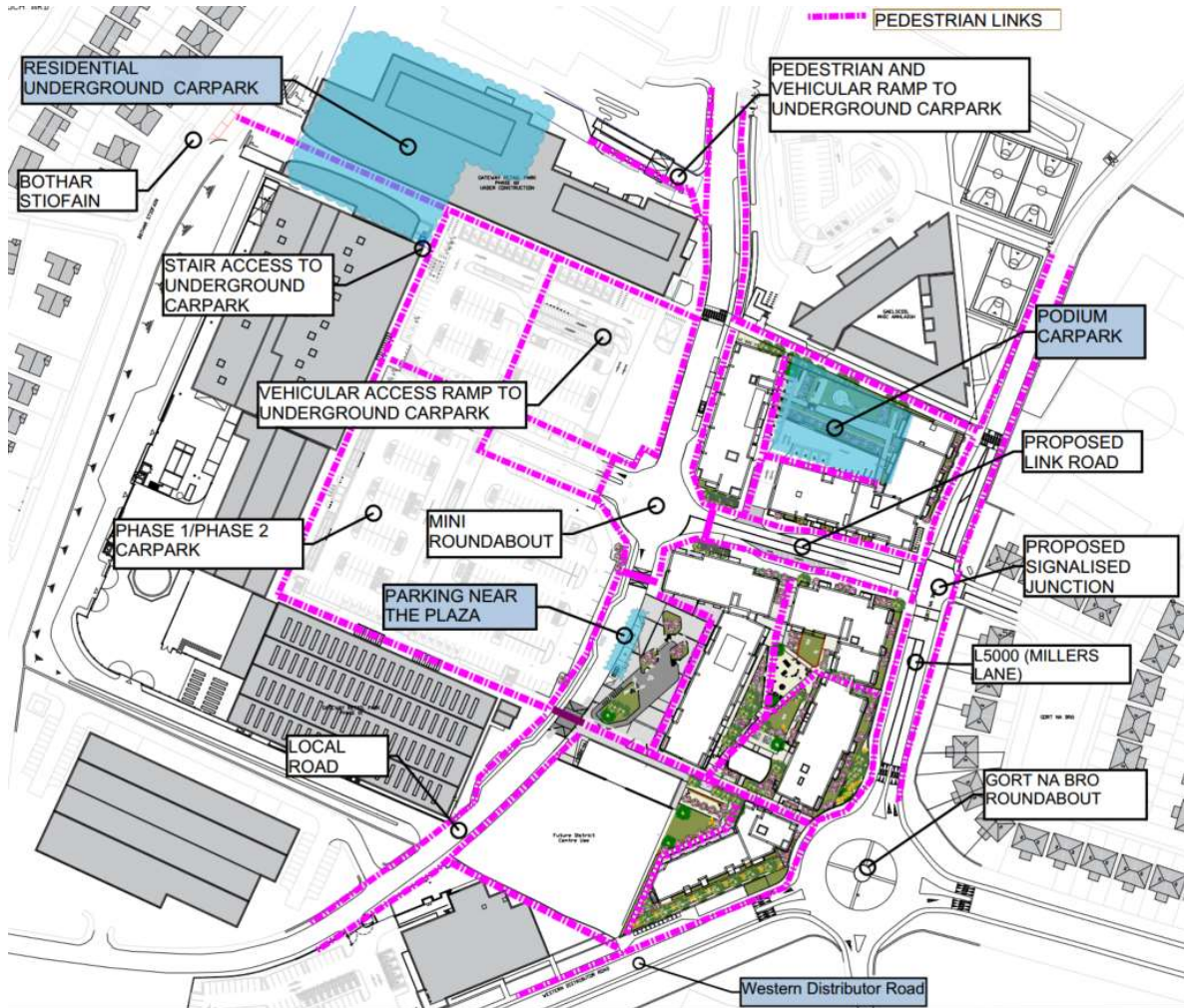
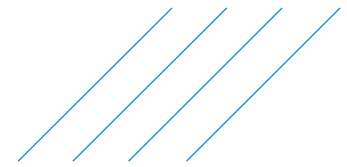


Figure 3 – Main pedestrian routes on the completion of the proposed development



### 3. Residential parking provision

The residential parking provision is discussed in Chapter 9 of the Traffic and Transport Assessment (TTA). It is based on the requirements of the "Sustainable Urban Housing: Design Standards for New Apartments Guidelines for urban Planning Authorities".

Parking ratio of 0.8 has been proposed for the residential aspect of the proposed development and is discussed in Section 10.5 of the TTA. The podium carpark provides for 82 No. spaces, 3 No. parking spaces are proposed along the Plaza area and the remaining 181 No. spaces are allocated in the Phase 2 Basement carpark area. See figures 4 and 5 below for parking allocation plans.

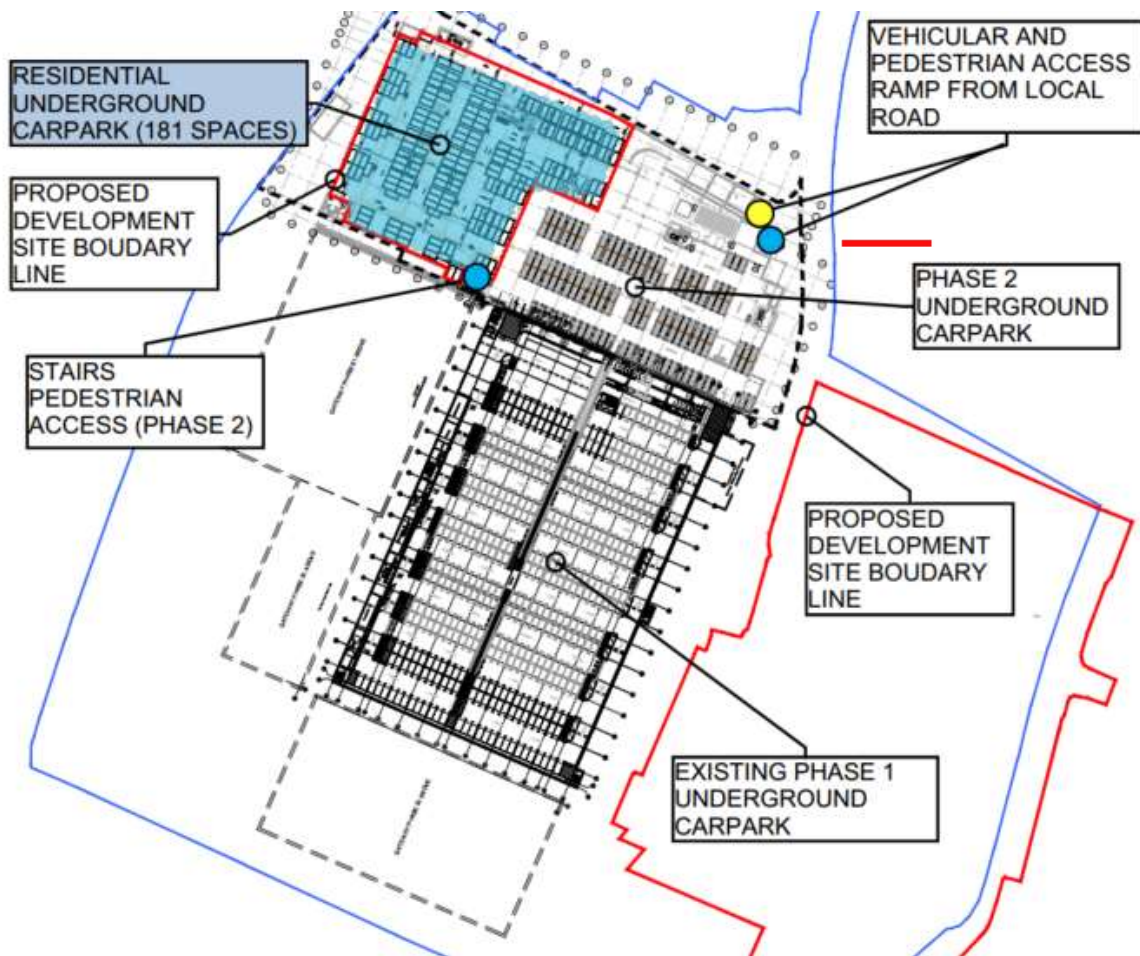


Figure 4 – Proposed parking allocation plan – basement carpark.



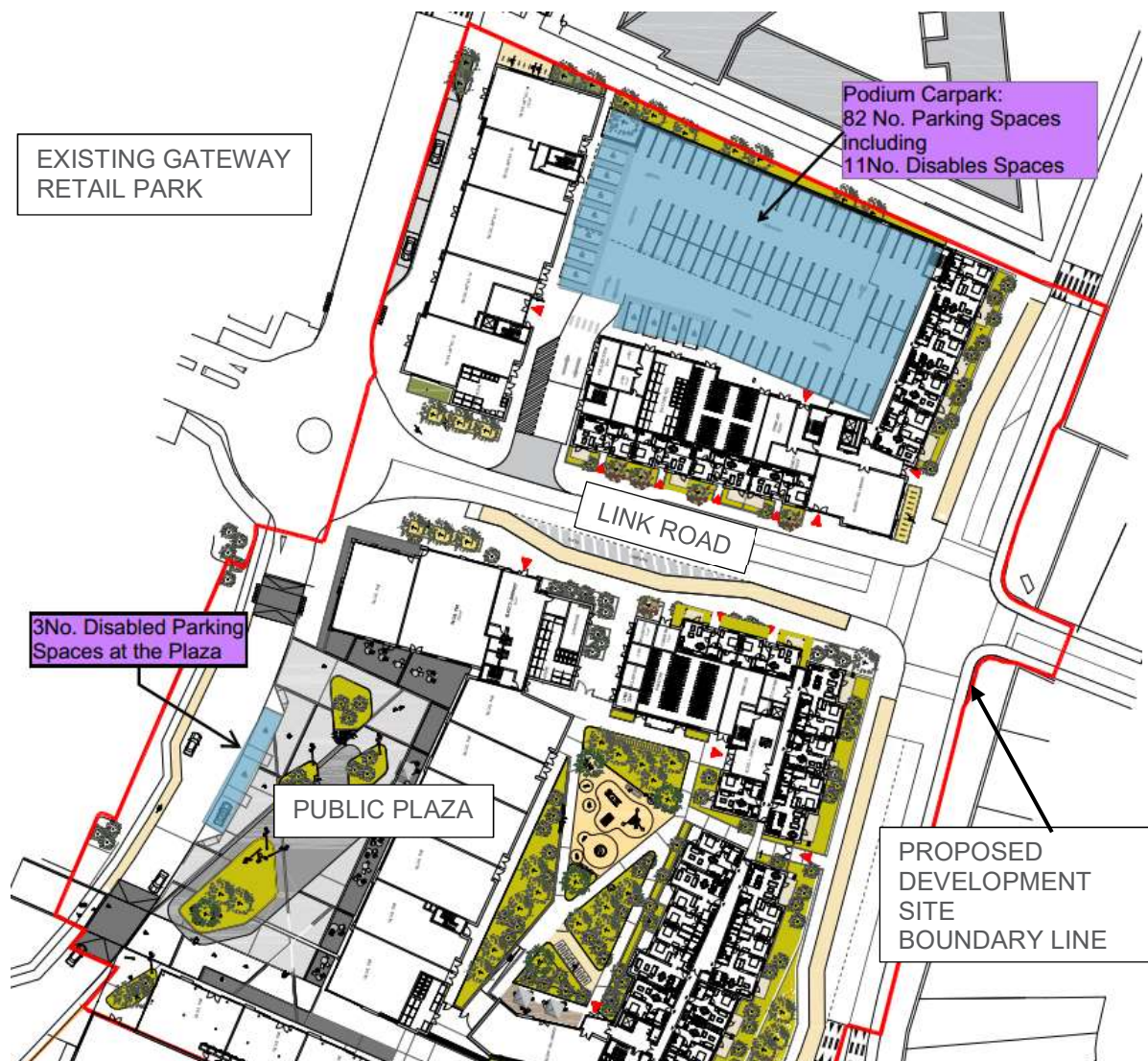


Figure 5 – Proposed parking allocation plan – ground floor carpark

### 3.1. Podium carpark

The podium carpark is an at grade parking area located between blocks E and F, see Figure 5 above for location plan. 82 No. parking spaces have been allocated within this carpark including

- 11No. disabled spaces
- 14No. electrical supplied carparking spaces to encourage e-car usage (5% of overall residential parking provision).

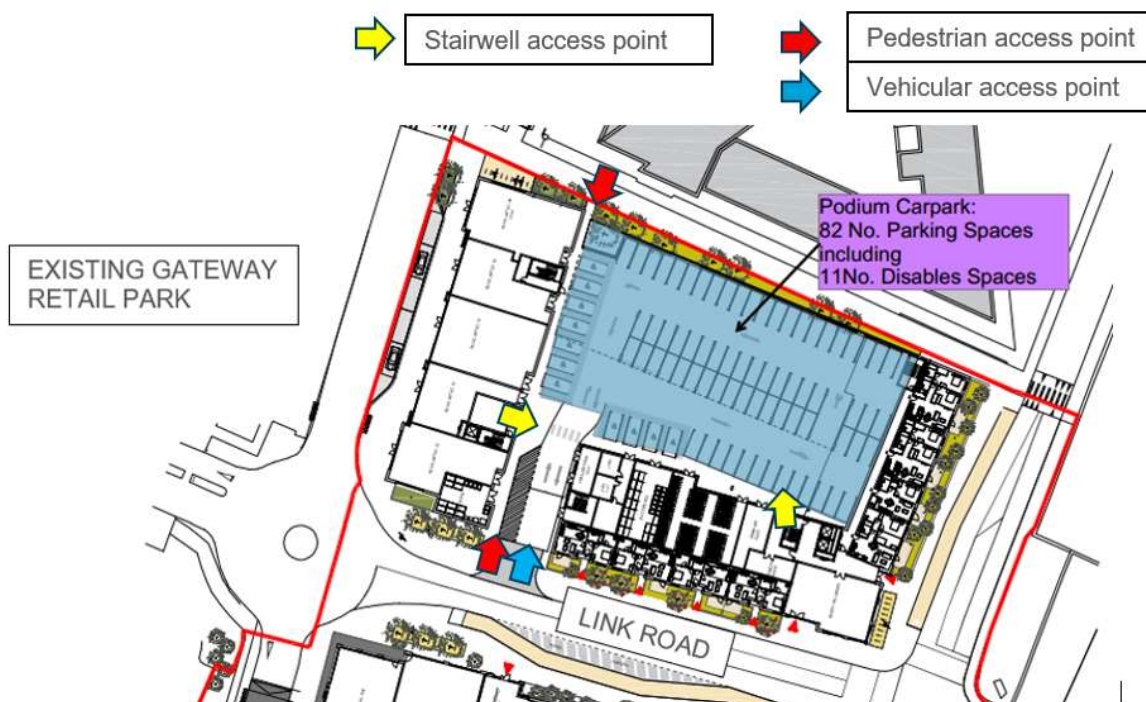


Figure 6 – Podium carpark access points

### 3.1.1. Vehicular Access/Egress

Access to this carpark is provided off the Link Road and will be controlled by means of an automated gate. Refuse vehicle and deliveries also use this same entrance. It is proposed that the deliveries and refuse removal will be scheduled for off peak times to minimise the disruption to residents entering/exiting the carpark. To further assist with this, the delivery bay is placed away from the entrance and the refuse vehicles movements are envisaged to occur once a week.

Detailed Autotrack analysis have been carried out using a Large Car. Autotrack analysis drawings are included in Appendix B of the Traffic and Transport Assessment report prepared by Atkins.

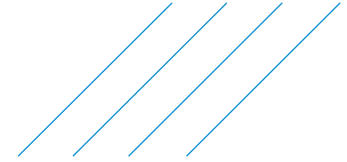
### 3.1.2. Pedestrian facilities

The pedestrian access is provided off the Link Road and directly from the entrance to the Blocks E and F. A 1.8m two-way pedestrian facility is proposed to be incorporated within the circulatory carriageway of the carpark. The disabled users parking spaces are provided near the entrance to Building F.

Pedestrian access to this carpark is provided through Stairwells in Blocks E and F. Residents can also gain access by foot through main entrance from Link Road and from walkway at the boundary with the Gaelscoil Mhic Amhlaigh school. See Figure 6 above for pedestrian access location.

## 3.2. Parking at the plaza

Parking at the plaza is located along the Local Road as shown in Figure 5 above. The 3 No. residential parking spaces provided at this location have been designated for mobility impaired users only. These spaces are conveniently accessed from the Local Road and are accessible by foot through the Plaza area.



### 3.3. Underground carpark

The underground residential carpark is proposed in the void space located in the basement of Phase 2 development, see Figure 4 above for location plan. It includes 181 No. Parking spaces. Detailed Autotrack analysis have been carried out using a Large Car. The drawing showing general arrangement of this carpark and Autotrack analysis is included in Appendix A.

#### 3.3.1. Vehicular Access/Egress

The vehicular access to the basement carpark is provided off the Local Road, north-west of Block E by means of a two-way ramp, see Figure 7 below.

Phase 2 service yard entrance is located adjacent to the underground carpark access ramp. The deliveries and refuse pick-up will be scheduled so that they don't coincide with the parking peak periods.

Within the underground carpark the residential parking zone will be delineated using bollards and appropriate signage. Automated fob-controlled barriers will be located at the entry and exit from the residential carpark zone. The headroom restriction bar will be set at 2.1m at the entry barrier, as headroom is reduced at this location due to existing lift shaft above.

A total of 5 No. parking spaces near Stair S06 will be accessible from the commercial parking area of Phase 2 only. Access to these parking spaces will be provided by means of fob controlled automated bollards to prevent unauthorised parking. See parking plan drawing in Appendix A for parking plan layout and bollard location details.

#### 3.3.2. Pedestrian facilities

1.8m pedestrian walkway will be delineated within the carpark circulatory carriageway connecting the pedestrian points of entry with the residential carpark area. See proposed carpark layout drawing in Appendix A for details.

The residents can access the carpark on foot using the pedestrian stairs adjacent to vehicular ramp at the entrance from the Local Road near the school, and also through Stair S2 from the retail carpark above, which provides both stair and lift options. See Figure 7 below for access points location.

The current retail operating hours are 8:30am to 10pm Monday to Saturday and 9am-10pm on Sunday.

Security management company will patrol the site outside of the retail operating hours. The appropriate level of lighting and CCTV surveillance will be provided to ensure safety of residents outside of the retail park operating hours, especially during the darkness and night.



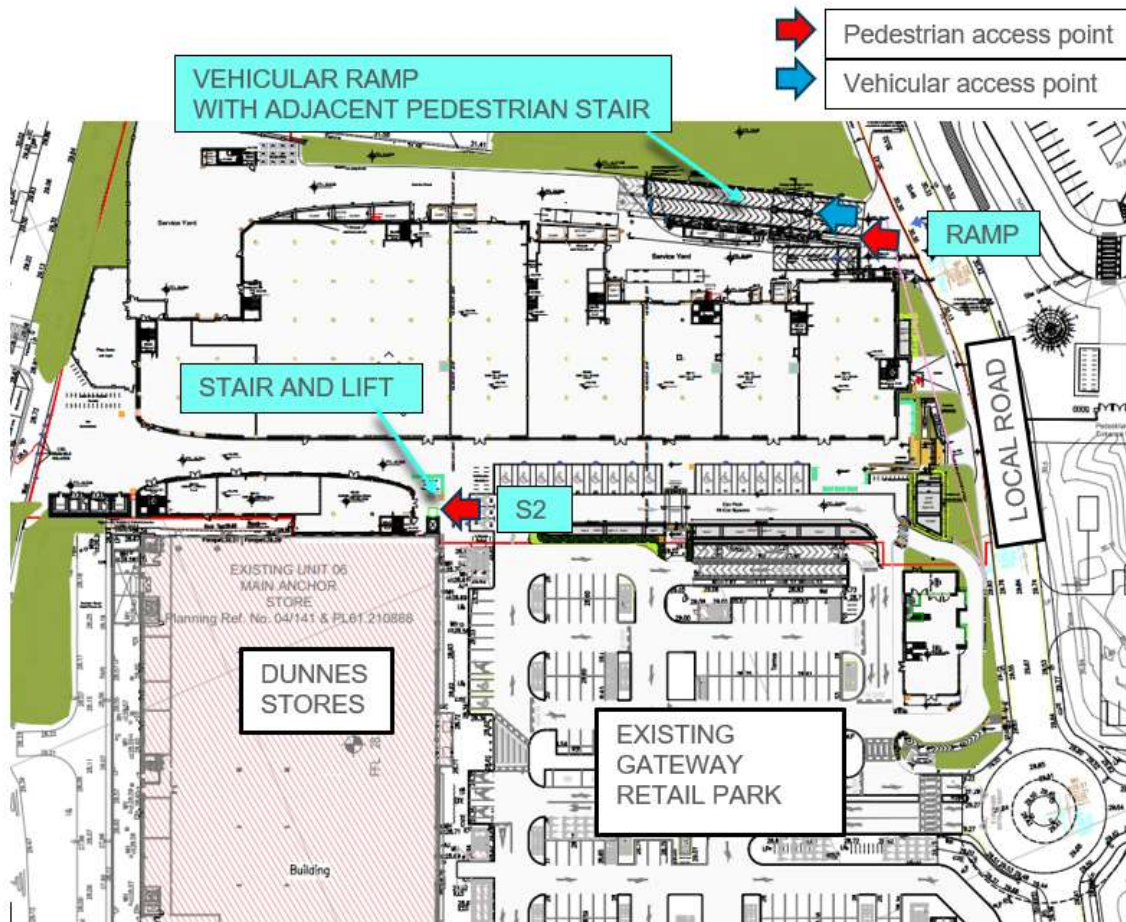
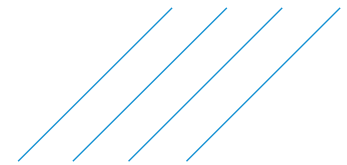


Figure 7 – Basement carpark access points

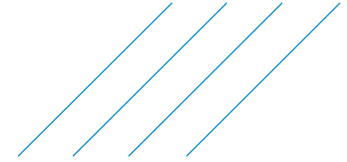
### 3.4. Disabled spaces allocation

The disabled spaces required is typically 5% of overall parking provision for the residences. This means that a total of 14 spaces are required for the proposed development. 11 No. disabled spaces are located within the Podium Carpark along the blocks E and F. Additionally 3 No. disabled parking spaces are proposed along the Local road in the Plaza area. All of these spaces are in close proximity to the residences provided as part of the proposed development.

### 3.5. Residential visitor parking

As the proposed development forms part of the Knocknacarra District Centre it is anticipated that the residential visitor trips will be of dual purpose, ie. the residential visitors will also visit the retail or other services within the Knocknacarra District Centre (like community amenity, creche etc.). In addition to this, the proposed development is located in a well serviced accessible urban location with an array of alternative transport modes to facilitate visitor trips.





One bus stop is located in the middle of proposed development with alternative bus stops located within 5-10minute walk from the development. Currently these services combined provide 7 No. of buses every hour during peak times. The NTA is proposing upgrade works to their existing bus service in this area to high level of service. It is anticipated that on the completion of the works the bus frequency will further increase.

A mix of sheltered and surface visitor bicycle parking spaces are proposed within the development. These are conveniently located throughout the proposed development and are directly accessible from the public roads and shared areas. All bicycle parking is located at ground level, so that cyclists don't need to negotiate access up stairs or ramps. The total bicycle stands provision of 677 spaces within the development is well in excess of the requirements within Galway City Development Plan.

The visitors will also have access to the car club facility set up as part of the proposed development. Along the Local Road adjacent to the plaza there is an existing drop-off facility, that may be utilised by the visitors as well as the taxi rank that is located within the existing Gateway Retail Park ground floor carpark.

The combination of above facilities well serves residential visitor access to the proposed development.

Visitor parking demand can be accommodated within the available parking provision. The parking permits may be issued to residents for visitors parking, so that the visitors display them while parking within the development. The management company will monitor the visitor parking and will review it on ongoing basis.

## 4. Residential parking management

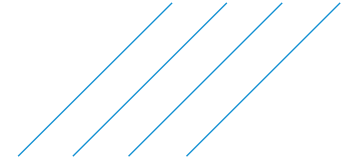
The residential car parking spaces will be allocated within the designated residential parking areas to those residents who will purchase the spaces from the Client. All parking bays will be numbered. The management company will assign parking permits for each parking space and will record vehicle registration associated with each space.

Residents will be issued with a fob to activate automated gates at entry/exit to carpark and to access Stair S01 outside business hours. The 4 No. spaces accessible from commercial parking will be controlled using fob controlled automated bollards.

It is envisaged that Residential Management company will engage with the residents to address any parking management issues. Residents will be informed of parking restrictions within the retail parking areas and control measures in place.

Periodic patrols of the development's car parking areas will be conducted. More frequent monitoring will be in place for the 3 parking spaces dedicated to persons with disabilities along the plaza area.

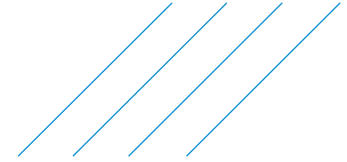
Any unauthorised cars parked within the development will be subject to enforcement measures. These enforcement measures will include warning notices and vehicle clamping (with fines levied when appropriate for the release of vehicles). Appropriate signage will be posted within the development, in proximity to car parking spaces, to draw attention to the parking restrictions and enforcement regime in place. The enforcement of car parking restrictions within the development will be the responsibility of a management company.



## 5. Car share facility

Estate management will be responsible for setting up and running of the Car club, alternatively agreement with Gocar/Zipcar will be arranged for the development. All residents in the development will be made aware of this facility and will have access to this car club. The car club will also be open to other users and locals within the area.

In general one car club space can replace 10 – 15 residential parking spaces. Exact number and location of the car club parking spaces will be agreed based on the model to be incorporated.



## 6. Summary

The proposed residential parking provision will be met by the combination of three areas within the development boundary. The majority of the parking is proposed within the unused void space in Phase 2 basement. Remaining parking is allocated at ground floor in the podium carpark between blocks E and F and at the Plaza area along the Local Road.

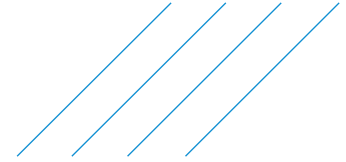
The pedestrian and vehicular access to the basement carpark is proposed off the Local Road through the Phase 2 ramp and basement parking area. Additional pedestrian access is provided in the Phase 2 development also at stair S2. Access within basement carpark will be controlled by gates and bollards. Illegal parking will be monitored by regular patrols by management company.

Access to ground floor parking in the podium and at the plaza will be provided from existing and proposed roads and pedestrian network that will be available on the completion of the proposed development.

The disabled parking spaces are located within the ground floor level at podium carpark and adjacent to the plaza to ensure that they are easily accessible from the residential units. All electric charged parking spaces are provided within the podium car park to encourage e-car usage.

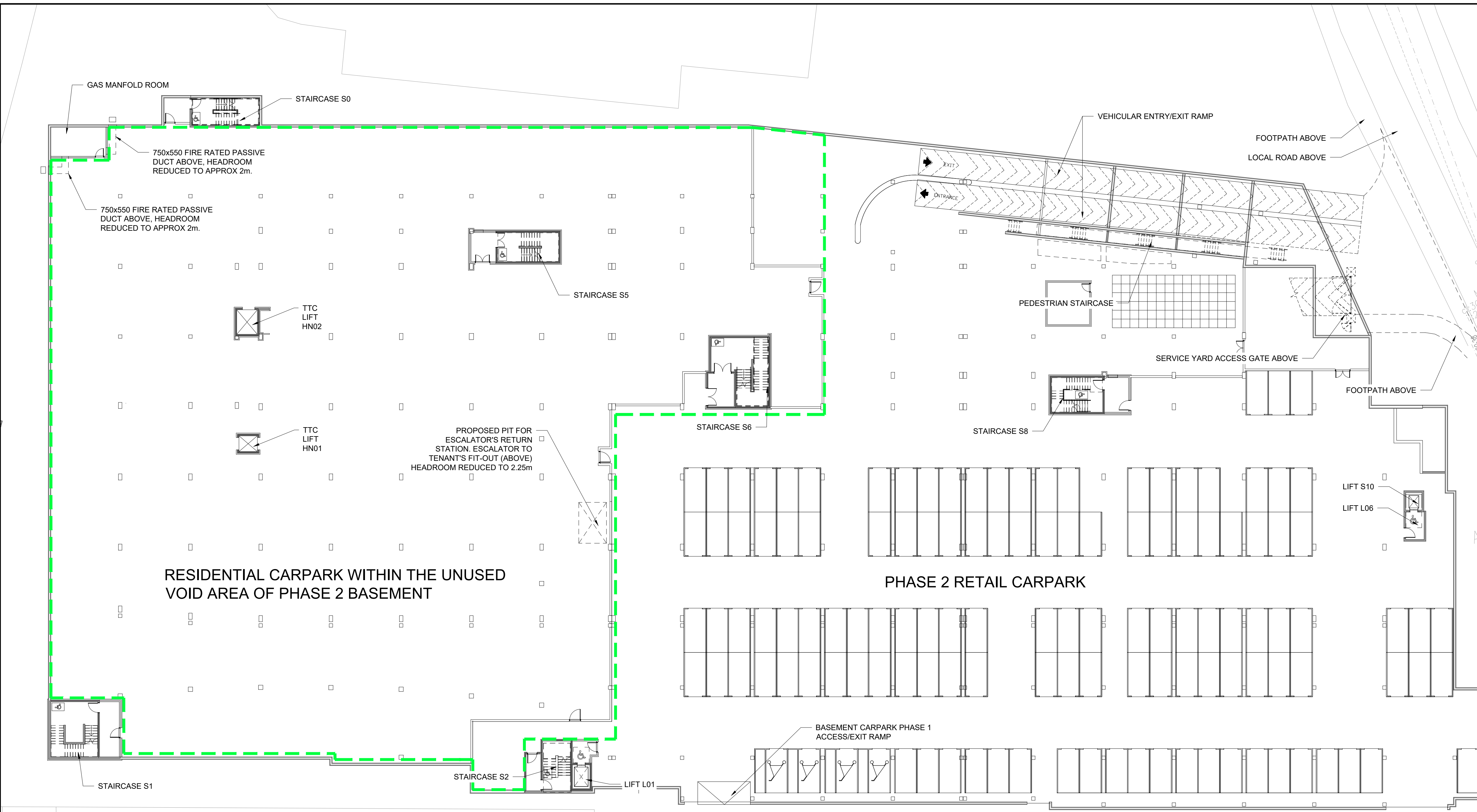
Majority of residential visitor trips will be of dual character, ie. they will be linked with other amenity visits within the development and can be accommodated within the available parking provision. In addition to this, the proposed development is located in well serviced accessible location with array of alternative access modes to facilitate visitor trips.

The residents will have access to a car club that will be set up within the development for use by the residents, visitors and the public.



# Appendix A. Drawings





- GENERAL NOTES**
1. ALL DIMENSIONS ARE IN METRES UNLESS NOTED OTHERWISE
  2. ONLY WRITTEN DIMENSIONS SHALL BE USED. NO DIMENSIONS SHALL BE SCALED FROM THE DRAWINGS
  3. ALL LEVELS ARE IN METRES AND ARE TO MALIN HEAD DATUM
  4. ALL COORDINATES ARE IN METRES AND ARE TO IRISH TRANSVERSE MERCATOR
  5. DRAWINGS ARE TO BE READ IN CONJUNCTION WITH THE SPECIFICATION
  6. POSITIONS OF EXISTING UTILITIES ARE BASED ON RECORDS FROM UTILITY COMPANIES WHERE AVAILABLE. THESE ARE SHOWN FOR BACKGROUND INFORMATION ONLY.
  7. ALWAYS REFER TO UTILITY RECORDS PACK AND VERIFY POSITIONS OF ASSETS ON SITE PRIOR TO COMMENCING ANY EXCAVATIONS.

**LEGEND:**

--- EXTENTS OF AREA REQUIRED FOR RESIDENTIAL CARPARK WITHIN THE UNUSED VOID AREA OF PHASE 2 BASEMENT

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Purpose: **STAGE 3 SUBMISSION**

Rev	Description	By	Date	Chk'd	Auth
A	ISSUED FOR INFORMATION	YC	02.10.19	AN	KG
-	ISSUED FOR INFORMATION	RG	14.05.19	AN	KG

**ATKINS**  
Member of the SNC-Lavalin Group

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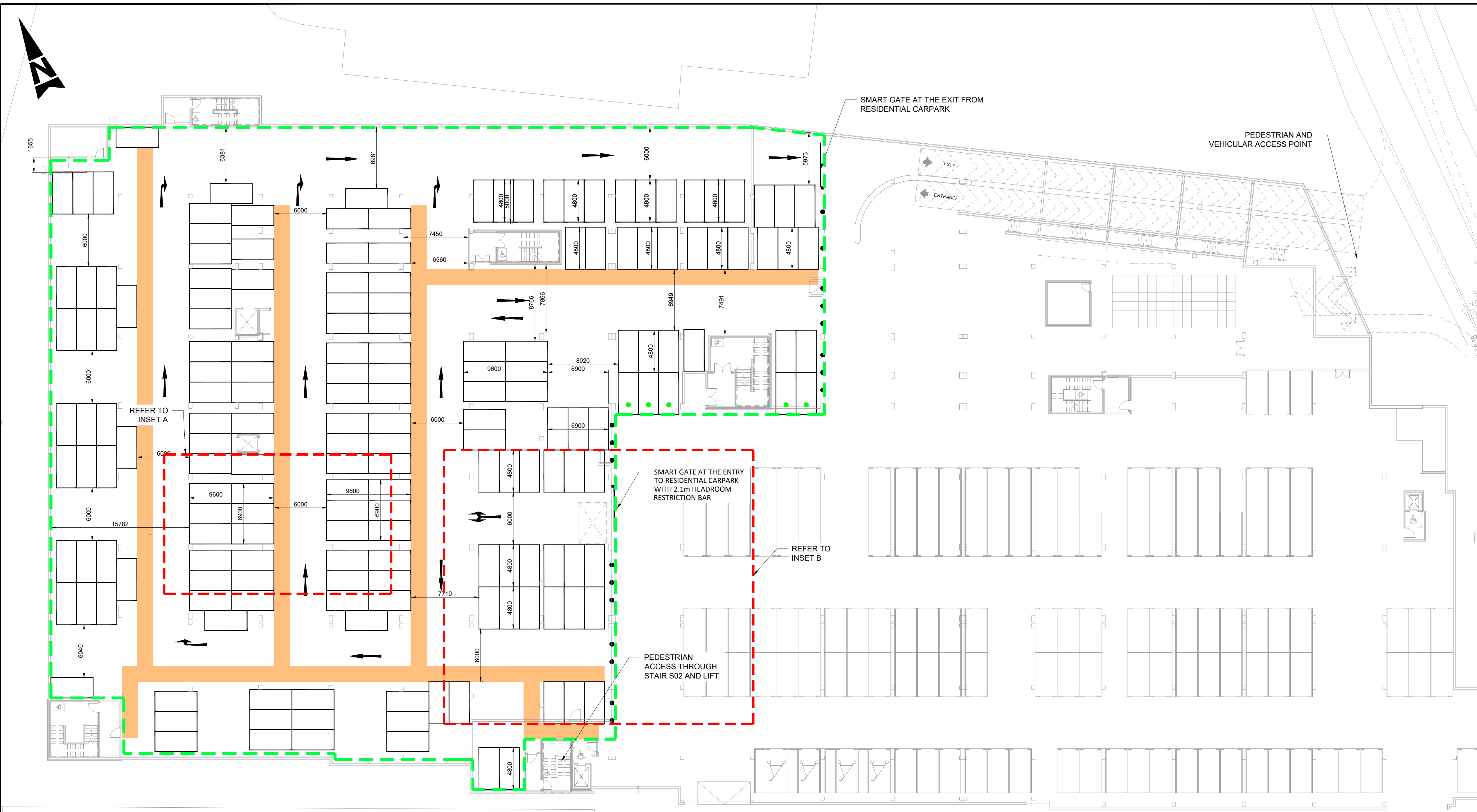
Unit 2B, 2200 Cork Airport Business Park, Cork  
Tel (+353) 021 429 0300 Fax (+353) 021 429 0360

2nd Floor Technology House Parkmore Technology Park, Galway  
Tel (+353) 091 786 0350 Fax (+353) 091 779 830

Client: **Glenveagh Living**

Project: **KNOCKNACARRA DISTRICT CENTRE**

Original Scale	Design/Drawn	Checked	Authorised
1:250 at A1	KH	KG	
1:500 at A3	Date 09.04.19	Date 09.04.019	Date 09.04.019
Status	Drawing Number	Rev	
I	5168265 / ATK / HT / 0106	A	



- GENERAL NOTES**
1. ALL DIMENSIONS ARE IN METRES UNLESS NOTED OTHERWISE
  2. ONLY WRITTEN DIMENSIONS SHALL BE USED. NO DIMENSIONS SHALL BE SCALED FROM THE DRAWINGS
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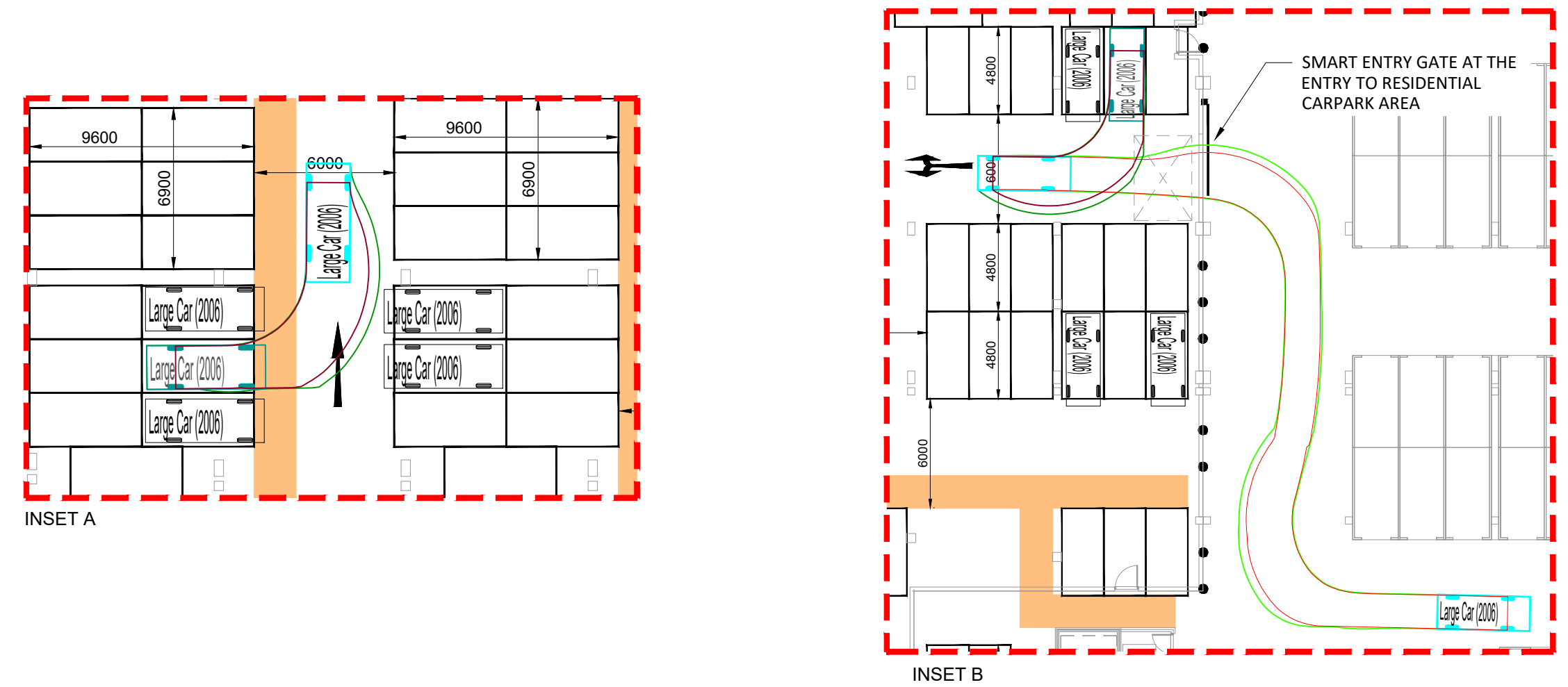
**LEGEND:**

- EXTENTS OF AREA REQUIRED FOR RESIDENTIAL CARPARK WITHIN THE UNUSED VOID AREA OF PHASE 2 BASEMENT
- 1.8m WIDE PEDESTRIAN WALKWAY WITHIN THE RESIDENTIAL CARPARK CIRCULATORY CARRIAGEWAY
- BOLLARDS TO DELINEATE RESIDENTIAL CARPARK
- COLLAPSIBLE BOLLARDS TO MANAGE RESIDENTIAL PARKING SPACE ACCESS
- M111, WHITE, 1200mm
- RRM 004, WHITE, 3600mm
- RRM 006, WHITE, 3600mm
- M 126, WHITE, 3600mm

LARGE CAR (2006)

OVERALL LENGTH	5.079m
OVERALL WIDTH	1.872m
OVERALL BODY HEIGHT	1.525m
MIN BODY GROUND CLEARANCE	0.310m
MAX TRACK WIDTH	1.831m
LOCK-TO-LOCK TIME	4.00s
CURB TO CURB TURNING RADIUS	5.900m

**RESIDENTIAL CARPARK PLAN**  
181 No. Parking spaces



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ORDNANCE SURVEY IRELAND & GOVERNMENT OF IRELAND

Rev	Description	By	Date	Chk'd	Auth
A	ISSUED FOR INFORMATION	YC	02.10.19	AN	KG
-	ISSUED FOR INFORMATION	RG	14.05.19	AN	KG

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Member of the SNC-Lavalin Group

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Unit 2B, 2200 Cork Airport Business Park, Cork  
Tel (+353) 021 429 0300 Fax (+353) 021 429 0360

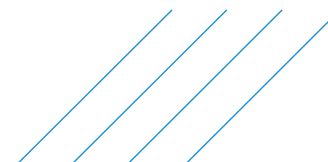
2nd Floor Technology House Parkmore Technology Park, Galway  
Tel (+353) 091 786 0350 Fax (+353) 091 779 830

Client: **Glenveagh Living**

Project: **KNOCKNACARRA DISTRICT CENTRE**

Purpose: <b>STAGE 3 SUBMISSION</b>			
Title: <b>BASEMENT CARPARK CARPARK PLAN</b>			
Original Scale: <b>1:200 at A1 1:400 at A3</b>	Design/Drawn: <b>KH</b>	Checked: <b>KG</b>	Authorised:
Status: <b>I</b>	Drawing Number: <b>5168265 / ATK / HT / 0107</b>	Date: <b>09.04.19</b>	Rev: <b>A</b>

# Appendix H. Consultation with N6 Galway City Ring Road



## Meeting Notes

<b>Project:</b>	5168265		
<b>Subject:</b>	Record of Meetings - Knocknacarra District Centre / N6GCRR		
<b>Meeting place:</b>	Arup Offices Galway	<b>Meeting no:</b>	5168265MINUTES0048
<b>Date and time:</b>	06/09/2019 02/10/2019	<b>Minutes by:</b>	Sharon Connolly
<b>Present:</b>	Eileen McCarthy Aisling Mooney Sean Devaney Niall Hogan (part) Sharon Connolly Sean McCarthy (part)	<b>Representing:</b>	Arup Arup Galway Co Co Galway Co Co Atkins MKOS

ITEM	DESCRIPTION AND ACTION	DEADLINE	RESPONSIBLE
1.	There have been two main meetings between the parties on dates stated above. There have also been phone calls and communication via e-mail. The main purpose of these meetings was to discuss the Phase 3 SHD submission for the above and its interaction with the N6 Galway City Ring Road (GCRR), noting that the N6 GCRR application is already lodged with An Bord Pleanála (ABP). These meeting minutes are a summary of what has been agreed between both parties.		
2.	Neither of the projects have been through planning and therefore it is uncertain as to which project will be built first.  Even if Knocknacarra District Centre receives planning first, the start of construction will be decided based on the economic climate.		

<b>Next meeting:</b>	NA		
<b>Distribution:</b>	Attendees & Aisling Byrne, Garret Collins, Paddy O' Connor, Lisa Cassidy, Sean McCarthy, Mike Freaney		
<b>Date issued:</b>	03/10/2019	<b>File Ref:</b>	5168265MINUTES0048

**NOTE TO RECIPIENTS:**

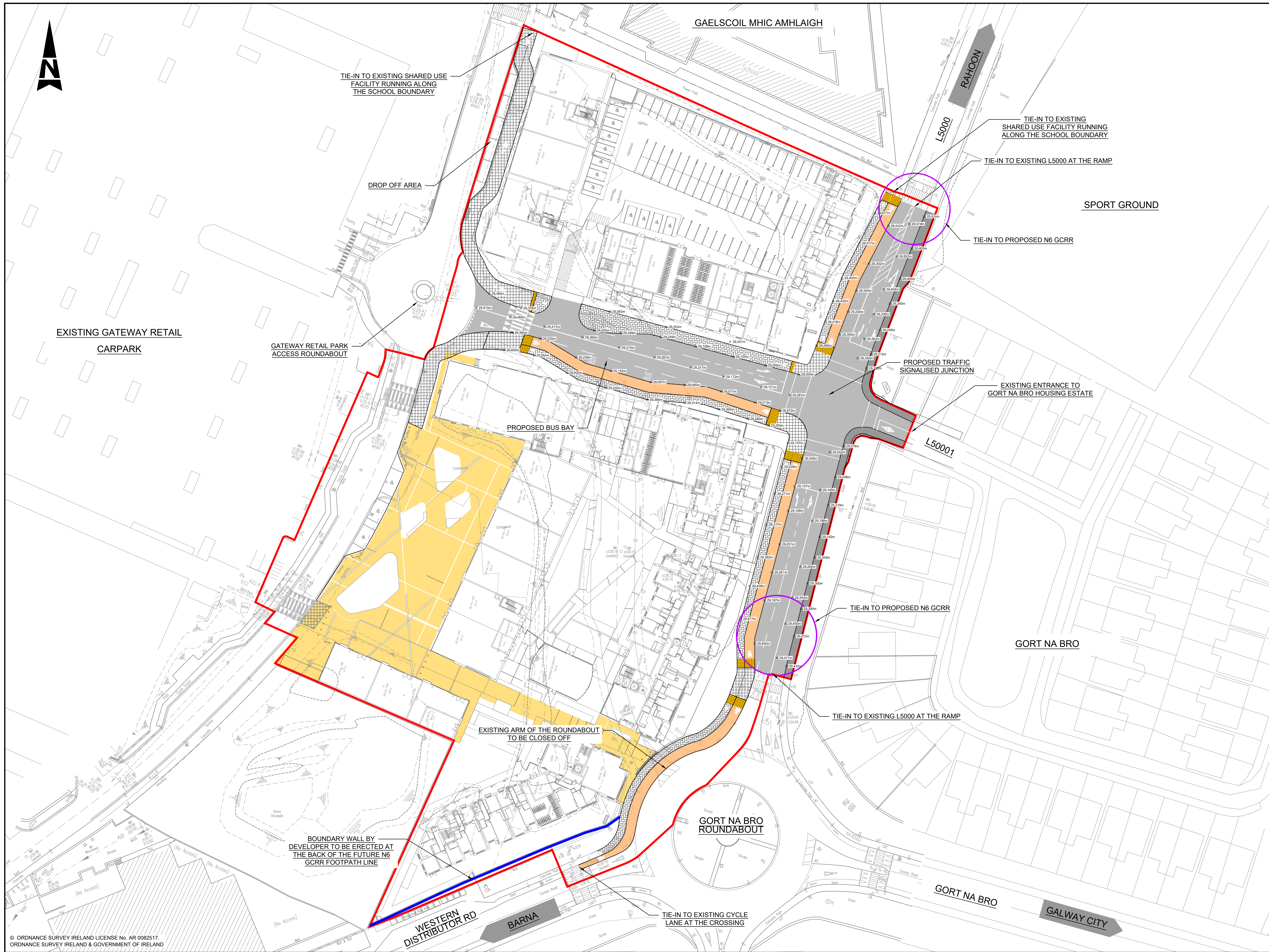
These meeting notes record Atkins understanding of the meeting and intended actions arising therefrom. Your agreement that the notes form a true record of the discussion will be assumed unless adverse comments are received in writing within five days of receipt.





ITEM	DESCRIPTION AND ACTION	DEADLINE	RESPONSIBLE
3.	<p>Both projects were assessed on the basis of:</p> <p>1 – Knocknacarra District Centre gets planning and builds first. This will be in line with Atkins drawing SK1021 Rev B.</p> <p>2 – N6 GCCR gets planning, serves notice to treat and construct roads as per Arup drawing Figure 5.3.09 and ‘Landowner Accommodation Works Details’ Figure 4.1.26.</p>		
4.	<p>If Knocknacarra District Centre is built first, they will build the new link road into the development and also upgrade sections of the L5000 for the extents shown on drawing SK1021 Rev B. The N6 GCRR will tie in at either end of the works on the L5000 to allow for the completion of the works as per the N6 GCRR application shown on Figure 5.3.09 and ‘Landowner Accommodation Works Details’ Figure 4.1.26 which includes further works on the L5000 and upgrading the junction on the Western Distributor Road from a Roundabout to a signalised junction.</p> <p>If N6 GCCR is built first, they will complete their works as per Figure 5.3.09 and ‘Landowner Accommodation Works Details’ Figure 4.1.26. Knocknacarra District Centre will utilise the road network constructed under the N6 GCRR application and complete their works as per Atkins drawing SK1021 Rev B.</p>		
5.	<p>Both parties have reviewed both schemes. Knocknacarra District Centre has designed their scheme to avoid conflict with the N6 GCCR, the planning application which is currently under assessment by ABP.</p>		





- GENERAL NOTES**
1. ALL DIMENSIONS ARE IN METRES UNLESS NOTED OTHERWISE
  2. ONLY WRITTEN DIMENSIONS SHALL BE USED. NO DIMENSIONS SHALL BE SCALED FROM THE DRAWINGS
  3. ALL LEVELS ARE IN METRES AND ARE TO MALIN HEAD DATUM
  4. ALL COORDINATES ARE IN METRES AND ARE TO IRISH TRANSVERSE MERCATOR
  5. DRAWINGS ARE TO BE READ IN CONJUNCTION WITH THE SPECIFICATION
  6. POSITIONS OF EXISTING UTILITIES ARE BASED ON RECORDS FROM UTILITY COMPANIES WHERE AVAILABLE. THESE ARE SHOWN FOR BACKGROUND INFORMATION ONLY.
  7. ALWAYS REFER TO UTILITY RECORDS PACK AND VERIFY POSITIONS OF ASSETS ON SITE PRIOR TO COMMENCING ANY EXCAVATIONS.

- LEGEND**
- NEW BOUNDARY WALL BY THE DEVELOPER
  - EXTENT OF THE WORKS BOUNDARY
  - EXISTING FOOTPATH
  - PROPOSED FOOTPATH
  - PROPOSED CARRIAGEWAY
  - PROPOSED CYCLEWAY
  - PROPOSED SHARED USE FACILITY FOR PEDESTRIANS AND CYCLISTS
  - TACTILE PAVING (LADDER & TRAMLIN)
  - PLUBLIC PLAZA AND SHARED USE ACCESS

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File: 5168265-ATK-HT-SK-1021.dwg  
Date: Oct 30, 2019 - 2:05pm  
Plotted by: AKrypkolisev

Rev	Description	By	Date	Chk'd	Auth
B	ISSUED FOR INFORMATION	AK	23.09.19	KG	KG
A	FFL ADDED	KG	29.09.19	KG	KG
-	ISSUED FOR INFORMATION	RG	17.07.19	AN	KG

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2nd Floor Technology House  
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Fax (+353) 091 779 830

Client  
**Glenveagh Living**

Project  
**KNOCKNACARRA DISTRICT CENTRE**

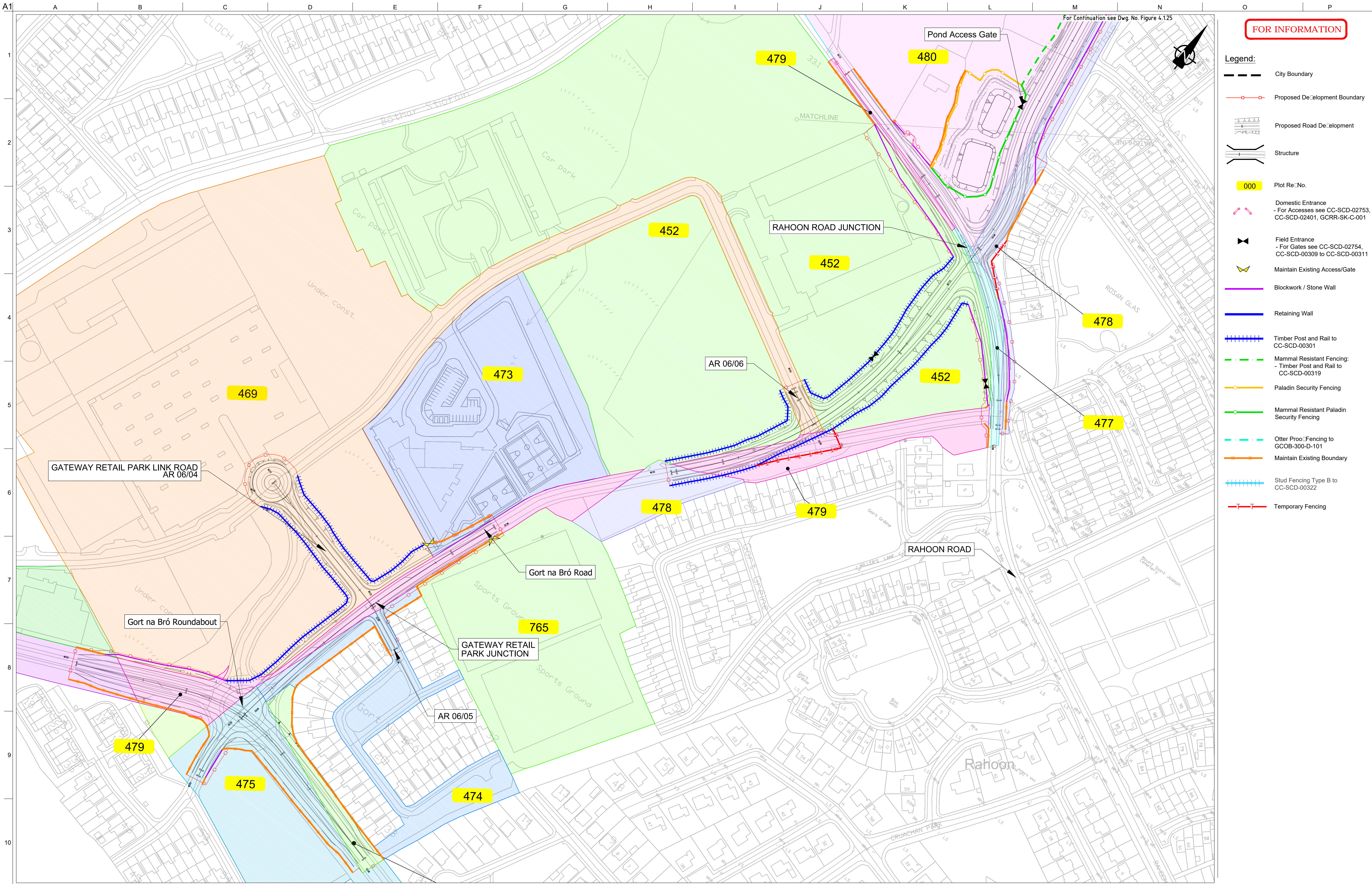
Purpose  
**STAGE 3 SUBMISSION**

Title  
**PROPOSED DEVELOPMENT PLAN CONSULTATION WITH N6GCRR**

Original Scale	Design/Drawn	Checked	Authorised
1:500 @ A1 1:1000 @ A3	JG	AN	KG
Date	Date	Date	Date
17.07.19	17.07.19	17.07.19	17.07.19

Status	Drawing Number	Rev
I	5168265 / ATK / SK / 1021	B





**FOR INFORMATION**

- Legend:**
- City Boundary
  - Proposed Development Boundary
  - Proposed Road Development
  - Structure
  - Plot Re. No.
  - Domestic Entrance  
- For Accesses see CC-SCD-02753, CC-SCD-02401, GCRR-SK-C-001
  - Field Entrance  
- For Gates see CC-SCD-02754, CC-SCD-00309 to CC-SCD-00311
  - Maintain Existing Access/Gate
  - Blockwork / Stone Wall
  - Retaining Wall
  - Timber Post and Rail to CC-SCD-00301
  - Mammal Resistant Fencing:  
- Timber Post and Rail to CC-SCD-00319
  - Paladin Security Fencing
  - Mammal Resistant Paladin Security Fencing
  - Otter Proof Fencing to GCOB-300-D-101
  - Maintain Existing Boundary
  - Stud Fencing Type B to CC-SCD-00322
  - Temporary Fencing

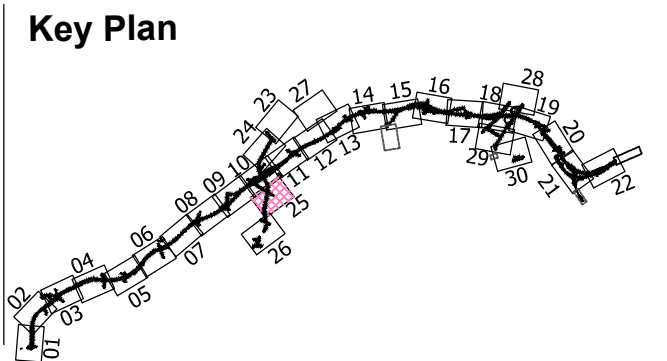
Son áireamh tá sonraíochtaí Shuirbhíreachtí Ordánais Éireann arna aitiúradh i fíor Chéadúnas OSI Uimh. 2010/19CCMA/Comhairle Contae na Gaillimhe. Sírtaonn aitiúradh naomhúdaraithe cóipeacht Shuirbhíreachtí Ordánais Éireann Agus Rialtas na hÉireann. © Suirbhíreachtí Ordánais Éireann, 2010.

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Clients



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Job Title  
**N6 Galway City Ring Road**

Scale  
1:2500 A3

Date:  
August 2019

Issue	Date	By	Chkd	Appd
I1	30/08/2019	AG	MH	EMC

Drawing Title  
**Landowner Accommodation Works Details Sheet 26 of 30**

Drawing Status  
**For Information**

Job No  
**233985**

Drawing No  
**Figure 4.1.26**

Issue  
**11**



## Garvey, Kasia

---

**From:** CONLON David <dconlon@systra.com>  
**Sent:** 2019-01-11 16:36  
**To:** Connolly, Sharon  
**Cc:** Michael Gaughan; Eileen McCarthy (Eileen.McCarthy@arup.com); ARCHER Andrew  
**Subject:** RE: GCRR: Gateway Development Knocknacarra  
**Attachments:** 20190111 Knocknacarra Flows V1\_AM.xlsx

**Follow Up Flag:** Follow up  
**Flag Status:** Flagged

Sharon,

Please find attached link flows and turning movements for your study area as requested.

As discussed on the phone yesterday, it is important to note the scale of the N6 GCRR Highway Model which was developed to assess the strategic impacts of large scale infrastructure proposals. Consequently, it may not have a sufficiently detailed level of zonal detail, or calibration of turning movements, to allow for a robust assessment of proposed developments in this area. However, the N6 GCRR Highway Model will provide a good indication of the change in traffic, and traffic routing patterns, as a result of the introduction of the N6 Galway City Ring Road. Therefore, it is recommended that the attached traffic data is used to calculate the proportional change in strategic traffic movements through the area following the introduction of the Ring Road.

Tab 1 of the attached spreadsheet contains the development assumptions used to prepare trip ends for this zone. These assumptions were based on TII National Transport Model assumptions (Central Case). As you can see these allow for almost 0 growth in population in this area between 2012 and 2039 and a circa 40% increase in the number of jobs located in the area.

I also mentioned previously that we are working on an "NPF" sensitivity test for the GCRR. I have amended the forecast population assumptions in this area to include the development you are currently working on and can make the flows available to you once we have them, if you require.

Please feel free to contact me if you have any questions.

Regards,

Dave

DAVID CONLON  
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**From:** N6 Galway City Transport Project [<mailto:N6GCOB@arup.com>]

**Sent:** 09 January 2019 10:35

**To:** CONLON David <[dconlon@systra.com](mailto:dconlon@systra.com)>

**Cc:** Michael Gaughan <[michael.gaughan@arup.com](mailto:michael.gaughan@arup.com)>; Aisling Mooney <[Aisling.Mooney@arup.com](mailto:Aisling.Mooney@arup.com)>; N6 Galway City Transport Project <[N6GCOB@arup.com](mailto:N6GCOB@arup.com)>

**Subject:** GCRR: Gateway Development Knocknacarra

Happy New Year David,

Can you please read the email below from Atkins in respect of a development on which they are working at the junction of Gort na Bro and the Western Distributor Road? Is this something that we would direct them to the NTA server themselves to address? They are looking at Zone 102. We need them to be assessing the same development potential as our scheme is showing, so if currently our Zone 102 is showing low development potential, then we need to ensure that in our sensitivity test that we also have allowed the full complement of development that they are proposing in this zone.

I will give you a call there to discuss.

Many thanks,

Eileen

[Eileen McCarthy](#)

Associate Director

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---

**From:** Connolly, Sharon <[Sharon.Connolly@atkinsglobal.com](mailto:Sharon.Connolly@atkinsglobal.com)>

**Sent:** Thursday 3 January 2019 13:05

**To:** N6 Galway City Transport Project <[N6GCOB@arup.com](mailto:N6GCOB@arup.com)>

**Cc:** Eileen McCarthy <[eileen.mccarthy@arup.com](mailto:eileen.mccarthy@arup.com)>; Foy, Matt <[Matt.Foy@atkinsglobal.com](mailto:Matt.Foy@atkinsglobal.com)>

**Subject:** [External] Gateway Development Knocknacarra

To Whom It Concerns,

We are undertaking a traffic assessment for a large development within the Knocknacarra area, as outlined in red below on an extract of the drawing you have produced for the N6GCCR. As you will see from the series of e-mails below we requested this information through Galway City Council in the first instance. The intention is that as part of the development we would construct the Gateway Retail Park Junction (4 arm signalised junction) and the link road to the internal mini roundabout and any adjustments required to that roundabout. We need to ensure that any works we undertake do not impact negatively on the N6GCCR project and ensure that projected traffic flows are taken into consideration. To allow us to assess the impact of the N6 can you please provide data as requested

below. If you require any further information or would like a meeting to go through the proposals please do not hesitate to contact the undersigned.



The SATURN Network flow diagram (zoomed in for our area of interest) for:

- Base Do Nothing
- Do Minimum for the Opening Year
- Do Scheme Opening Year
- Do Minimum for the Future Design Years
- Do Scheme for the Future Design Years

A list of the other schemes that are included within the Do Minimum scenarios.

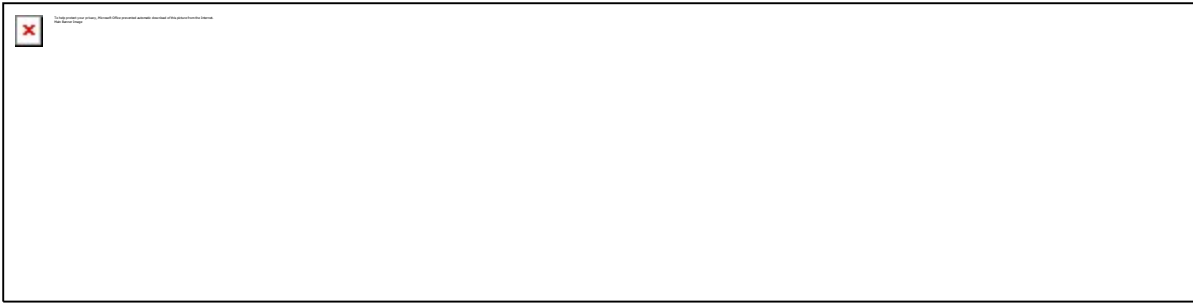
We would also need to know what developments have been allowed for, in particular for Zone 102.

Kind Regards

**Sharon Connolly** *BEng(Hons) CEng MEI*  
Regional Manager  
Ireland  
Roads and Transportation

091 386631    0872685044  

1st Floor Technology House, Parkmore Technology Park, Galway, Ireland



Company 

---

**From:** Eileen McCarthy [<mailto:Eileen.McCarthy@arup.com>]

**Sent:** 21 December 2018 01:24

**To:** Susan Loughnane <[Susan.Loughnane@galwaycity.ie](mailto:Susan.Loughnane@galwaycity.ie)>

**Cc:** Uinsinn Finn <[Uinsinn.Finn@galwaycity.ie](mailto:Uinsinn.Finn@galwaycity.ie)>; Colm O'Riordan <[Colm.ORiordan@galwaycity.ie](mailto:Colm.ORiordan@galwaycity.ie)>; Fintan O'Meara <[fomeara@GalwayCoCo.ie](mailto:fomeara@GalwayCoCo.ie)>; Sean Devaney <[sdevaney@galwaycoco.ie](mailto:sdevaney@galwaycoco.ie)>; N6 Galway City Transport Project <[N6GCOB@arup.com](mailto:N6GCOB@arup.com)>

**Subject:** RE: Gateway Development Knocknacarra

Hi Susan,

Please do ask Sharon to contact [n6gcob@arup.com](mailto:n6gcob@arup.com) with her queries and we will certainly do what we can.

Regards,

Eileen

[Eileen McCarthy](#)

Associate Director

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**From:** Susan Loughnane <[Susan.Loughnane@galwaycity.ie](mailto:Susan.Loughnane@galwaycity.ie)>

**Sent:** Wednesday 19 December 2018 17:49

**To:** Eileen McCarthy <[eileen.mccarthy@arup.com](mailto:eileen.mccarthy@arup.com)>

**Cc:** Uinsinn Finn <[Uinsinn.Finn@galwaycity.ie](mailto:Uinsinn.Finn@galwaycity.ie)>; Colm O'Riordan <[Colm.ORiordan@galwaycity.ie](mailto:Colm.ORiordan@galwaycity.ie)>

**Subject:** [External] FW: Gateway Development Knocknacarra

Eileen

Please see email below. Atkins are preparing a Transport Assessment for Phase 3 of the Knocknacarra Development. Phase 1 is B&Q, Dunnes, Next etc., phase 2 is currently under construction and phase 3 is the a mixed retail and residential development.

Atkins have requested access to data from the N6GCRR project as outlined in the email below.

Can I put Sharon Connolly in touch with you directly regarding this?

Thanks and regards

Susan

---

**From:** Connolly, Sharon [<mailto:Sharon.Connolly@atkinsglobal.com>]  
**Sent:** Thursday 6 December 2018 13:16  
**To:** Susan Loughnane <[Susan.Loughnane@galwaycity.ie](mailto:Susan.Loughnane@galwaycity.ie)>  
**Subject:** Gateway Development Knocknacarra

Susan,

Following on from the presentation two weeks ago would you be available for a meeting next week. I would intend this to be more of a detailed review of our approach and general agreement on our approach. So more like a scoping exercise. We will have completed the initial runs for our development so will go through the outputs from those.

We do need some information though from the N6GCRR project, would it be possible to get the following:

The SATURN Network flow diagram for:

- Base Do Nothing
- Base Do Nothing for the Opening Year
- Do Something Opening Year

Also for Zone 102 we would need what development they allowed for within this zone.

We want to ensure that we are as close to their figures as possible as we are acutely aware that if we our figures should be in the same region.

Regards

Sharon

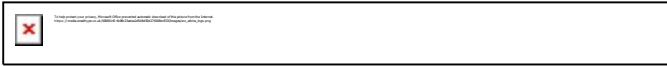
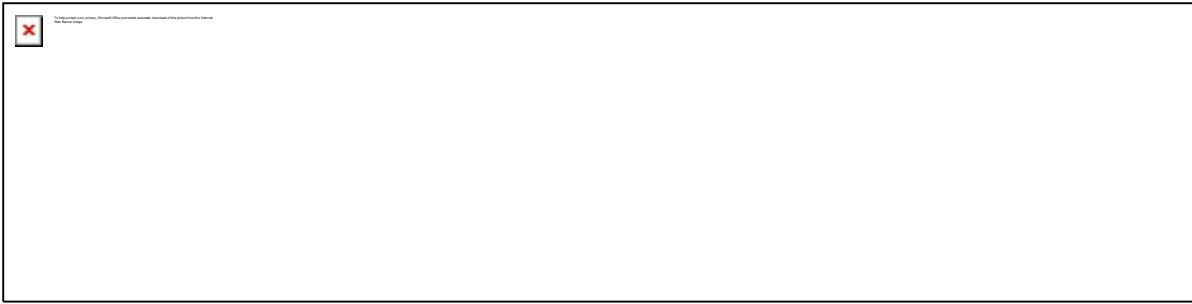
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# Appendix I. Consultation with NTA

## Garvey, Kasia

---

**From:** Eoin Farrell <eoin.farrell@nationaltransport.ie>  
**Sent:** 2019-05-09 09:50  
**To:** Garvey, Kasia; Michael MacAree  
**Cc:** Marian Wilson; Connolly, Sharon  
**Subject:** RE: Proposed Bus Routes - Knocknacarra, Galway City - Parking

Hi Kasia,

Unfortunately I have come down with a bout of Laryngitis, so wont be able to discuss this issue with you later.

However, based on the information provided below, the NTA would have no objection to the specifications of Phase 3 of the proposed development. The following points should be noted.

- It is the view of the NTA that the proposal, in general, would have no negative impact on the implementation of the Galway Transport Strategy (GTS).
- The NTA has no issues with the scale of Phase 3 development.
- The NTA has no issues with the quantum of car parking or cycle parking as proposed for Phase 3.
- The design and specification of the residential cycle storage / parking should give careful consideration to the location, accessibility and security of bicycles.
- The NTA have not been provided with a detailed site layout, however pedestrian permeability, particularly in relation to access to the Western Distributor Road, which, under the GTS proposals would be served by both the Red and Brown bus routes, should be fully considered.

I hope this information is of assistance, however if you wish to discuss further I can give you a call on Monday.

Thanks,

Eoin.

---

**From:** Garvey, Kasia [<mailto:Kasia.Garvey@atkinsglobal.com>]  
**Sent:** Wednesday 8 May 2019 13:30  
**To:** Michael MacAree  
**Cc:** Marian Wilson; Eoin Farrell; Connolly, Sharon  
**Subject:** RE: Proposed Bus Routes - Knocknacarra, Galway City - Parking  
**Importance:** High

Hi Mick,

Sincere apologies for getting back to you this late on behalf of myself and Sharon Connolly. During the preparation of the planning submission we had few design iterations and then the project hand over further delayed this process.

At this stage the project is ready for the ABP submission and we are very keen to close out the consultation with NTA as soon as possible.

I note the suggestion in the email from Marian below to contact you with regards to parking provision within the development. I was trying to ring you earlier, see below a summary of my agenda.

1. **The proposed development:**



This development – Phase 3 – forms part of the 4 phased development. Phase 1 is existing, already operation retail development. The Phase 2 is currently under construction and Phase 4 is a future cinema development.

Phase 3 of the development is a mixed use and the following approximates what it will include

- 335 new residential units
- commercial floor space of 2,714sqm.
- 267 no. car parking spaces and provision of realigned road between Gort na Bró and Gateway Retail Park Road
- Community space, shared communal and private open space, site landscaping and all associated development works.

2. **Public parking:**

There is no public parking proposed within this phase of the development. We deem the retail and visitors parking demand for Phase 3 will be absorbed within Phase 1 and Phase 2 parking provision.

3. **Residential parking:**

A 268 No. residential parking spaces are proposed as part of Phase 3, this comes at 0.8 ratio to the number of residential units. Parking bays will be available for purchase by the residents.

4. **Sustainable travel mode:**

The development also includes 595No. residential bicycle parking and 87No. visitor cycle spaces. Travel plan forms part of the planning submission and includes a consideration for a car club.

The 0.8 residential parking ratio, good quality bicycle parking and travel plan are envisaged to contribute to change of travel mode for the development and encourage move from one-car travel to more sustainable modes.

I would like to discuss this with you at your earliest convenience, or would be grateful if you could issue your feedback as soon as possible.

Please let me know if you require any further info to complete your assessment.

We are keen in closing this out as soon as possible. Please let me know if you are aware of any delays with getting back to us.

Regards,  
Kasia  
0876572972

---

**From:** Marian Wilson <[marian.wilson@nationaltransport.ie](mailto:marian.wilson@nationaltransport.ie)>

**Sent:** 2019-02-13 13:23

**To:** Connolly, Sharon <[Sharon.Connolly@atkinsglobal.com](mailto:Sharon.Connolly@atkinsglobal.com)>

**Cc:** Eoin Farrell <[eoin.farrell@nationaltransport.ie](mailto:eoin.farrell@nationaltransport.ie)>; Michael MacAree <[michael.macaree@nationaltransport.ie](mailto:michael.macaree@nationaltransport.ie)>

**Subject:** RE: Proposed Bus Routes - Knocknacarra, Galway City

Sharon,

Apologies for not coming back to you till now.

I have discussed the proposed development at Knocknacarra District Centre with Eoin Farrell, my planning colleague in the Transport Planning and Investment directorate of the Authority. Our intention is to ensure through layout and design of the expanded quadrant that the likely increased demand for sustainable transport arising from the expanded development once operational can best be served by the existing and proposed network of Galway Urban bus services.

It is considered that continuing to operate bus services on the existing road network, i.e. on the Western Distributor Road and on Bothar Stiofan, assuming the provision of professionally appointed bus stopping places and crossing

points well-juxtaposed with the proposed pedestrian entries into the development quadrant to minimise walking times, would be the easiest way to serve the expanded development. Pedestrian access between the road-based bus services and the planned cinema at night-time should be particularly carefully considered. The approach of staying on the existing road network surrounding the expanded District Centre will minimise disruption to patterns of existing usage arising from other development in the immediate surrounds of the Centre. A key enabler of success of the approach will be the location and quality of bus stops on the Western Distributor and Bothar Stiofan, quality of public lighting, type and frequency of road crossings, and the ambient traffic regime on those roads.

In the context of the road known locally as Millers Lane, the provision of an alternative regulatory pull-in and passenger stop both for setting down and on the eastern side for picking up passengers on the inbound return journey for Route 405, in addition to an opportunity to turn the bus at a roundabout at a point northbound on Millers Lane, will permit the continued delivery of services on Route 405. This will substitute for the current facility which would be removed as a result of closure of the current vehicular access off Millers Lane which is required in the plan. You may wish to examine locations along Millers Lane as far north as the school to maximise access to the bus service. Depending on how far north on Millers Lane from the junction with the Western Distributor the terminus is chosen, there may also be an intermediate pair of stops required at the southern end of Millers Lane to maintain access to both any pedestrian entry points to the District Centre and to the residential development opposite at Gort na Bro.

Key to achieving a pattern of sustainable travel to and from the Knocknacarra District Centre from the immediate environs and from the wider catchment of Galway City is the issue of the proposed quantum of supply of, the management of and the pricing of car parking associated with the development. Discussion of this is outside my area of expertise apart from an understanding of the interdependency of this issue with mode choice. It would be useful if you would forward a parking plan to Mick MacAree in the first instance at your earliest convenience.

I trust this is helpful.

Regards,

Marian

Marian Wilson

Head of Transport Services  
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**From:** Connolly, Sharon [<mailto:Sharon.Connolly@atkinglobal.com>]  
**Sent:** 29 January 2019 12:47  
**To:** Marian Wilson  
**Cc:** Niedziela, Agnieszka  
**Subject:** RE: Proposed Bus Routes - Knocknacarra, Galway City

Marion,

I might try and give you a call later today with regards to the above project. The development will be going into ABP for planning in about a month. It would be great if we could review the bus routes with and potential for bus stops in the main plaza area, that would also take in the cinema. If it would be helpful I can resend the previous e-mails so that you can review the information.

Also if it would be easier I can meet with you and bring along drawings so we can agree the way forward.

Thanks

Sharon

---

**From:** Connolly, Sharon  
**Sent:** 2018-12-14 12:53  
**To:** 'Marian Wilson' <[marian.wilson@nationaltransport.ie](mailto:marian.wilson@nationaltransport.ie)>  
**Cc:** Niedziela, Agnieszka <[Agnieszka.Niedziela@atkinglobal.com](mailto:Agnieszka.Niedziela@atkinglobal.com)>  
**Subject:** FW: Proposed Bus Routes - Knocknacarra, Galway City

Marian,

Just following up on this. Have you had a chance to review? Also if you do have any information on changes to the bus services and are able to provide an update that would greatly be appreciated. If it would be easier to meet to go through these let me know and we can arrange at your convenience.

Kind Regards

Sharon

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**From:** Connolly, Sharon  
**Sent:** 2018-11-22 16:35  
**To:** 'Marian Wilson' <[marian.wilson@nationaltransport.ie](mailto:marian.wilson@nationaltransport.ie)>  
**Subject:** RE: Proposed Bus Routes - Knocknacarra, Galway City

Marian,

Apologies for such a long delay in replying. I have attached a pdf which gives a brief overview of what the project will be. Below I have tried to explain each page so that you can have a better understanding of what we are trying to achieve. I have also attached meeting minute notes. If you have any comments on them let me know. It would be great to get an update on the bus routes as they stand and what is proposed in the interim. Also it may be easier to meet up once you have had a chance to review what I have attached and go through with you the changes to the bus routes. However also please feel free to call me if you have any queries at all.

Page 1 – This just shows where the site is in the context of the surrounding area.

Page 2 - These are the existing bus routes as we originally had shown them. We would need input from your selves over the changes that have occurred and the programme going forward for further changes.

Page 3 – Shows where the Phase 3 site is. As you can see it is adjacent to the Gaelscoil Mhic Amhlaigh, I have just seen that they have put the wrong name on the school. Phase 1 as highlighted is built and has been open to the public for quite a few years. Phase 2 is under construction and will be open to the public in Q1 2020. This will be mainly commercial units, there is also a creche and probably a gym to go in here. Phase 3 is what the current planning application is for. Phase 4 – proposed Cinema but will go in under a separate planning application.

Page 4 – Is the same as 3 but without aerial photography.

Page 5 – This is a brief summary of what they propose for Phase 3 please note that could be subject to some changes as the project progresses.

Page 6 – This is the proposed ground floor plan of the Phase 3 development, this probably best shows where the walking routes. There will be cycle facilities provided along the main entrance to the site. This will be raised and adjacent to the footpath. We are also looking at tying these into the cyclepath on Western Distributor Road. You will see also that the bus layby has been allowed for.

Page 7 – Is more or less the same as above but shows location of where secure cycle parking could be provided. Like everything else this has yet to be finalised and is very much at preliminary stage.

Page 8 – This is just an extract from the N6 Galway City Ring Road that was published in October it shows what their proposed layout was. Note that it does not look like that it allows for any bus stops.

Page 9 – This shows what our proposed layout is for the link road into the site (This is just general and DMURS principles will be used to tighten up radii at junction and also in final positioning of pedestrian crossings). It also shows a visual representation in the background with the buildings placed on it. We intend to make the existing roundabout a 4 arm rather than a 5 arm as it is at present. Realign the link road into the site as per layout and signalise the junction with Gort Na Bro / Millers Lane (both names used locally for this road as it has no official name).

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**From:** Marian Wilson <[marian.wilson@nationaltransport.ie](mailto:marian.wilson@nationaltransport.ie)>  
**Sent:** 2018-11-16 16:00  
**To:** Connolly, Sharon <[Sharon.Connolly@atkinsglobal.com](mailto:Sharon.Connolly@atkinsglobal.com)>  
**Subject:** FW: Proposed Bus Routes - Knocknacarra, Galway City

Hi Sharon,

Did you send through the maps we spoke about on 9 October 2018 – I don't seem to have received anything?

Just to let you know that Bus Eireann has made changes to routes and services in the Galway Urban network on 16 September this year that have resulted in a significant increase in bus patronage.

If you need updates let me know.

Regards,

Marian

Marian Wilson

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**From:** Marian Wilson  
**Sent:** 05 October 2018 14:03  
**To:** 'Connolly, Sharon'  
**Subject:** RE: Proposed Bus Routes - Knocknacarra, Galway City

Sharon,

Thanks for your email below and apologies for the delay in responding.

I would be happy to go through the NTA plans for bus transport which forms the city bus element of the Galway Transport Strategy (GTS) adopted by the Galway City Development Plan 2017 – 2023. It would also be useful to better understand what you plan in the proposed development, how it will link up with the existing network and how sustainable modes will be able to effectively meet its demands for transport once it is operational.

Let me know what your availability is to meet and where. My number is 01-8798312.

Regards,

Marian Wilson

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**From:** Connolly, Sharon [<mailto:sharon.connolly@atkinglobal.com>]  
**Sent:** 28 September 2018 10:05  
**To:** Marian Wilson  
**Cc:** McAndrew, Catherine  
**Subject:** Proposed Bus Routes - Knocknacarra, Galway City

Marian,

I was at a meeting with you colleague Roy O' Connor on a project here in Galway City and he has said that you are the person to contact in the first instance with regards to another project Atkins are involved in as Transportation Consultants. We are working for Glenveagh / Sigma on a development in the Gateway Retail Park, Knocknacarra, Galway City which is adjacent to the Western Distributor Road, the existing locations is shown below on the extract of the map. They are looking at developing the area (as shown on the attached plan) which is highlighted in red as Proposed Site 1 and 2, this will mainly be residential, with some retail. The residential will be apartments.



I have highlighted the existing bus route 405, which has a bus stop on the existing access to the site. As part of the proposal for this development, the existing access to the development is to be closed and realigned to the position shown on the attached plan. It is intended, that if required, the bus would use this new realigned road for access to The Gateway Retail Park and that we need to look at where it would be best to place a bus stop.

We are aware that the bus routes including the 405 are under review, and were included in the Galway Transportation Strategy. The Western Distributor Road is highlighted as a key transport corridor and the proposal includes for upgrading the corridor to allow for bus lanes and also replacement of most of the roundabouts to signalised junctions. As part of our Traffic and Transport Assessment, we want to take into account the existing services available, the short term proposals and long term. This is particularly important in relation to the access to

the Gateway Retail Park, the proposed changes and what we will need to provide. It is also important for the proposed development to understand what public transport will be available for use of those that will live here in the future.

Would it be possible to meet with yourselves to go through what the NTA proposals are for the area. Also we would like to go through in a bit more detail what our proposals are and what we need to provide to ensure that we allow for transport in the interim and into the future.

If you require any further clarification or are able to meet with us please do not hesitate to contact me on the numbers below.

Kind Regards

Sharon

**Sharon Connolly** *BEng(Hons) CEng MEI*  
Regional Manager  
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Company

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[Redacted]

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## Garvey, Kasia

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**From:** Eoin Farrell <eoin.farrell@nationaltransport.ie>  
**Sent:** 2019-10-04 15:39  
**To:** Garvey, Kasia; Marian Wilson  
**Cc:** Connolly, Sharon  
**Subject:** RE: Refuse collection and bus bay interaction

Hi Kasia,

Thanks for the update.

We have no further comment at this time.

Thanks  
Eoin.

---

**From:** Garvey, Kasia [mailto:Kasia.Garvey@atkinsglobal.com]  
**Sent:** Wednesday 2 October 2019 11:59  
**To:** Eoin Farrell; Marian Wilson  
**Cc:** Connolly, Sharon  
**Subject:** RE: Refuse collection and bus bay interaction

Hi Eoin,

Thank you for your response.

We have discussed the proposed development with Galway City Council. They are aware of the proposed link road design and lay by location and the surrounding environment.

The proposed bus bay will have standard design features like kassel kerbs or similar as a measure to deter public from parking. Furthermore, the retail units don't face directly onto the bus bay, as the proposed shop fronts are onto the plaza area.

Regards,  
Kasia

---

**From:** Eoin Farrell <[eoin.farrell@nationaltransport.ie](mailto:eoin.farrell@nationaltransport.ie)>  
**Sent:** 2019-10-01 18:18  
**To:** Garvey, Kasia <[Kasia.Garvey@atkinsglobal.com](mailto:Kasia.Garvey@atkinsglobal.com)>; Marian Wilson <[marian.wilson@nationaltransport.ie](mailto:marian.wilson@nationaltransport.ie)>  
**Cc:** Connolly, Sharon <[Sharon.Connolly@atkinsglobal.com](mailto:Sharon.Connolly@atkinsglobal.com)>  
**Subject:** RE: Refuse collection and bus bay interaction

Hi Kasia,

Sorry I keep missing you, I seem to never get a chance to be at my desk these days!

The issues raised are more of an issue for the transportation department of Galway City Council as the conflict between bin lorries and bus is likely to be minimal. As an observation, I would have greater concern with the likelihood of cars parking in the layby, which will have easy access to the shops.

Thanks,

Eoin.

---

**From:** Garvey, Kasia [<mailto:Kasia.Garvey@atkinsglobal.com>]  
**Sent:** Friday 27 September 2019 15:01  
**To:** Eoin Farrell; Marian Wilson  
**Cc:** Connolly, Sharon  
**Subject:** Refuse collection and bus bay interaction

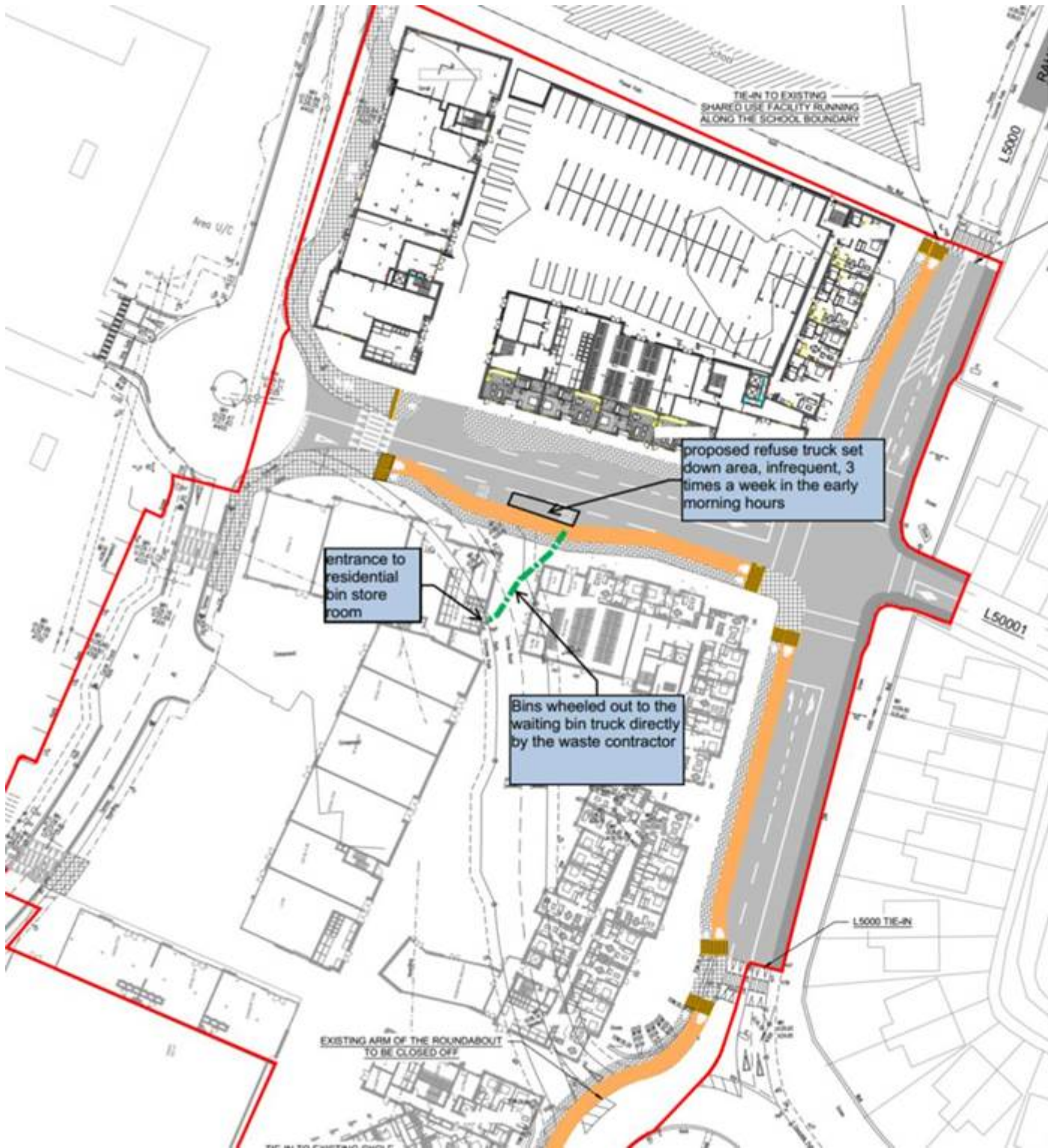
Hi Marian/Eoin,

Further to our phonecall today please see below sketch illustrating the proposed arrangement for residential refuse collection.

As mentioned, this is an urban design street bounded with multi-storey residential blocks either side. The proposed interaction between the bin truck and buses is going to be infrequent, it will occur in early morning hours three times a week.

This proposal takes into account minimising impact on the bus users and the public.

The bins are proposed to be wheeled out from the bin room directly by the waste contractor once the bin truck is set down. Bins will not be left standing on the footpath or cycleway as they will be directly wheeled back to the bin store.



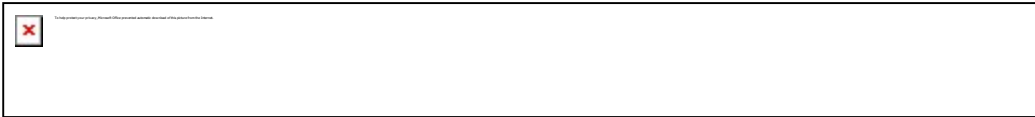
Please review and confirm this arrangement will be acceptable.

Regards,  
Kasia

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