local transport projects

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Strata

Proposed Residential Development

Land to the South of the A1077, Barton-upon-Humber

Transport Assessment

August 2023

Armstrong House,
The Flemingate Centre,
Beverley,
HU17 0NW

01482 679 911
info@ltp.co.uk
www.local-transport-projects.co.uk

Registered No. 5295328

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Land to the South of the A1077, Barton-upon-Humber
Transport Assessment

August 2023

Client Commission			
Client:	Strata	Date Commissioned:	October 2022

LTP Quality Control						
Job No:	LTP/22/5136	File Ref:	Land South of A1077 Barton TA Final Issue 1B			
Issue	**Revision**	**Description**		**Author**	**Checked**	**Date**
1	B	Minor amendments		MR	-	22/08/2023
1	A	Revised site plan		AC	MR	18/08/2023
1	-	Final issue for planning		AC	MR	10/02/2023
				Authorised for Issue:		SW

LTP PROJECT TEAM

As part of our commitment to quality the following team of transport professionals was assembled specifically for the delivery of this project. Relevant qualifications are shown and CVs are available upon request to demonstrate our experience and credentials.

Team Member	LTP Designation	Qualifications
Steven Windass	*Technical Director (Developments)*	*BSc(Hons) MSc(Eng) CEng FIHE MCIHT*
Mike Raynor	*Principal Transport Planner*	*BA(Hons) MIHE*
Annabel Carrick	*Senior Transport Planner*	*BSc(Hons) EngTech MIHE MCIHT*

PROPOSED RESIDENTIAL DEVELOPMENT
LAND TO THE SOUTH OF THE A1077, BARTON-UPON-HUMBER
TRANSPORT ASSESSMENT

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EXECUTIVE SUMMARY

This Transport Assessment (TA) provides a detailed appraisal of the likely transport impacts associated with a proposed residential development on land to the south of the A1077 in Barton-upon-Humber, North Lincolnshire. The key findings of this TA are summarised below:

- The scope of this report has been produced in accordance with the relevant local and national guidance.
- A Travel Plan (LTP, 2023) has been produced in association with this TA to help promote and encourage sustainable travel to/from the proposed development.
- The proposals comprise a residential development of 173 dwellings to be served via a new four-arm priority-controlled roundabout connecting with the A1077 and Falkland Way on the northern boundary of the site. The main site access road is to form part of a new link road running between the A1077 to the north and Caistor Road to the south. Footways flanking the internal roads are proposed, with a segregated foot/cycle facility expected to be provided on the western side of the new link road, and a footway on the eastern side, separated from the carriageway by a grassed verge. The facilities will connect with the pedestrian/cycle infrastructure provided on the A1077/Falkland Way. During construction of the roundabout and the first section of the link road, the site will be temporarily accessed via a priority T-junction with the A1077 to the east of Falkland Way.
- The site is in an accessible location with pedestrian routes to local amenities, bus stops accommodating services to various key destinations, with a large number of areas/facilities within a reasonable cycle ride.
- Analysis of the 28 Personal Injury Collisions (PICs), which have occurred over a five-year study period (2017-2021), has not revealed any identifiable existing collision issues associated with the expected movements generated by the development, therefore it is considered that there are no pertinent road safety issues for the proposals.
- The traffic projections indicate that when the site is fully occupied, it is expected to generate up to 84 two-way vehicle trips during the AM peak hour (08:00-09:00) and 86 during the PM peak hour (17:00-18:00).
- The distribution of development traffic across the local highway network has been predicted using a gravity model derived from analysis of travel to work patterns for the local resident population.
- Capacity assessments of the key junctions have been undertaken using the industry-standard Junctions 9 and LinSig v3 modelling software. The results indicate that the proposed development will not have a severe impact on the operation of these key junctions once the schemes have been implemented.

This TA demonstrates that the proposed development would not be expected to have a significant impact in terms of sustainable travel, traffic impact and road safety. As the impact of the proposals is not expected to be severe, the proposals are therefore considered to be in accordance with the National Planning Policy Framework (NPPF).

1. INTRODUCTION

1.1 Background

1.1.1 Local Transport Projects Ltd (LTP) has been commissioned to produce a Transport Assessment (TA) in support of a full planning application for a proposed residential development on land to the south of the A1077 in Barton-upon-Humber, North Lincolnshire. This TA provides a detailed appraisal of the expected transport impacts of the proposals. A plan of the proposed site layout is attached as Appendix 1.

1.1.2 The local planning and highway authority for the site is North Lincolnshire Council (NLC).

1.1.3 A Travel Plan (LTP, 2023) that provides a strategy for encouraging sustainable travel at the proposed development site has been produced in conjunction with this TA as a separate document.

1.2 Scope

1.2.1 This report is written in accordance with the Government's *'National Planning Policy Framework'* (MHCLG, 2021) and *'Planning Practice Guidance'* (MHCLG, 2014), with the scope summarised below:

- ***Executive Summary:*** A non-technical summary of the report outlining the key outcomes of the assessment.
- ***Introduction & Description of Proposals:***
  - Description of the development site, including location and any existing access arrangements;
  - Summary of relevant planning and allocation history for the site;
  - Description of the proposed development including site layout, pedestrian/cycle facilities and proposed access arrangements.
- ***Site Assessment:***
  - Site assessments to determine existing traffic conditions, such as posted speed limits, road restrictions, highway geometry, on-street parking restrictions and any other relevant features of the local area;
  - Assessment of the sustainable transport infrastructure (pedestrian, cycle and public transport) local to the site.
- ***Road Casualty Appraisal:*** Examination of road collision records (5-year study period) and assessment of the road safety impact of the proposed development on the local highway network.
- ***Traffic Impact:***
  - Calculation of the projected trip generation for the proposed development, utilising data from the industry-standard TRICS database;
  - Consideration of any relevant consented developments within the local area and any committed changes to the surrounding highway network;
  - Prediction of the distribution of the vehicle trips generated by the site onto the local highway network, utilising a gravity model;

- Junction capacity assessment utilising the industry-standard modelling programmes (PICADY/ARCADY/LinSig) at the key local junctions:
  - A1077/Falkland Way/site access roundabout;
  - A1077/Hungate/Holydyke mini-roundabout (existing layout); and
  - A1077/Hungate/Holydyke improvement scheme (proposed layout).
- Assessment of the likely traffic impact of the proposed development on the operation of the local highway network.

- ***Access, Parking & Internal Layout:*** Consideration of the proposed access arrangements and internal layout of the site, including the servicing arrangements, parking provision (with reference to NLC parking standards) and suitability of the proposed access arrangements.
- ***Conclusions:*** Conclusions summarising the outcomes of the TA, including a commentary on the suitability of the proposals in terms of sustainable travel, traffic impact and road safety.

1.2.2 This TA report has been prepared in accordance with the above scope and reference has been made to the following documents where appropriate:

- North Lincolnshire Local Plan – Draft Submission November 2022 (NLC, 2022);
- National Planning Policy Framework (MHCLG, 2021);
- Planning Practice Guidance (MHCLG, 2014);
- North Lincolnshire Local Development Framework: Core Strategy (NLC, 2011a);
- North Lincolnshire Local Transport Plan 2011-2026 (NLC, 2011b);
- Manual for Streets 2: Wider Application of the Principles (CIHT, 2010);
- Parking Provision Guidelines for New & Change of Use Developments (NLC, 2009);
- Guidance on Transport Assessment (DfT, 2007a);
- Manual for Streets (DfT, 2007b); and
- Saved Policies from The North Lincolnshire Local Plan 2003 (NLC, Updated 2007).

2. SITE BACKGROUND

2.1 Site Location & Existing Use

2.1.1 The site currently comprises agricultural land located to the south of the A1077 in the town of Barton-upon-Humber, North Lincolnshire. The site is bound by Falkland Way, and the A1077 to the north, agricultural land to the east and south, with existing dwellings served via Danson Close, Cornhill Drive, and Glebe Way forming the western boundary. The approximate location and boundary of the development site is highlighted in red in Figure 1 below.

Figure 1: Site Location

Source Imagery: Copyright Google Earth Pro (License Key-JCPMR5M58LXF2GE)

2.2 Development Proposals & Access Arrangements

2.2.1 This report is based upon the proposals outlined on the site layout plan attached at Appendix 1. The proposals include the development of the site to accommodate 173 dwellings with a mixture of dwelling sizes and types. It is understood that the planning application will be seeking full consent, therefore all matters (including access) are for consideration.

2.2.2 To ensure that the conclusions of this TA are robust, the traffic impact assessments have been based on a slightly larger development of up to 175 dwellings.

2.2.3 Vehicular access is to be provided via a new four-arm priority-controlled roundabout with the A1077 and Falkland Way on the northern boundary of the site. The main site access road is to form part of a new link road running between the A1077 to the north and Caistor Road to the south, which is discussed further in Section 2.4. During construction of the roundabout and the first section of the link road, the site will be temporarily accessed via a priority T-junction with the A1077 to the east of Falkland Way.

2.2.4 Footways flanking the internal roads are proposed, with a segregated foot/cycle facility expected to be provided on the western side of the new link road, and a footway on the eastern side, separated from the carriageway by a grassed verge. It is understood that pedestrian/cycle infrastructure improvements on the A1077 corridor and Falkland Way are to be implemented by NLC.

2.2.5 The internal highway network of the site has been designed to ensure that refuse vehicles can utilise the highway alignment to enter and exit the site in a forward gear, as shown in Appendix 2. A large car has also been tested as part of the TA.

2.2.6 The visibility splays at junctions and the forward visibility on the internal access roads has been tested as part of this TA and a copy of the drawings are attached as Appendix 3.

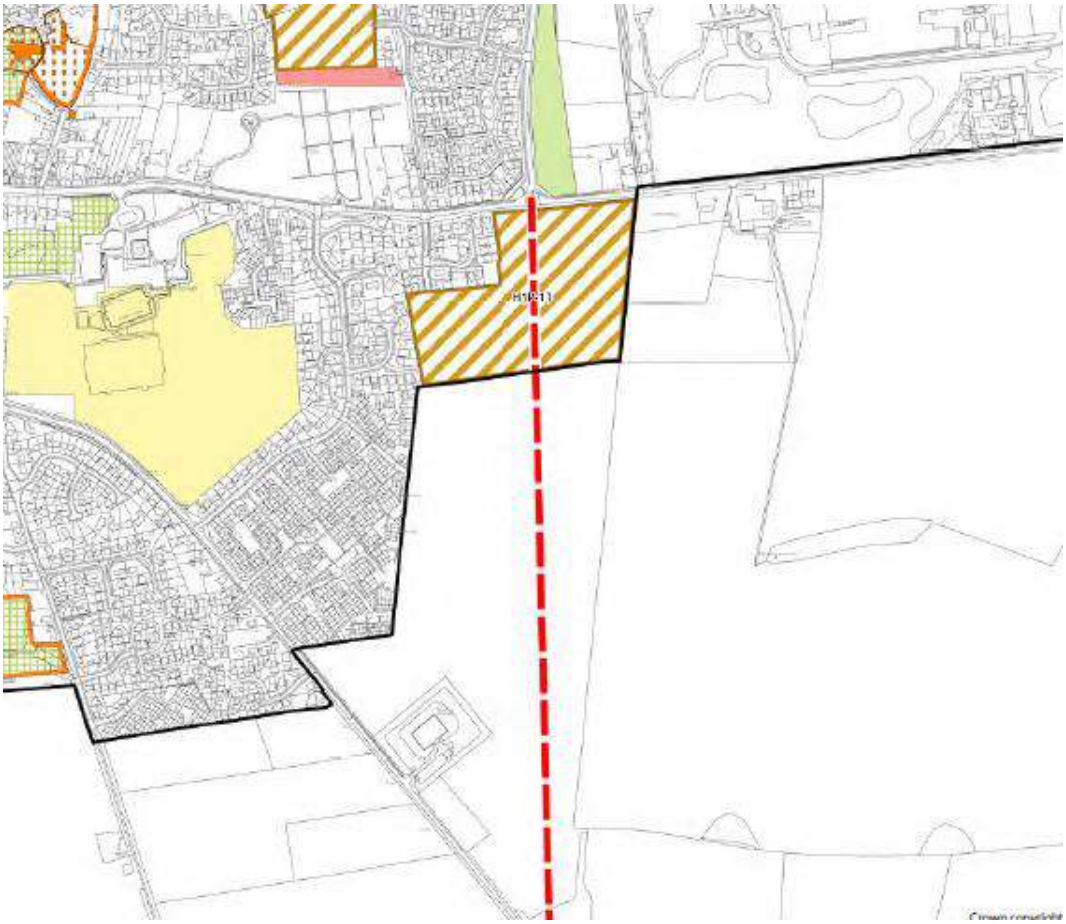
2.2.7 Parking standards are outlined within NLC's *'Parking Provision Guidelines for New & Change of Use Developments'* (NLC, 2009). The document outlines that for 2-3 bed dwellings, 1 parking space and 0.5 communal parking space should be provided, with 4+ bed dwellings requiring 2 spaces and 0.5 communal space. The parking provision at the proposed development is to be provided in accordance with NLC parking requirements.

2.2.8 The development will include links to existing pedestrian and cycle routes therefore according with saved policies T6 and T8 of The North Lincolnshire Local Plan 2003 (NLC 2007).

2.3 Planning Context

2.3.1 The site is allocated for residential development (ref: H1P-13) within the draft North Lincolnshire Local Plan (NLC, 2022). Figure 2 shows the boundary of the H1P-13 residential allocation (provisionally allocated for up to 225 dwellings).

Figure 2: Extract of Draft Local Plan Policies Map



Source: NLC, 2022

2.3.2 The access and highway requirements for the H1P-13 site within the draft North Lincolnshire Local Plan (NLC, 2022) have been extracted below:

- *"Vehicular, pedestrian and cycle access point/s are to be taken from A1077 and will need to be agreed with the Local Highways Authority.*
- *Good footpath and cycle provision are to be delivered throughout the site, linking the development with the town centre, local services and employment areas.*
- *A Transport Assessment and Residential Travel Plan will be required to demonstrate that the development will have no adverse impacts on the highway network.*
- *A new link road is to be constructed between A1077 and Caistor Road including a new roundabout. Developers will be required to enter into a legal agreement to implement this proposal or make an appropriate financial contribution towards its completion.*
- *Financial contributions will be required for improvements to the Barrow Road/Falkland Way junction and other junctions on the A1077."*

2.3.3 There have been no pertinent planning applications relating to the proposed development site.

2.4 Link Road Overview

2.4.1 The proposed link road alignment is shown in Figure 3 below, with the section highlighted in blue forming new carriageway (including the section running through the proposed development site considered in this TA). The Caistor Road section highlighted in red is an existing road that is to be upgraded, and the green section along the B1206 would be retained, connecting to the A15 at the Bonby Lodge junction to the south-west.

Figure 3: Proposed Link Road Alignment

Source: LTP, 2022

2.4.2 It should be noted that a second round Levelling Up Fund (LUF) bid submitted by NLC for the *'Barton Principal Town Regeneration Project'* was successful with a total of £19.7 million being awarded to deliver the project, which includes a number of infrastructure improvements and active travel measures, including the delivery of the first phase of Barton link road, A1077 corridor improvements and cycle infrastructure upgrades.

2.4.3 Further details regarding the proposed link road alignment are outlined in the *'Barton Link Road Technical Note 2'* (LTP, 2022), which was commissioned by NLC to assess changes from the original alignment of the link road (which was assessed in a previous Technical Note).

2.4.4 Alongside the '*Barton Link Road Technical Note 2'* (LTP, 2022), the Local Plan evidence base also includes an assessment of the capacity for key local junctions, including the A1077/Holydyke/Hungate junction and the A1077/Falkland Way/Link Road roundabout, as presented in the *'A1077 Corridor Improvements Technical Note'* (LTP, 2021). To ensure consistency with the assessments undertaken on behalf of NLC for the proposed link road, the baseline traffic flows and junction models utilised within these two documents have been utilised as part of this TA, as agreed with NLC Highways.

3. SITE ASSESSMENT

3.1 Local Highway Network

3.1.1 As previously outlined, vehicular access to the site is to be provided via a new four-arm priority-controlled roundabout connecting with the A1077 and Falkland Way on the northern site boundary.

3.1.2 The A1077 is a two-way single carriageway that measures approximately 6.2m in width and is subject to a 30mph speed limit within the vicinity of the site, although 160m to the east of the Falkland Way junction the road is subject to a derestricted (60mph) speed limit. The road continues to the east of the site for approximately 2.5km before connecting with the B1402 via a three-arm priority-controlled roundabout. The A1077 continues south of the roundabout, providing access to several villages, including Barrow-upon-Humber, Ulceby, Thornton Curtis and Wootton before connecting with the A160, via Habrough Roundabout.

Photo 1: A1077 Along the Site Frontage

3.1.3 Approximately 1.4km to the west of the site, the A1077 connects with the B1218 and Hungate via a four-arm mini-roundabout. Hungate continues to the north, providing access to Barton-upon-Humber town centre, whilst the B1218 continues to the north-west, providing access to additional amenities within Barton-upon-Humber.

3.1.4 The A1077 continues to the south-west of the mini-roundabout for approximately 800m before connecting with the A15 via a Grade Separated Junction (GSJ). The A15 is a north-south route connecting the city of Hull and the East Riding of Yorkshire to the north and Peterborough to the south, via Lincoln and Sleaford. To the west of the A15 interchange, the A1077 continues to the town of Scunthorpe and provides access to the M181 which forms part of the Strategic Road Network (SRN).

3.1.5 Falkland Way is a two-way single carriageway which measures approximately 7.2m in width and is subject to a 40mph speed limit. The road provides access to several key employment sites including Wren Kitchens, Bakkavor and the Humber Bridge Industrial Estate. The road also provides access to a number of dwellings currently accessed via Canberra View, although further phases of residential development are currently under construction with an additional vehicular access to be provided. Falkland Way continues to the north-west, connecting with Pasture Road North and Pasture Road via a simple priority T-junction. There are no existing waiting/parking restrictions on Falkland Way apart from No Waiting At Any Time (NWAAT) restrictions in the vicinity of the Wren Kitchens site access.

Photo 2: Falkland Way

3.2 Pedestrian Provision

3.2.1 Guidance from Chartered Institution of Highways & Transportation (CIHT) suggests a preferred maximum walking distance of 2km for a number of trips, including commuting and school trips (IHT, 2000). The site is located within a 2km walking distance of the majority of the built-up area of Barton-upon-Humber as shown within Figure 4.

Figure 4: 2km Walking Isochrone

Source: ORS, 2023

3.2.2 Barton-upon-Humber town centre is accessible within a 2km walk of the site and includes various amenities, such as Co-op Food, Heron Foods, Boyes, restaurant/cafés, hot food takeaways and medical facilities. Furthermore, there are several schools accessible within a 2km walk of the site, including Baysgarth School, Barton St Peter's CofE Primary School and Bowmandale Primary School.

3.2.3 As part of the development, footways flanking the internal roads are proposed, with a segregated foot/cycle facility expected to be provided on the western side of the new link road, and a footway on the eastern side, separated from the carriageway by a grassed verge. The facilities will connect with the pedestrian/cycle infrastructure on the A1077 corridor and Falkland Way, which is set to be improved as part of the active travel scheme which has received LUF funding.

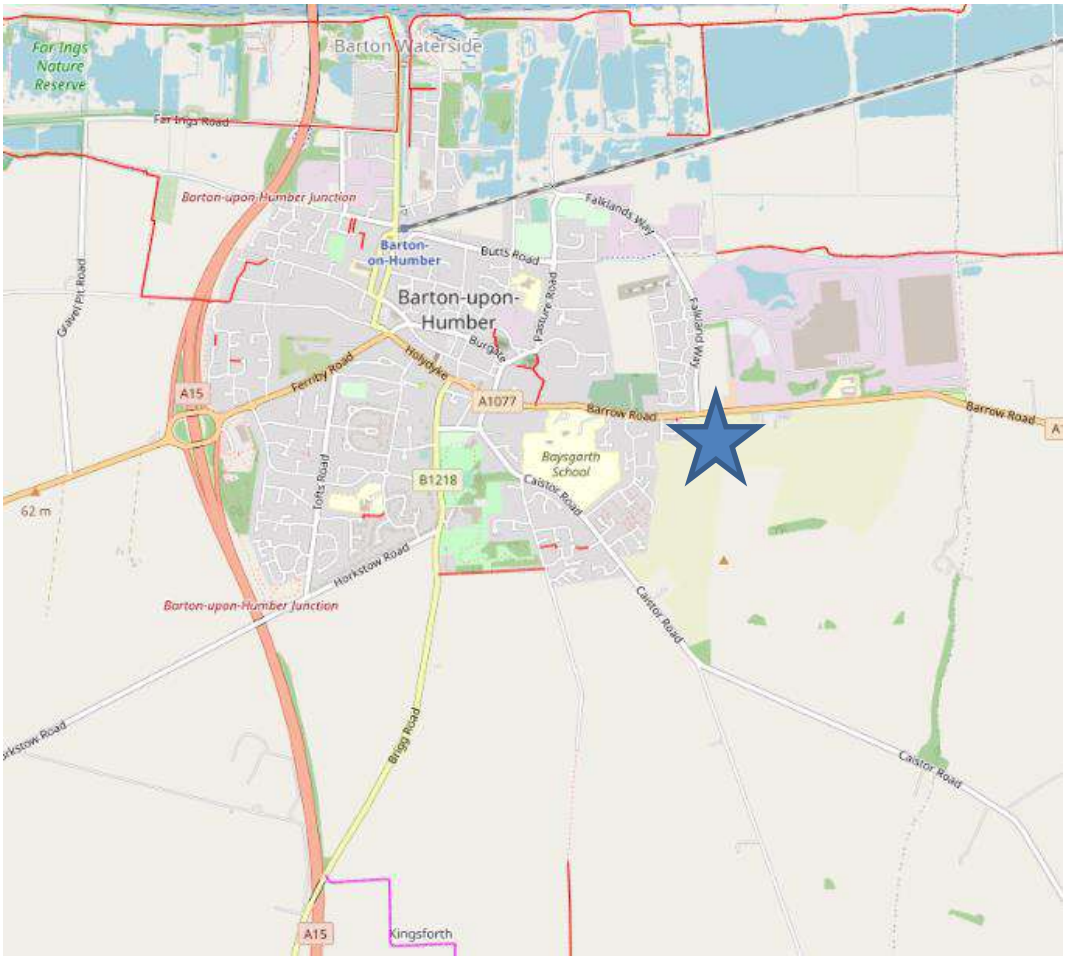
3.2.4 There is currently no footway on the southern side of the A1077 within the extents of the site boundary, however immediately to the west of the site, a footway which shortly becomes a shared foot/cycleway at the junction with Cornhill Drive is provided, which varies in width between approximately 2.4m and 6.6m.

3.2.5 A footway measuring approximately 1.2m in width, separated from the carriageway by an approximately 1.4m wide grassed verge is provided on the northern side of the A1077 within the vicinity of the site. The footway on the northern side of the carriageway continues to the east, providing access to Wren Kitchens and the village of Barrow-upon-Humber, and to the west provides access to Barton-upon-Humber town centre.

Photo 3: Footway on the Northern Side of the A1077

3.2.6 There are a number of Public Rights of Way (PRoW) within the vicinity of the site, as shown within Figure 5. Public footpaths are shown in red, public bridleways in magenta, with the site indicated by the blue star.

Figure 5: Public Rights of Way



Source: FPM, 2023

3.2.7 Figure 5 shows that Barton PRoW #38 is accessible from Green Lane approximately 700m to the west of the site, and Barton PRoW #37 is accessible from Eastfield Road approximately 1.6km to the south-west of the site providing access to Brigg Road.

3.2.8 The pedestrian infrastructure within the vicinity of the site is sufficient to facilitate the movements of mobility and visually impaired people, with the provision of dropped kerbs and tactile paving at most local junctions/crossing points within the local area. As mentioned above, the pedestrian/cycle infrastructure on the A1077 corridor and Falkland Way is set to be improved as part of the active travel scheme associated with *'Barton Principal Town Regeneration Project'* which has received LUF funding. The footways are of sufficient width and surface quality to accommodate the passage of wheelchairs (DfT, 2021).

3.2.9 The proposed internal pedestrian routes will be of adequate width, with step-free access between the site and the local footway network to allow the site to be suitably accessed on foot by all users, including those accompanied by young children and the mobility impaired.

3.2.10 Measures to promote walking trips to and from the site are included within the site TP (LTP, 2023).

3.3 Cycling Provision

3.3.1 Cycling is a low cost and healthy alternative to car use, which can substitute for short car trips, or can form part of a longer journey by public transport. The Department for Transport (DfT) state that journeys up to five miles (circa 8km) are *"an achievable distance to cycle for most people"* (DfT, 2020).

3.3.2 The site is located within a reasonable cycle ride, up to 8km (approximately 25 minutes at the average cycling speed of 12mph), of the entire built-up areas of Barton-upon-Humber, Barrow-upon-Humber, Hessle within the East Riding of Yorkshire, and a number of further settlements, as illustrated within Figure 6.

Figure 6: 8km Cycle Isochrone

Source: ORS, 2023

3.3.3 A shared foot/cycleway measuring approximately 2m in width is provided on the western side of Falkland Way providing access to key employment sites, such as Wren Kitchens and Bakkavor and the Humber Bridge Industrial Estate. A shared foot/cycleway that measures approximately 2.7m in width is provided on the southern side of the A1077 commencing at the junction with Cornhill Drive. National Cycle Network (NCN) Route 1 is accessible from Whitecross Street within Barton-upon-Humber town centre approximately 900m to the west of the site. NCN Route 1 is a long-distance cycle route connecting Dover and Scotland.

Photo 4: Shared Foot/Cycleway on Falkland Way

3.3.4 As part of the *'Barton Principal Town Regeneration Project'* which has been awarded LUF funding, a number of cycle route improvement schemes are to be implemented to enhance cycling connectivity within Barton-upon-Humber.

3.3.5 Given the availability of local cycle facilities and that the majority of the local roads are subject to a 30mph speed limit, it is considered that the local area is suitable to encourage cycling trips to/from the site.

3.3.6 Measures to promote cycling trips to and from the site are included within the site TP (LTP, 2023).

3.4 Public Transport Provision

3.4.1 Advice within *'Guidelines for Public Transport in Development'* (IHT, 1999) states that the generally acceptable maximum distance that a bus stop should be located from a development site is 400m, although it is acknowledged that actual walking distances can be notably longer. The nearest bus stops to the site are located on the A1077, approximately 145m to the west of the site, providing travel in both directions. An additional bus stop is provided on Falkland Way approximately 170m to the north of the site, providing access to northbound services.

3.4.2 Details of the bus services that operate from the local bus stops are outlined within Table 1.

Table 1: Local Bus Services

Service	Route	Weekday Frequency*
Services accessible from the A1077 (≈145m)		
254	**Barton upon Humber Town Circular Service** (via Tesco, Market Place, Leisure Centre & Lidl)	Hourly between 09:00 and 14:15
255	North Bransholme – Hull Paragon Interchange – Anlaby – Hessle – **Barton-upon-Humber**	6-7 services per day in each direction
260	**Barton-upon-Humber** – Barrow – Goxhill – New Holland (Circular service)	7-8 services per day
350	Hull Paragon Interchange – **Barton-upon-Humber** – South Ferriby – Winterton – Scunthorpe Bus Station	2-3 services per day in each direction *(Every 30 mins to/from Barton town centre bus stops)*
355	**Barton-upon-Humber** – South Ferriby – Winteringham – Winterton – Scunthorpe Bus Station	1-2 services per day in each direction
560	Scunthorpe – Roxby – Winterton – South Ferriby – **Barton-upon-Humber** – East Halton	2 services per day in each direction
Additional Services from Falkland Way(≈170m)		
250	Hull Paragon Interchange – Anlaby – Hessle – **Barton-upon-Humber** - Grimsby	Hourly
455	**Barton-upon-Humber** – Ulceby – Immingham – Stallingborough – Nunsthorpe – Grimsby Riverhead Exchange – Cleethorpes	1-2 services per day in each direction

*Refers to the general daytime service between 08:00 and 18:00.

3.4.3 Table 1 demonstrates that a number of frequent services are available from local stops, including services to Barton-upon-Humber town centre, Scunthorpe, Hull and Cleethorpes.

3.4.4 The nearest rail station to the site is Barton-on-Humber Rail Station, located approximately 1.9km to the north-west of the site. Barton-on-Humber Rail station is managed by East Midlands Railway and provides infrequent services to Cleethorpes. Amongst the facilities available at the station is a car park, cycle parking, and step-free access.

3.4.5 Measures to promote public transport trips to and from the site are included within the site TP (LTP, 2023).

3.5 Summary

3.5.1 The site is readily accessible by a range of sustainable transport modes in accordance with saved Policy T2 of The North Lincolnshire Local Plan 2003 (NLC, 2007).

4. ROAD CASUALTY APPRAISAL

4.1 Collision Record

4.1.1 Personal Injury Collision (PIC) data for the highway network local to the site for the most recent available five-year study period (01/01/2017 to 31/12/2021) was obtained via a search of the Department for Transport's (DfT) road safety data (DfT, 2022a).

4.1.2 A total of 28 collisions occurred within the study area, which includes an approximately 4km section of the A1077 between and including the A1077/B1402 roundabout to the east, and the A1077/Holydyke/Hungate mini-roundabout to the west. The study area extents and the locations of the collisions are indicated on the plan attached as Appendix 4. Table 2 below outlines the collision history of the study area.

Table 2: Collision History

Year	2017	2018	2019	2020	2021	Total
Fatal	-	-	-	-	-	**0**
Serious	1	6	1	-	1	**9**
Slight	6	4	3	4	2	**19**
Total	**7**	**10**	**4**	**4**	**3**	**28**

4.1.3 The collision records show that the number of collisions has reduced in the last three years, with the most collisions recorded in 2018, whereby 10 collisions occurred. There were 9 KSI (Killed or Seriously Injured) collisions recorded during the study period, resulting in a severity ratio of 32.1%.

4.2 Collision Conditions

4.2.1 Table 3 below summarises the collisions by road surface, weather and lighting conditions:

Table 3: Collision Conditions

Road Surface	Collisions	%
Dry	21	**75%**
Wet or damp	7	**25%**
Weather	**Collisions**	**%**
Fine	24	**85.7%**
Rain	3	**10.7%**
Unknown	1	**3.6%**
Lighting	**Collisions**	**%**
Daylight	21	**75%**
Dark	7	**25%**

4.2.2 As illustrated in Table 3, the majority of the collisions occurred without adverse road surface, weather or lighting conditions.

4.3 Collision Times

4.3.1 Table 4 summarises the collisions by time of year:

Table 4: Collisions by Time of Year

Time of Year	Collisions	%
Winter (Dec-Feb)	4	**14.3%**
Spring (Mar-May)	8	**28.6%**
Summer (Jun-Aug)	7	**25%**
Autumn (Sep-Nov)	9	**32.1%**

4.3.2 Table 4 shows that the collisions were relatively spread out across the year, with a slight peak during the autumn months (32.1%).

4.3.3 Table 5 below summarises the collisions by day of week and also the time of day:

Table 5: Collisions by Day & Time

Day	Morning (06:00-11:00)	Lunch (11:00-14:00)	Afternoon (14:00-19:00)	Evening (19:00-01:00)	Night (01:00-06:00)	Total	%
Monday	-	-	4	-	-	**4**	**14.3%**
Tuesday	1	-	-	1	-	**2**	**7.1%**
Wednesday	2	-	3	1	-	**6**	**21.4%**
Thursday	2	-	1	1	-	**4**	**14.3%**
Friday	2	-	3	1	-	**6**	**21.4%**
Saturday	2	1	-	2	1	**6**	**21.4%**
Sunday	-	-	-	-	-	**0**	**-**
Total	**9**	**1**	**11**	**6**	**1**	**28**	
%	**32.1%**	**3.6%**	**39.3%**	**21.4%**	**3.6%**		

4.3.4 Table 5 shows that there was a spread of collisions across the week, with most collisions recorded on a Wednesday, Friday or Saturday (21.4% respectively). There were no collisions on a Sunday. Over a third (39.3%) of the collisions were recorded during the afternoon period, with a single collision recorded during the lunch and night time periods (3.6% respectively).

4.4 Collision Locations

4.4.1 The locations of the 28 study collisions (shown on the plot attached as Appendix 4) can be summarised as follows:

- 6 PICs occurred on the A1077 (not at a junction);
- 6 PICs occurred at the A1077/B1218 priority junction;
- 3 PICs occurred at the A1077/Hungate/Holydyke mini-roundabout;
- 3 PICs occurred at the A1077/Whitecross Street priority junction;

- 2 PICs occurred at the A1077/parking access;
- 2 PICs occurred at the A1077/Cornhill Drive priority junction;
- 1 PIC occurred at the A1077/B1402 priority-controlled roundabout;
- 1 PIC occurred at the A1077/Holly Dene priority junction;
- 1 PIC occurred at the A1077/Options Barton School priority junction;
- 1 PIC occurred at the A1077/Oak Drive priority junction;
- 1 PIC occurred at the A1077/Market Place junction; and
- 1 PIC occurred on George Street (not at a junction).

4.4.2 It is noted that no collisions occurred at the existing A1077/Falkland Way priority junction where the proposed site access roundabout is due to be constructed.

4.5 Casualties

4.5.1 A total of 35 casualties occurred as a result of the 28 recorded injury collisions during the study period. Table 6 below provides a breakdown of the casualties according to the mode of travel and age group:

Table 6: Casualty Road User Groups

	Age (years)							
Road User Group	**0 to 15**	**16 to 20**	**21 to 25**	**26 to 45**	**46 to 65**	**66+**	**Total**	**%**
Pedestrian	2	-	-	1	5	2	**10**	**28.6%**
Cyclist	2	-	-	2	-	-	**4**	**11.4%**
Powered Two-Wheeler	-	-	2	1	-	-	**3**	**8.6%**
Car Driver	-	2	3	4	3	-	**12**	**34.3%**
Car Passenger	-	2	-	3	1	-	**6**	**17.1%**
Total	**4**	**4**	**5**	**11**	**9**	**2**	**35**	
%	**11.4%**	**11.4%**	**14.3%**	**31.4%**	**25.7%**	**5.7%**		

4.5.2 Table 6 shows that over half of the casualties (51.4%) were car occupants, and over a quarter (28.6%) were pedestrians. Almost a third of the casualties (31.4%) were aged between 26 and 45 years, with the fewest casualties aged 66 years and older (5.7%).

4.6 Road Safety Impact

4.6.1 A total of 28 collisions, resulting in 35 casualties, have occurred within the study area during the five-year study period. Analysis of the study collisions has not revealed any identifiable existing collision issues associated with the expected movements of the proposed development; therefore, it is considered that there are no existing road safety issues pertinent to the development of the site.

4.6.2 If the proposed site access and internal roads are designed with due consideration to road safety, with appropriate highway design features incorporated into the detailed design, then the proposals should not have a detrimental road safety impact on the local transport network and should not adversely affect the safety of other road users.

5. TRIP GENERATION

5.1 Proposed Traffic Generation

5.1.1 As agreed with NLC Highways, the approved vehicle trip rates within the Transport Assessment (BSP, 2020) produced for the Pasture Road South site (H1P-12) have been used to predict the likely vehicle trips expected to be generated by the proposed residential development. The vehicle trip rates and projected trip generation associated with the proposed development are shown in Table 7, with full details of the trip generation for the site attached as Appendix 5.

Table 7: Projected Vehicle Trip Generation

	AM Peak (08:00-09:00)		PM Peak (17:00-18:00)	
Houses Privately Owned (03-A)	**Arrivals**	**Departures**	**Arrivals**	**Departures**
Approved Vehicle Trip Rates (per dwelling)	0.122	0.360	0.333	0.158
Development Vehicle Trips (175 dwellings)	**21**	**63**	**58**	**28**

5.1.2 The trip generation projections shown in Table 7 indicate that the proposed development could be expected to generate up to 84 two-way vehicle trip movements during the AM peak hour and 86 during the PM peak hour.

5.1.3 A TP (LTP, 2023) has been produced in association with this TA to help promote and encourage sustainable travel to/from the proposed development. In order to ensure that this assessment robustly analyses a *'worst-case scenario'*, the potential vehicle trip reducing benefits of the site Travel Plan have not been considered within the trip generation projections. However, it is worth noting that the Travel Plan would be expected to increase the number of trips generated by sustainable modes and reduce the number of car trips.

5.2 Modal Split

5.2.1 In order to predict the modal split of trips generated by the site, local travel patterns have been interrogated using *'Method of Travel to Work'* data from the 2011 National Census (ONS, 2013). The modal split has been predicted based upon the travel patterns for those living within '*North Lincolnshire 001'* within which the site is located. Table 8 provides a summary of the projected baseline modal split for the proposed development.

Table 8: Projected Modal Split (2011 Census)

Mode of Travel	Modal Split
Car/Van Drivers	65.9%
Taxi	0.4%
Powered Two-Wheeler	0.6%
Vehicle Trip Generating	**66.9%**
Car Passengers	6.7%
Pedestrians	17.3%
Cyclists	6.7%
Public Transport Users	1.9%
Other	0.5%
TOTAL	**100%**

* Total may not represent the sum of its parts due to rounding.

5.2.2 These modal split predictions indicate that just under a third of the person trips (33.1%) generated by the development would be expected to be made by sustainable modes (pedestrian, cycle, public transport and car passenger).

6. TRAFFIC IMPACT

6.1 Previous Assessment Work

6.1.1 The *'A1077 Corridor Improvements Technical Note'* (LTP, 2021) produced to assess the link road impact tested a number of different development scenarios, based on potential residential development site allocations, with the most relevant scenario relating to the proposed development summarised below:

- **2031 With Residential Allocation Sites**: This scenario was based on 2019 traffic survey data growthed to 2031, with the addition of traffic associated with an approved extension to the Wren Kitchens site, as well as the development traffic associated with the following residential allocation sites (based on emerging Local Plan reference numbers that may have subsequently changed):
  - Land to the rear of 13-19 Pasture Road (H1C-29) = 19 dwellings.
  - Coach and Horses Inn 86 – 88 High Street (H1C-30) = 18 dwellings.
  - 7a, Marsh Lane (H1C-31) = 5 dwellings.
  - Bank House, 8 Holydyke (H1C-32) = 5 dwellings.
  - Pasture Road South (H1P-10) = 350 dwellings.
- The above sites total 394 dwellings but did not include the application site considered in this TA. Sites H1C-29/30/31/32 represent existing commitments with planning approval, whereas H1P-10 was the only site proposed for residential allocation at the time of producing the Technical Note (LTP, 2021).
- Since the Technical Note (LTP, 2021) was produced, there have been some changes to the proposed allocations, as part of the most recent version of the draft Local Plan (NLC, 2022), as outlined below:
  - Land to the rear of 13-19 Pasture Road (now H1C-23) = 16 dwellings.
  - Coach and Horses Inn 86 – 88 High Street (now H1C-24) = 18 dwellings.
  - 7a, Marsh Lane = now removed (6 dwellings constructed and occupied).
  - Bank House, 8 Holydyke = removed (the planning permission [ref: PA/2017/1046] expired in 2021, with the development not constructed).
  - Land adjacent to White Swan, Butts Road (H1C-25) = added site with 5 dwellings (due to a recent planning consent).
  - Pasture Road South (now H1P-12) = 319 dwellings approved (ref: PA/2020/1628) which includes a £100,000 contribution associated with capacity improvements on the A1077 as requested by NLC Highways.
  - Land off Barrow Road (H1P-13) = 225 dwellings (this is the site assessed in this TA).
- The above sites now total 583 dwellings, an increase of 189 dwellings relative to the link road assessments. It should be noted that the application site (H1P-13) was not considered as part of this scenario within the Technical Note (LTP, 2021).

6.1.2 In order to reflect the latest development quantum associated with the draft Local Plan sites, the trip generation associated with these sites (excluding H1P-13) has been updated. A future assessment year of 2038 has also been considered rather than the future year of 2031 utilised within the Technical Note (LTP, 2021) in order to align with the updated local plan period, which ensures that the assessments presented in this TA are robust. The future year vehicle trip projections and assignment are illustrated in the network diagrams attached as Appendix 6.

6.2 Assessment Scenario

6.2.1 The proposals have been tested against the weekday network AM and PM peak hour traffic flow scenario summarised below, as agreed with NLC Highways:

- ***2038 With Development:*** *'2019 Base'* traffic flows (recorded during June 2019 traffic surveys), growthed to 2038 (end of refreshed local plan period), with the addition of traffic associated with the Wren Kitchens extension, the residential sites allocated in the draft North Lincolnshire Local Plan (NLC, 2022) and the proposed development (see Section 5.1). In order to consider a robust worst-case assessment, all development traffic flows have been assigned to the proposed roundabout and would be expected to travel through local junctions within Barton-upon-Humber rather than utilising the proposed link road.

6.2.2 The traffic flows at 2038 have been predicted using the DfT's *'National Traffic Model'* (NTM) and *'Road Traffic Forecasts'* (RTFs). The growth factor obtained from the NTM has been adjusted to reflect local circumstances from the local MSOA *'North Lincolnshire 001',* using TEMPro (v7.2b) software (Ref: Yorkshire & Humber Dataset Version 7.2), see Appendix 7.

6.2.3 In accordance with the DfT's *'Transport Analysis Guidance'* (TAG) (DfT, 2022b), the underlying NTEM growth includes for households and jobs have also been adjusted to reflect the local development traffic that has been explicitly incorporated into the traffic projections of this TA, in order to avoid double counting the associated traffic flows.

6.3 Trip Distribution & Assignment

6.3.1 The distribution of traffic associated with the site has been predicted utilising a gravity model based upon commuting patterns of existing residents within the *'North Lincolnshire 001'* Middle-Layer Super Output Area (MSOA), in which the site is situated. *'Location of usual residence and place of work by method of travel to work'* data from the 2011 National Census (ONS, 2014) shows the proportion of existing residents travelling to each workplace destination (MSOAs and local authority districts) by mode of travel.

6.3.2 This trip distribution data has been combined with an assessment of route choice (traffic assignment) to determine the likely distribution of development traffic across the highway network. The predicted traffic assignment has been undertaken utilising journey planning tools to help determine the relative attractiveness of alternative routes, with consideration of influences such as the location and size of settlements and employment areas within each workplace destination, and known existing traffic conditions on the relevant routes. The defined zones utilised within the gravity model calculations are illustrated in Figure 7. It should be noted that this assumes that the first phase of the link road hasn't been fully implemented to Caistor Road and therefore all vehicle trips will utilise the proposed A1077/Falkland Way four-arm priority-controlled roundabout.

Figure 7: Gravity Model Zones

Source Imagery: Copyright Google Earth Pro (License Key-JCPMR5M58LXF2GE)

6.3.3 The detailed calculations of the gravity model are attached as Appendix 8, with the results summarised in Table 9.

Table 9: Gravity Model Results

Zone	Route	Distribution Split	AM 2-Way	PM 2-Way
A	A1077 (E)	13.9%	12	12
B	A15 (N)	17.7%	15	15
C	A15 (S) via A1077	37.7%	32	32
D	A1077 (W)	11.9%	10	10
E	Falkland Way	6.3%	5	5
F	A1077 (W) (within Barton-upon-Humber town centre)	12.6%	11	11
TOTAL		**100.0%**	**84**	**86**

6.3.4 Network diagrams showing the distribution of proposed development trips at the site access roundabout are included as Appendix 6.

6.4 J1 A1077/Falkland Way/Link Road Roundabout

6.4.1 As mentioned previously, the proposed development site will be accessed via a new four-arm priority-controlled roundabout in the location of the existing A1077/Falkland Way priority junction, which is required to deliver the first phase of the Barton link road.

6.4.2 In order to assess the ability of the proposed roundabout to accommodate the projected future traffic flows, a junction capacity assessment has been undertaken using Junctions 9 modelling software (ARCADY module), which is a software package produced by Transport Research Laboratory (TRL) that provides an industry-standard method for assessing capacity, queuing and delay at priority junctions (PICADY) and roundabouts (ARCADY). The input parameters used to create the Junctions 9 model have been extracted from the junction modelling utilised as part of the Technical Note (LTP, 2021).

6.4.3 The future peak hour traffic flows have been assessed against the proposed junction layout, the results of which are summarised in Table 10 and the complete modelling output in Appendix 9.

Table 10: J1 Capacity Assessment

Arm	2038 With Development		
	Max. RFC	Max End Q	Max. Delay (secs)
AM Peak (07:45-08:45)			
Falkland Way	18.8%	0.2	2.9
A1077 (E)	33.9%	0.5	3.5
Link Road	4.8%	0.0	2.6
A1077 (W)	44.4%	0.9	4.8
OVERALL	**44.4%**	**0.9**	**4.8**
PM Peak (17:00-18:00)			
Falkland Way	33.2%	0.5	3.6
A1077 (E)	35.0%	0.5	3.6
Link Road	2.3%	0.0	2.6
A1077 (W)	48.0%	0.9	4.9
OVERALL	**48.0%**	**0.9**	**4.9**

6.4.4 The capacity assessment results shown in Table 10 indicate that the proposed A1077/Falkland Way/Link Road priority-controlled roundabout is expected to operate well within capacity during both the AM and PM peak hours with the residential development fully occupied, with a maximum Ratio of Flow to Capacity (RFC) value of 48.0% (A1077 (W), PM peak), which is well below the typical target level of 85%.

6.5 J2 A1077/Holydyke/Hungate Mini-Roundabout

6.5.1 In order to assess the ability of the existing A1077/Holydyke/Hungate mini-roundabout to accommodate the projected future traffic flows, a junction capacity assessment has been undertaken using Junctions 9 modelling software (ARCADY module). An aerial image of the existing A1077/Holydyke/Hungate mini-roundabout can be seen in Figure 8.

Figure 8: J2 A1077/Holydyke/Hungate Mini-Roundabout

Source Imagery: Copyright Google Earth Pro (License Key-JCPMR5M58LXF2GE)

6.5.2 The input parameters used to create the Junctions 9 model have been extracted from the junction modelling utilised as part of the Technical Note (LTP, 2021).

6.5.3 The future peak hour traffic flows have been assessed against the existing junction layout, the results of which are summarised in Table 11 and the complete modelling output in Appendix 10.

Table 11: J2 Capacity Assessment (Existing Layout)

Arm	2038 With Development		
	Max. RFC	Max End Q	Max. Delay (secs)
AM Peak (07:45-08:45)			
Holydyke	46.2%	0.9	8.6
Hungate	44.3%	0.8	26.3
A1077 (Holydyke)	76.8%	3.3	17.0
A1077 (Ferriby Road)	82.0%	4.4	22.1
OVERALL	**82.0%**	**4.4**	**26.3**
PM Peak (17:00-18:00)			
Holydyke	52.1%	1.1	9.9
Hungate	67.3%	1.9	51.0
A1077 (Holydyke)	82.4%	4.5	22.1
A1077 (Ferriby Road)	115.5%	81.3	293.8
OVERALL	**115.5%**	**81.3**	**293.8**

6.5.4 The capacity assessment results shown in Table 11 indicate that the existing junction would be expected to operate over capacity with significant levels of queueing on the A1077 (Ferriby Road) arm during the PM peak with the development in place, however a junction improvement scheme is to be delivered as part of the *'Barton Principal Town Regeneration Project'* which has been considered in Section 6.6 of this TA.

6.6 J2 A1077/Holydyke/Hungate Improvement Scheme

6.6.1 As mentioned previously, a second round LUF bid for the *'Barton Principal Town Regeneration Project'* was successful with a total of £19.7 million being awarded to deliver the project, which includes a number of infrastructure improvements and active travel measures, including the delivery of the A1077/Holydyke/Hungate improvement scheme. NLC previously secured a £100,000 contribution towards capacity improvements on the A1077 corridor as part of the planning approval (ref: PA/2020/1628) for the Pasture Road South (H1P-12) development which was expected to partially fund the signalisation of the A1077/Holydyke/Hungate junction.

6.6.2 The Technical Note (LTP, 2021) considered an improvement scheme at the A1077/Holydyke/Hungate junction which would see the introduction of a signalised junction. As part of the scheme, Hungate would form a one-way egress and therefore for the purposes of this assessment, assumptions have been made in relation to the likely re-routing of vehicles with the following assumptions applied:

- 75% of right turn movements from Hungate added to the A1077 (W) arm and 25% added to the Holydyke arm.
- 20% of left turn movements from Hungate added to the Holydyke arm within the remaining 80% movements expected to utilise other routes within Barton-upon-Humber town centre to travel east.

6.6.3 In order to assess the ability of the proposed signalised junction to accommodate the projected future traffic flows, a junction capacity assessment has been undertaken using the industry-standard LinSig v3, a design and assessment tool for traffic signal junctions. The input parameters used to create the LinSig v3 model have been extracted from the junction modelling utilised as part of the Technical Note (LTP, 2021).

6.6.4 The future peak hour traffic flows have been assessed against the proposed junction layout, the results of which are summarised in Table 12 and the complete modelling output is provided in Appendix 11.

Table 12: J2 Capacity Assessment (Improvement Scheme)

Movement From	2038 With Development	
	DoS (%)	MMQ (PCU)
AM Peak (07:45-08:45)		
A1077 (W)	69.7%	18.1
Holydyke	67.8%	11.6
A1077 (E)	63.9%	12.8
A1077 (W) Internal	48.5%	3.4
Practical Reserve Capacity (PRC)	**+29.2%**	
PM Peak (17:00-18:00)		
A1077 (W)	87.9%	30.5
Holydyke	89.1%	16.2
A1077 (E)	81.2%	13.5
A1077 (W) Internal	50.2%	3.4
PRC	**+1.0%**	

6.6.5 The Degree of Saturation (DoS) quoted within Table 12 is a ratio of the demand to capacity on each approach to the junction, with a value of 100% meaning that demand and capacity are equal. The Mean Max Queue (MMQ) is a measurement of the average maximum queue likely to occur across all cycles of the modelled scenario.

6.6.6 The results of the capacity assessment presented in Table 12 that the proposed improvement scheme operates with spare capacity during both peak hours with the proposed development fully occupied.

6.7 Traffic Impact Summary

6.7.1 Capacity assessments have been undertaken associated with the proposed Barton link road roundabout with the A1077 and Falkland Way, the existing A1077/Holydyke/Hungate mini-roundabout and the A1077/Holydyke/Hungate improvement scheme. The results indicate that the proposed development will not have a severe impact on the operation of these key junctions once the schemes have been implemented.

6.7.2 Therefore, the proposals are considered to be in accordance with the *'National Planning Policy Framework'* (MHCLG, 2021), which states that *"development should only be prevented or refused on highways grounds if there would be an unacceptable impact on highway safety, or the residual cumulative impacts on the road network would be severe"*.

7. CONCLUSIONS

7.1.1 This TA provides a detailed appraisal of the expected transport impact associated with the proposed residential development on land to the south of the A1077 in Barton-upon-Humber, North Lincolnshire.

7.1.2 The scope of this report has been produced in accordance with the relevant local and national guidance.

7.1.3 A Travel Plan (LTP, 2023) that provides a strategy for encouraging sustainable travel at the site has been produced in conjunction with this TA as a separate document.

7.1.4 The proposals comprise a residential development of 173 dwellings to be served via a new four-arm priority-controlled roundabout connecting with the A1077 and Falkland Way on the northern boundary of the site. Vehicular access is to be provided via a new four-arm priority-controlled roundabout with the A1077 and Falkland Way on the northern boundary of the site. The main site access road is to form part of a new link road running between the A1077 to the north and Caistor Road to the south.

7.1.5 Footways flanking the internal roads are proposed, with a segregated foot/cycle facility expected to be provided on the western side of the new link road, and a footway on the eastern side, separated from the carriageway by a grassed verge. It is understood that pedestrian/cycle infrastructure improvements on the A1077 corridor and Falkland Way are to be implemented by NLC.

7.1.6 The site is well placed to generate trips by sustainable modes of transport, with amenities in Barton-upon-Humber town centre within a 2km walk, and the built-up areas of Barton-upon-Humber, Barrow-upon-Humber and the western extents of Hessle within an 8km cycle ride of the site. The nearest bus stops to the site are on the A1077 within an approximately 145m walk to the west of the site. These stops accommodate services to Hull, Scunthorpe, Cleethorpes and areas of the East Riding of Yorkshire. The nearest rail station is Barton-upon-Humber Rail Station, located approximately 1.9km to the north-west of the site, providing regular services to Cleethorpes.

7.1.7 A road casualty study showed that 28 PICs occurred within the study area around the proposed development site during the most recent five-year study period. Analysis of the study collisions has not revealed any identifiable existing collision issues associated with the expected movements of the proposed development; therefore it is considered that there are no existing road safety issues pertinent to the development of the site. If the proposed access roundabout and internal roads of the development are designed with due consideration to road safety, then the proposals should not have a detrimental road safety impact on the local highway network and should not adversely affect the safety of other road users.

7.1.8 The approved vehicle trip rates within the Transport Assessment (BSP, 2020) produced for the H1P-12 site have been used to predict the likely vehicle trips expected to be generated by the proposed development. The trip generation projections indicate that the proposed development is expected to generate 84 two-way vehicle trips during the AM peak hour (08:00-09:00) and 86 during the PM peak hour (17:00-18:00).

7.1.9 The distribution of development traffic across the local highway network has been predicted using a gravity model derived from analysis of travel to work patterns for the local resident population of the *'North Lincolnshire 001'* MSOA. There is expected to be a split of approximately 6.3% of trips to/from the north, 13.9% to/from the east, and 79.8% to/from the west at the proposed site access roundabout.

7.1.10 Capacity assessments have been undertaken associated with the proposed Barton link road roundabout with the A1077 and Falkland Way, the existing A1077/Holydyke/Hungate mini-roundabout and the A1077/Holydyke/Hungate improvement scheme. The results indicate that the proposed development will not have a severe impact on the operation of these key junctions once the schemes have been implemented.

7.1.11 It is therefore considered that the proposals will not have a significant impact on the operation of the local highway network. The proposals are therefore considered to be in accordance with the *'National Planning Policy Framework'* (NPPF) which states that *"development should only be prevented or refused on highways grounds if there would be an unacceptable impact on highway safety, or the residual cumulative impacts on the road network would be severe*" (MHCLG, 2021).

7.1.12 It is concluded from the assessments within this TA that the proposed development would not be expected to have a significant impact in terms of sustainable travel, traffic impact and road safety.

8. REFERENCES

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Appendix 1 – Proposed Site Layout Plan

BARROW ROAD | BARTON UPON HUMBER

All work to be carried out in accordance with the requirements of the Building Regulations,Water Authority and the Construction (Design and Management) Regulations currently in force.

Do not scale from this drawing. Architect to be notified of any discrepancies.

Verify relevant dimensions on site before commencing work or preparing shop drawings. This drawing is copyright.

Rev	Date	Description	By	Checked
A	-	-	-	-
B	04.01.23	Layout revised plot numbers have increased to 169 from 168. Raised tables included, sales area relocated, sheds and paths moved to retain hedgerow.	AW	LA
C	17.01.23	Welcome centre relocated inside double garage. Private drive near plots 1-5 straightened and now includes turning head. Access added from front of plots to public highway. Plots 7 & 8 parking re-worked. Gates and paths re-worked across the site. Plots 12 & 13 mirrored. Eliminated paths and created shared ones where possible. 'Dead ' POS space worked into rear gardens where possible. Plots 36, 53, 128 & 135 parking moved towards front of plot. Roads rounded off to eliminate harsh corners. Drive rotated to be perpendicular to plots 135-138, bin collection added. Reworked plots 121-124. Mirrored plots 158-159 to have meter boxes to drives. Pedestrian link added to existing path near plot 52. Plots 29-32, 80-81, 42-45 pulled to align with build line. Low level hedging added along main spine road.	GF	LA
D	08.02.23	Layout revised following tracking comments. Visibility splays on bends and private drives have been included.	AW	GF
E	20.03.23	Layout revised following title boundary updated and ransom strip. Plots 53 and 54 rear boundary revised to offset from existing building. Plots 36-52 moved north.	AW	GF
F	16.06.23	Layout revised to updated drainage and link road.	AW	GF
G	02.08.23	Layout revised following updated roundabout and link road design.	AW	GF
H	04.08.23	Red line boundary revised to incorporate the roundabout. Bin collection points added to private drives.	AW	KM
I	15.08.23	Layout revised following forward visibility and tracking comments.	AW	KM

PLEASE REFER TO ENGINEERING DRAWINGS FOR ALL ENGINEERING DETAILS

ACCOMMODATION SCHEDULE

SITE NAME:
DRAWING NUMBER:

HOUSE TYPE	SALES NAME	NO	SQ.FT	TOTAL SQ.FT	SQ.M	TOTAL SQ.M	%	REGULATORY COMPLIANCE	BEDS	PEOPLE	STOREY	CONFIGURATION	LAND SEGMENT
OPEN MARKET - CORE (#MIY)													
2-300	205-M43 (WHEEL CHAIR USER BUNGALOW)	1	858	858	80	80	0.6%	M4/3 / NDSS	2	3	1	BUNGALOW	A
3-703	MALMO	46	998	45,908	93	4,265	26.6%	M4/2 / NDSS	3	4	2	SEMI-DETACHED/TERRACE	B
MY-PL-302	GENEVA	57	1,204	68,628	112	6,376	32.9%	M4/1 / NDSS	3	5	2.5	SEMI-DETACHED/TERRACE	B
MY PL 404	ROSAS (3 BED PLUS STUDY)	28	1,246	34,888	116	3,241	16.2%	M4/1 / NDSS	3	5	2.5	SEMI-DETACHED	B
S-301	BOLOGNA (CT) (3 BED PLUS STUDY)	7	1,235	8,645	115	803	4.0%	M4/1 / NDSS	3	5	2	DETACHED	B/C
S-102	OPORTO (3 BED PLUS STUDY)	24	1,345	32,280	125	2,999	13.9%	M4/1 / NDSS	3	6	2.5	SEMI-DETACHED /DETACHED	B/C
4-301	COPENHAGEN	10	1,350	13,500	125	1,254	5.8%	TBC	4	6	2	DETACHED	B/C
	OPEN MARKET TOTALS:	173		203,849		18,938	100.0%						
	TOTALS:	173		203,849		18,938	100.0%						

Area Gross:	6.56	Hectares
Area Gross:	16.210088	Acres
Non Developable/POS area	0.5	Hectares
Non Developable/POS area	1.235525	Acres
Developable area	6.06	Hectares
Developable area	14.974563	Acres
Density:	28.55	Units / Hectare
Density:	11.55	Units / Acre
Sq.ft/acre	13613.02	Sq.ft/acre
Sq. Metres/Hectare	3125.09	Sq. Metres/Hectare

M4/2 PERCENTAGE	M4/2 PLOT TOTAL
32.4%	56

M4/3 PERCENTAGE	M4/3 PLOT TOTAL
0.6%	1

HOUSETYPE RANGE: MIY

SPECIFICATION TYPE: TBC

LAND CLUSTER: 3 (E. YORKS)

LAND SEGMENT: B

DRAWING STAGE: 3-PLANNING

SHOW HOME COMPLEX

LANDSCAPE SPEC: SILVER

strata homes limited | quay point | lakeside | doncaster | DN4 5PL
t: 01302 308508 www.strata.co.uk

scale: 1:500 @ A0 | drawn by: AW | date: 19/12/2022

Project: Barrow Road, Barton upon Humber DN18 6DB

Drawing: Planning layout

Planning Ref: N/A

Drawing Number: 22-CL3-SEGB-BR-01-PL

Revision: I

Appendix 2 – Swept Path Analysis

10mm

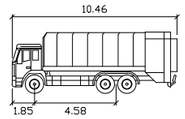
A3

Key:-

Outer Wheel Track	
Vehicle Swept Path	
Vehicle Centreline and Direction	

Notes:-

1. Simulated speed - not more than 5 mph
2. Actual vehicle dimensions and track may vary.



MB Econic Refuse Vehicle (NLC)

meters

Width	: 2.50
Track	: 2.50
Lock to Lock Time	6.0
Steering Angle	: 28.3

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iv. All work shall be carried out in accordance with local authority, statutory authority and health & safety requirements & regulations.

v. This drawing is produced to be printed and read in colour. Reproduction in black and white may prevent correct interpretation of some aspects.

vi. Based on Planning Layout Rev D provided by Client, received 27 07 23.

Rev.	Date	By	Chk	Description
E	16 08 23	JC	MR	Updated to new site layout XXXX-PL PlanningLayout Barrow Road -REV I
D	08 08 23	JC	MR	Updated to new site layout XXXX-PL PlanningLayout Barrow Road -REV H
C	27 07 23	JC	MR	Updated to new site layout MasterSiteLayout - Standard(work in progress) provided 26.07.23
B	10 02 23	OA	MR	Amended to match updated site layout provided by client 10 02 23.
A	09 02 23	OA	MR	Amended to match updated site layout provided by client 08 02 23.

Client

Strata

Project

Proposed Residential Development, Land to the South of A1077, Barton

Title

Swept Path Analysis Refuse Vehicle

local transport projects
traffic engineering and transport planning

Armstrong House,
The Flemingate Centre,
Beverley,
East Riding of Yorkshire.
HU17 0NW.

t 01482 679 911
info@ltp.co.uk
www.local-transport-projects.co.uk
Registered No. 5295328

Drawn	Date	
OA	19 01 23	
Scale	Checked	Approved
1 : 1000	AC	SW

Status

SITE TESTING

Drawing number

Project	Job	Drawing	Sheet	Revision
LTP/5136/	T1/	02	.01	E

Section of link road shown beyond the red line boundary to be delivered by others

10mm

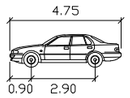
A3

Key:-

Outer Wheel Track	
Vehicle Swept Path	
Vehicle Centreline and Direction	

Notes:-

1. Simulated speed - not more than 5 mph
2. Actual vehicle dimensions and track may vary.



Car

	meters
Width	: 1.80
Track	: 1.80
Lock to Lock Time	6.0
Steering Angle	: 30.5

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A	09 02 23	OA	MR	Amended to match updated site layout provided by client 08 02 23.

Client

Strata

Project

Proposed Residential Development, Land to the South of A1077, Barton

Title

Swept Path Analysis
Large Car

local transport projects
traffic engineering and transport planning

Armstrong House,
The Flemingate Centre,
Beverley,
East Riding of Yorkshire.
HU17 0NW.

t 01482 679 911
e info@ltp.co.uk
w www.local-transport-projects.co.uk
Registered No. 5295328

Drawn	Date	
OA	19 01 23	
Scale	Checked	Approved
1 : 1000	AC	SW

Status

SITE TESTING

Drawing number

Project	Job	Drawing	Sheet	Revision
LTP/5136/	T1/	01	.01	E

Appendix 3 – Visibility Splays

© Local Transport Projects

10mm

A3

Key:-

- 2.4mx70m visibility splay from priority junctions required by North Lincolnshire's Residential Road design guide for 30mph
- 2.4mx33m visibility splay from residential access roads required by North Lincolnshire's Residential Road design guide for 20mph
- 2.4mx43m visibility splay from priority junctions required by Manual For Streets for 30mph
- 2.4mx##m achievable visibility splay (distance as annotated)
- 2.4mx43m visibility splay from private drives
- Tangent visibility check to outside of bend

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vi. Based on Planning Layout Rev D provided by Client, received 27 07 23.

.

Rev.	Date	By	Chk	Description
D	16 08 23	JC	MR	Updated to new site layout XXXX-PL.PlanningLayout Barrow Road -REV I
C	08 08 23	JC	MR	Updated to new site layout XXXX-PL.PlanningLayout Barrow Road -REV H
B	10 02 23	OA	MR	Amended to match updated site layout provided by client 10 02 23.
A	09 02 23	OA	MR	Amended to match updated site layout provided by client 08 02 23.

Client: Strata

Project: Proposed Residential Development, Land to the South of A1077, Barton

Title: Junction Visibility Splays

local transport projects
traffic engineering and transport planning
Armstrong House,
The Flemingate Centre,
Beverley,
East Riding of Yorkshire.
HU17 0NW.
t 01482 679 911
info@ltp.co.uk
www.local-transport-projects.co.uk
Registered No. 5295328

Drawn	Date	
OA	19 01 23	
Scale: 1 : 1000	Checked: AC	Approved: SW

Status: SITE TESTING

Drawing number

Project	Job	Drawing	Sheet	Revision
LTP/5136/	P1 /	01	.01	D

10mm

A3

Key:-

25m forward visibility splay required for 20mph required by manual for streets measured at 2.0m intervals along line offset 1.375m from kerbline

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C	09 08 23	JC	MR	Updated to new site layout XXXX-PL.PlanningLayout Barrow Road -REV H
B	10 02 23	OA	MR	Amended to match updated site layout provided by client 10 02 23.
A	08 08 23	JC	MR	Updated to new site layout XXXX-PL.PlanningLayout Barrow Road -REV H

Client

Strata

Project

Proposed Residential Development, Land to the South of A1077, Barton

Title

Forward Visibility Splays

local transport projects
traffic engineering and transport planning
Armstrong House,
The Flemingate Centre,
Beverley,
East Riding of Yorkshire.
HU17 0NW.
t 01482 679 911
e info@ltp.co.uk
w www.local-transport-projects.co.uk
Registered No. 5295328

Drawn	Date	
OA	19 01 23	
Scale	Checked	Approved
1 : 1000	AC	SW

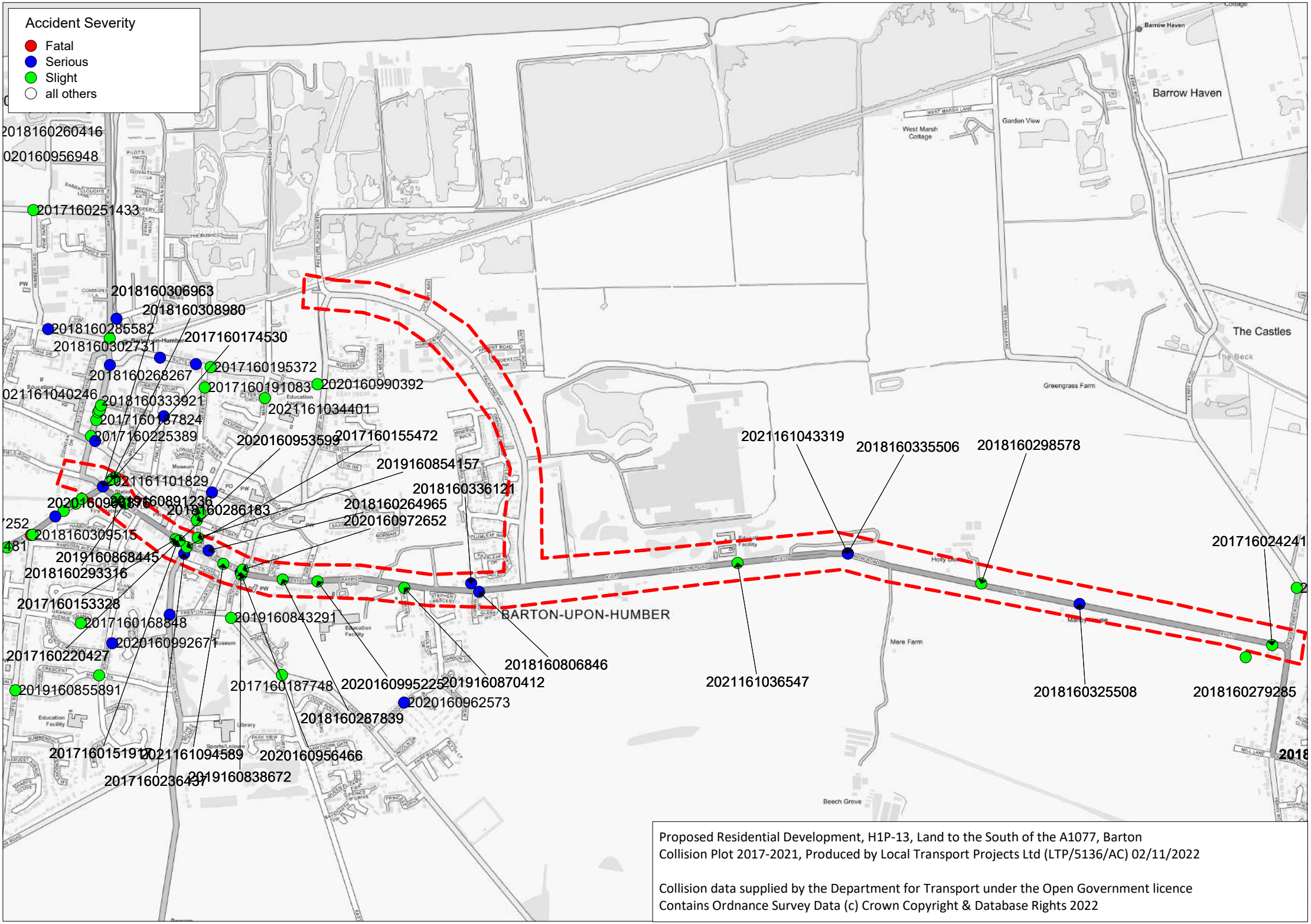
Status

SITE TESTING

Drawing number

Project	Job	Drawing	Sheet	Revision
LTP/ 5136 /	P1 /	01	.02	D

Appendix 4 – Collision Plot



Proposed Residential Development, H1P-13, Land to the South of the A1077, Barton
Collision Plot 2017-2021, Produced by Local Transport Projects Ltd (LTP/5136/AC) 02/11/2022

Appendix 5 – Trip Generation

Projected Vehicle Trip Generation - H1P-13

175 dwellings

Vehicle Trip Rates (per dwelling)

Time	IN	OUT	TOTAL
07:00-08:00			
08:00-09:00	0.122	0.360	0.482
09:00-10:00			
10:00-11:00			
11:00-12:00			
12:00-13:00			
13:00-14:00			
14:00-15:00			
15:00-16:00			
16:00-17:00			
17:00-18:00	0.333	0.158	0.491
18:00-19:00			
TOTAL	**0.455**	**0.518**	**0.973**

Vehicle Trips

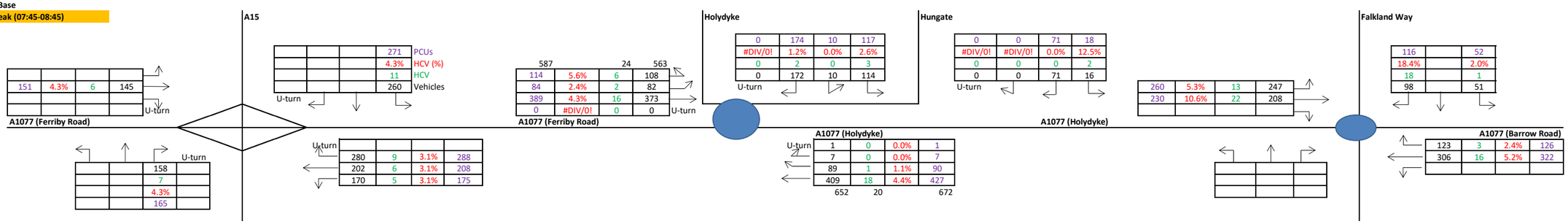
IN	OUT	TOTAL
21	63	84
58	28	86
79	**91**	**170**

*Approved trip rates from TA (BSP, 2020)

Appendix 6 – Network Diagrams

2019 Base

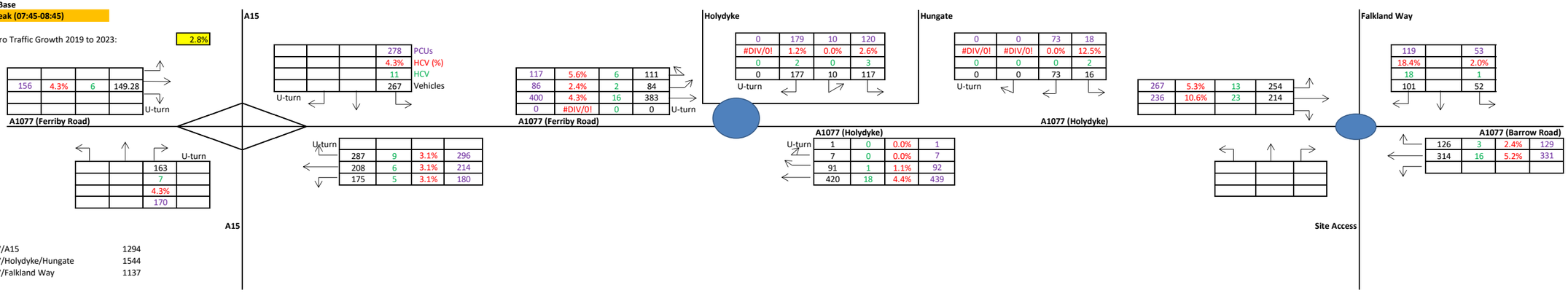
AM Peak (07:45-08:45)



2023 Base

AM Peak (07:45-08:45)

TEMPro Traffic Growth 2019 to 2023: 2.8%

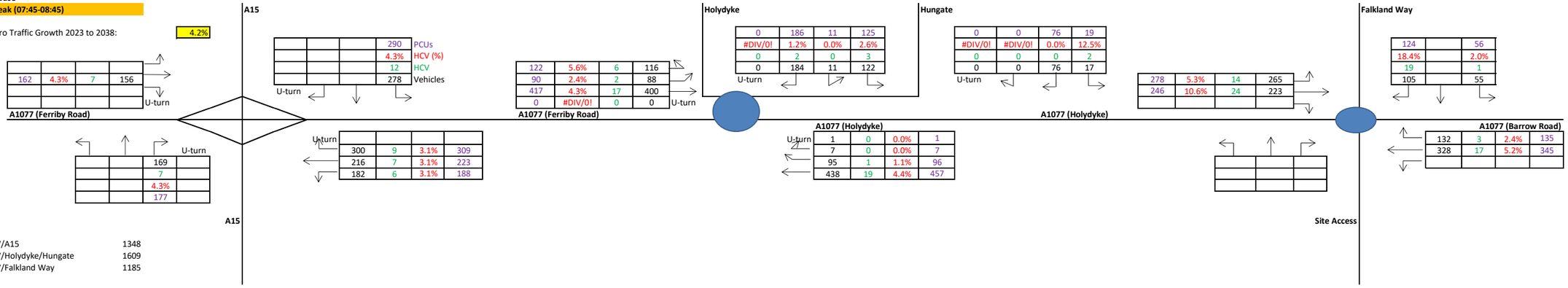


A1077/A15	1294
A1077/Holydyke/Hungate	1544
A1077/Falkland Way	1137

2038 Base

AM Peak (07:45-08:45)

TEMPro Traffic Growth 2023 to 2038: 4.2%



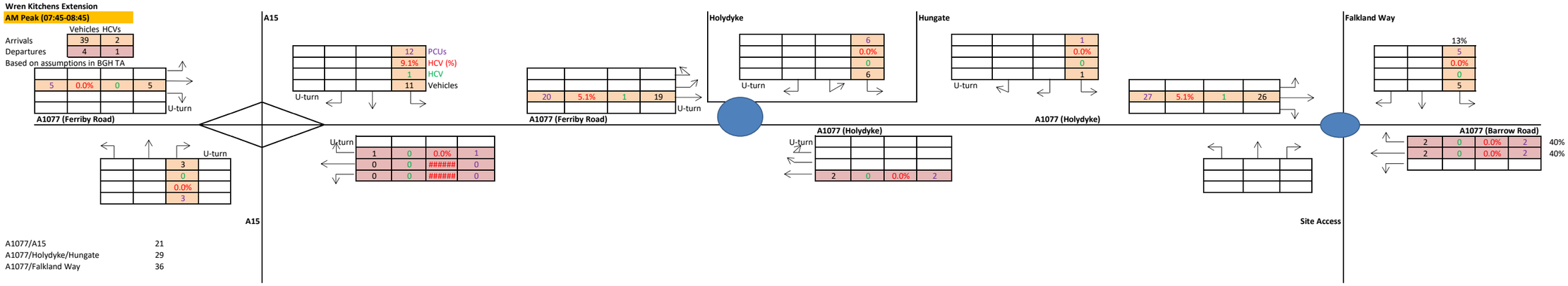
A1077/A15	1348
A1077/Holydyke/Hungate	1609
A1077/Falkland Way	1185

Wren Kitchens Extension

AM Peak (07:45-08:45)

	Vehicles	HCVs
Arrivals	39	2
Departures	4	1

Based on assumptions in BGH TA



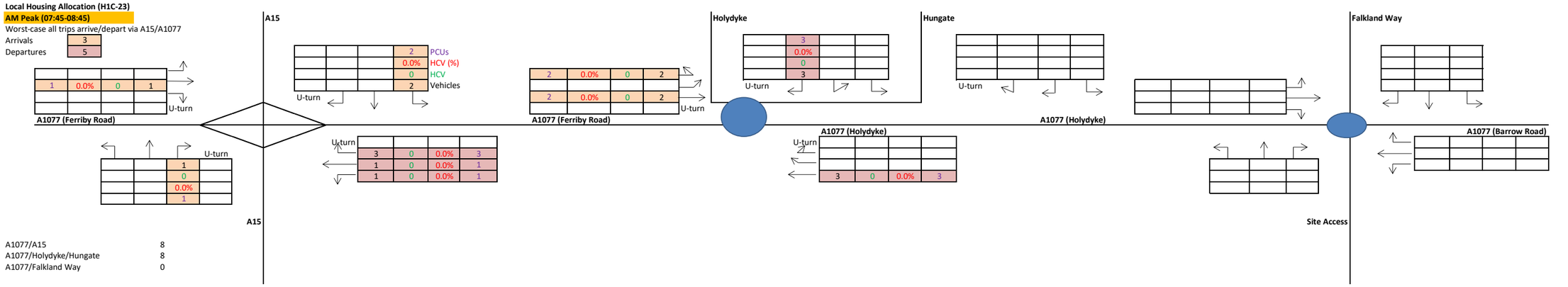
A1077/A15	21
A1077/Holydyke/Hungate	29
A1077/Falkland Way	36

Local Housing Allocation (H1C-23)

AM Peak (07:45-08:45)

Worst-case all trips arrive/depart via A15/A1077

Arrivals	3
Departures	5



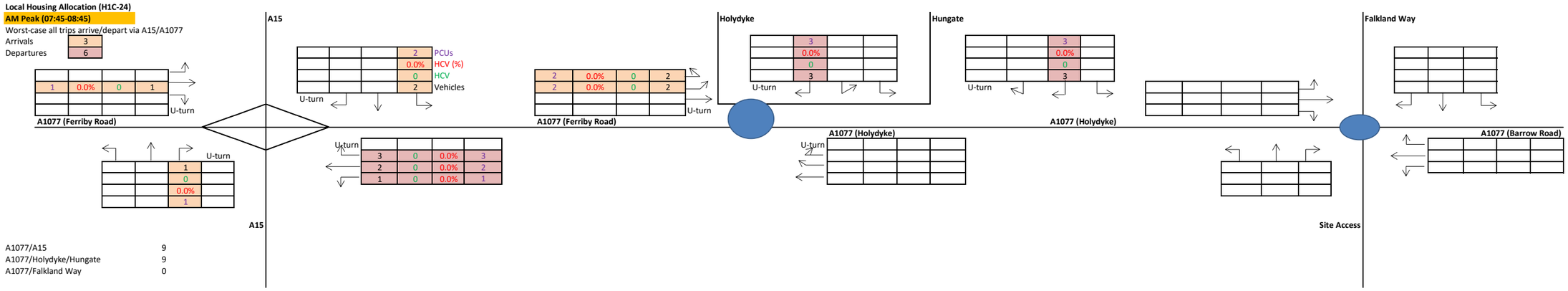
A1077/A15	8
A1077/Holydyke/Hungate	8
A1077/Falkland Way	0

Local Housing Allocation (H1C-24)

AM Peak (07:45-08:45)

Worst-case all trips arrive/depart via A15/A1077

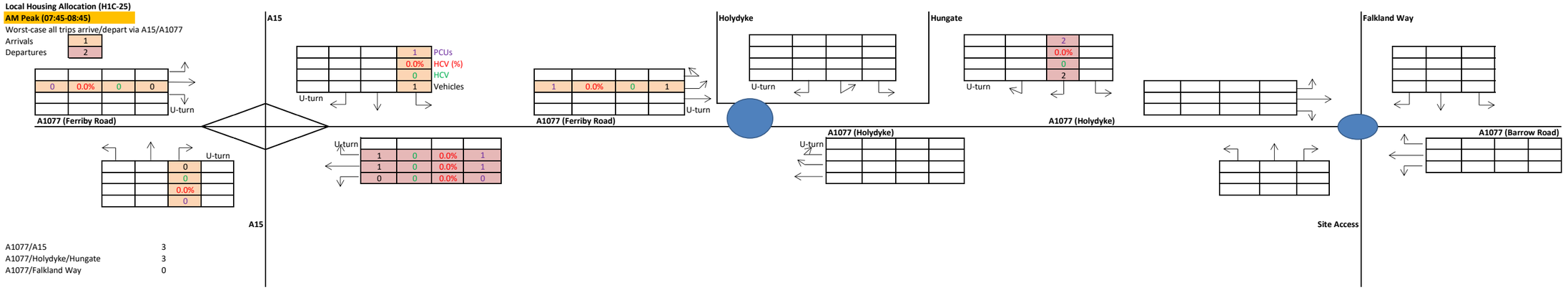
Arrivals	3
Departures	6



A1077/A15	9
A1077/Holydyke/Hungate	9
A1077/Falkland Way	0

Local Housing Allocation (H1C-25)
AM Peak (07:45-08:45)
Worst-case all trips arrive/depart via A15/A1077

Arrivals	1
Departures	2



A1077/A15	3
A1077/Holydyke/Hungate	3
A1077/Falkland Way	0

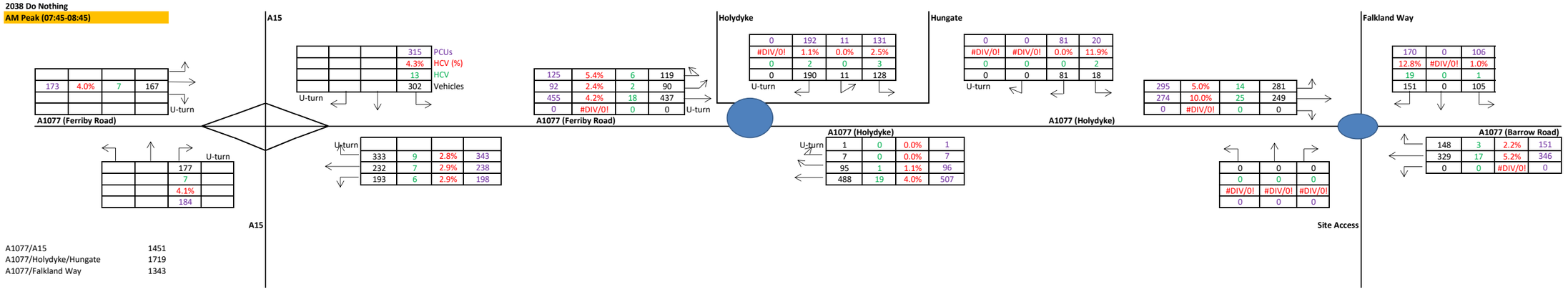
Local Housing Allocation (H1P-12)*
AM Peak (07:45-08:45)

Arrivals	39
Departures	114

A1077/A15	62
A1077/Holydyke/Hungate	62
A1077/Falkland Way	122

*Based on approved distribution & assignment presented within the TA (BSP, 2020) at the A1077/Falkland Way junction and the existing turning proportions at the A1077/A15 Interchange

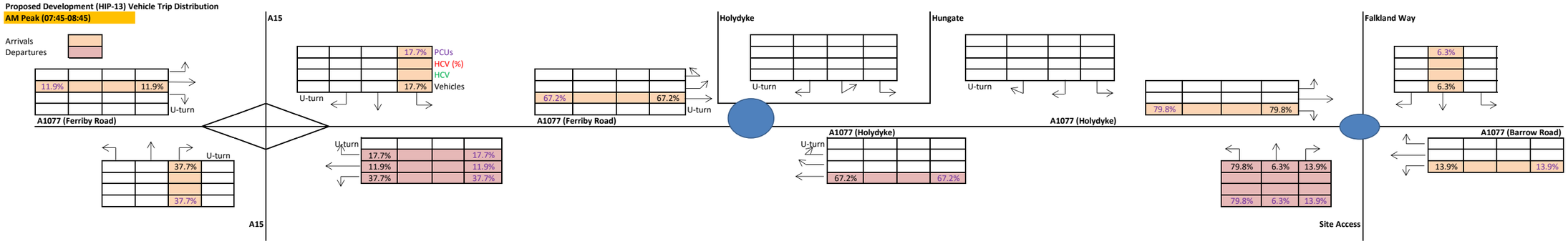
2038 Do Nothing
AM Peak (07:45-08:45)



A1077/A15	1451
A1077/Holydyke/Hungate	1719
A1077/Falkland Way	1343

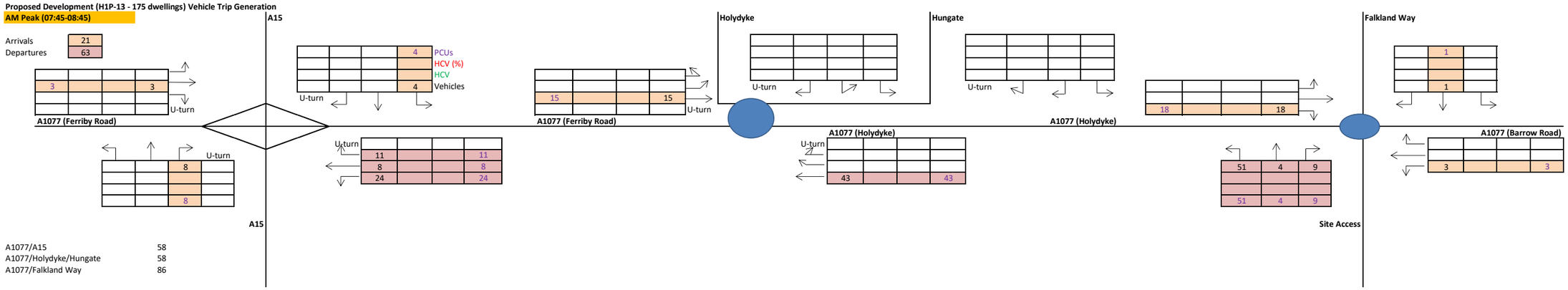
Proposed Development (HIP-13) Vehicle Trip Distribution

AM Peak (07:45-08:45)



Proposed Development (H1P-13 - 175 dwellings) Vehicle Trip Generation

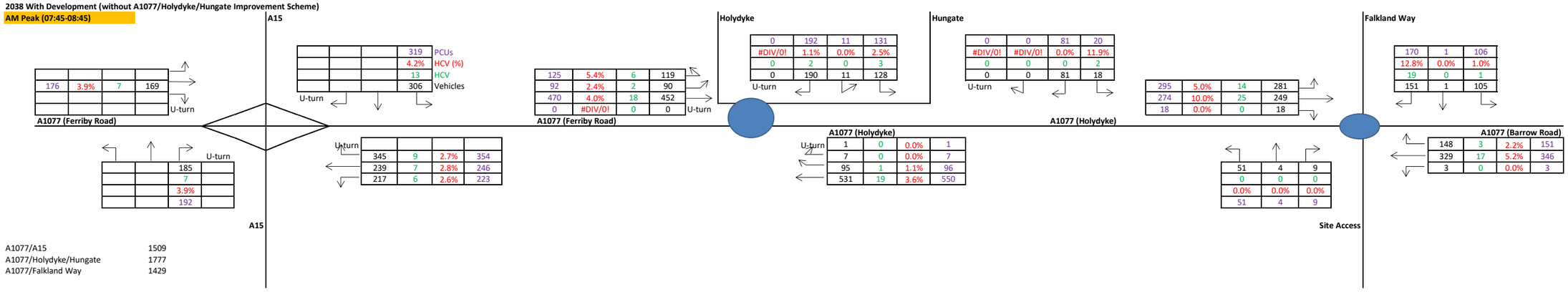
AM Peak (07:45-08:45)



A1077/A15	58
A1077/Holydyke/Hungate	58
A1077/Falkland Way	86

2038 With Development (without A1077/Holydyke/Hungate Improvement Scheme)

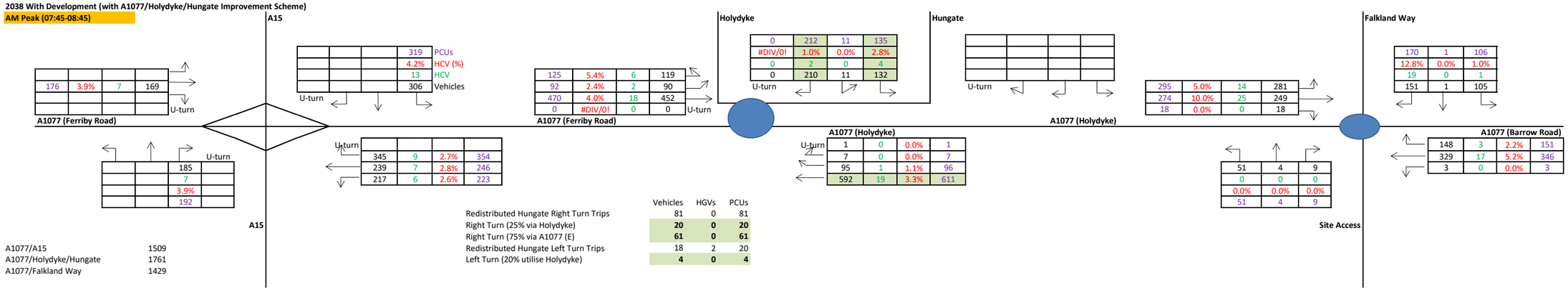
AM Peak (07:45-08:45)



A1077/A15	1509
A1077/Holydyke/Hungate	1777
A1077/Falkland Way	1429

2038 With Development (with A1077/Holydyke/Hungate Improvement Scheme)

AM Peak (07:45-08:45)



176	3.9%	7	169

			319
			4.2%
			13
			306

125	5.4%	6	119
92	2.4%	2	90
470	4.0%	18	452
0	#DIV/0!	0	0

0	212	11	135
#DIV/0!	1.0%	0.0%	2.8%
0	2	0	4
0	210	11	132

295	5.0%	14	281
274	10.0%	25	249
18	0.0%	0	18

			185
			7
			3.9%
			192

345	9	2.7%	354
239	7	2.8%	246
217	6	2.6%	223

1	0	0.0%	1
7	0	0.0%	7
95	1	1.1%	96
592	19	3.3%	611

51	4	9	
0	0	0	
0.0%	0.0%	0.0%	
51	4	9	

170	1	106	
12.8%	0.0%	1.0%	
19	0	1	
151	1	105	

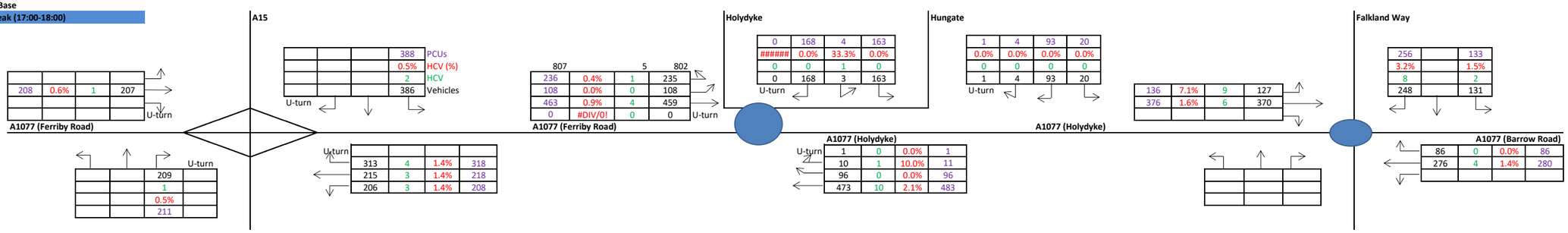
148	3	2.2%	151
329	17	5.2%	346
3	0	0.0%	3

	Vehicles	HGVs	PCUs
Redistributed Hungate Right Turn Trips	81	0	81
Right Turn (25% via Holydyke)	**20**	**0**	**20**
Right Turn (75% via A1077 (E)	**61**	**0**	**61**
Redistributed Hungate Left Turn Trips	18	2	20
Left Turn (20% utilise Holydyke)	**4**	**0**	**4**

A1077/A15	1509
A1077/Holydyke/Hungate	1761
A1077/Falkland Way	1429

2019 Base

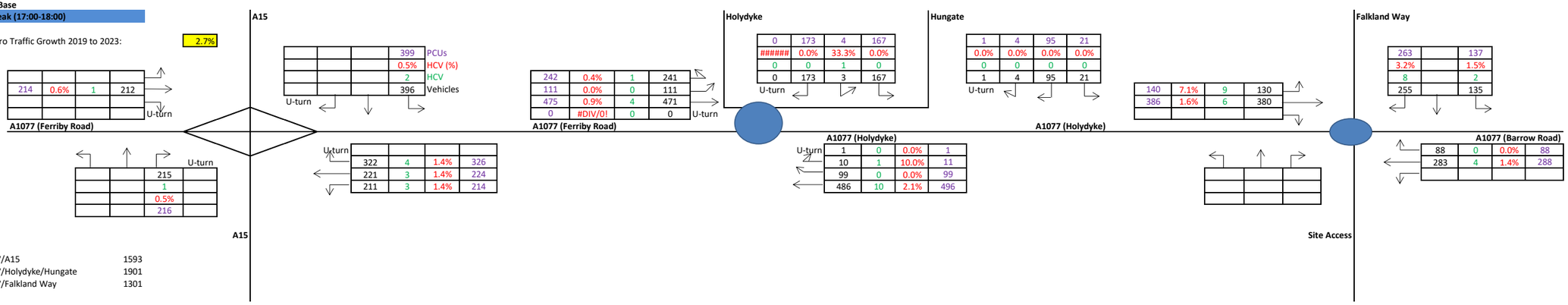
PM Peak (17:00-18:00)



2023 Base

PM Peak (17:00-18:00)

TEMPro Traffic Growth 2019 to 2023: 2.7%



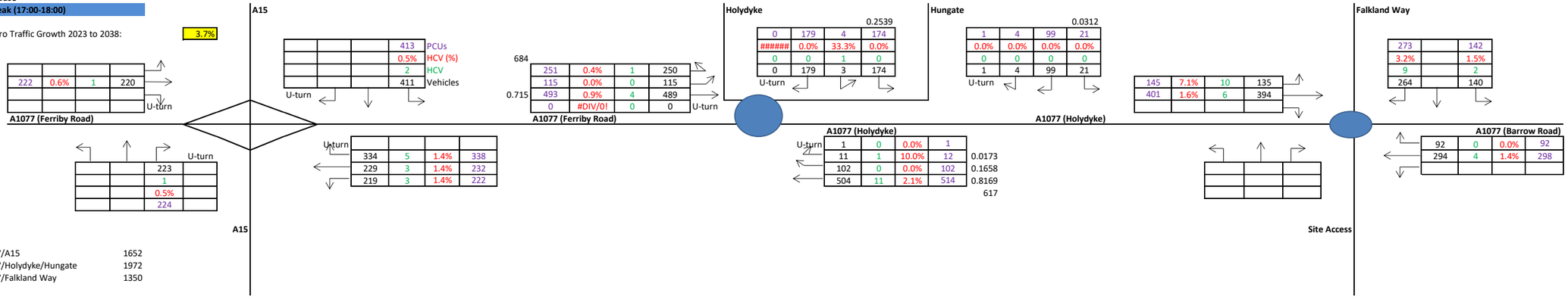
A15 Site Access

A1077/A15	1593
A1077/Holydyke/Hungate	1901
A1077/Falkland Way	1301

2038 Base

PM Peak (17:00-18:00)

TEMPro Traffic Growth 2023 to 2038: 3.7%



A15 Site Access

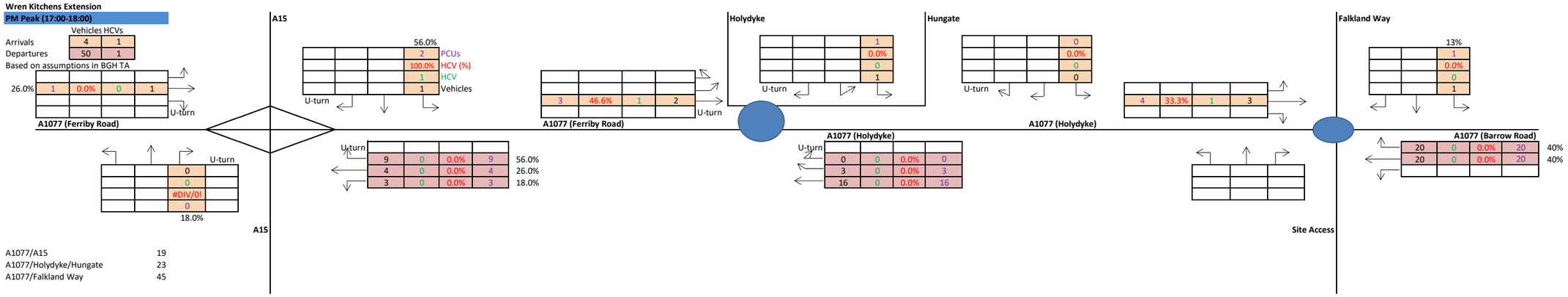
A1077/A15	1652
A1077/Holydyke/Hungate	1972
A1077/Falkland Way	1350

Wren Kitchens Extension

PM Peak (17:00-18:00)

	Vehicles	HCVs
Arrivals	4	1
Departures	50	1

Based on assumptions in BGH TA



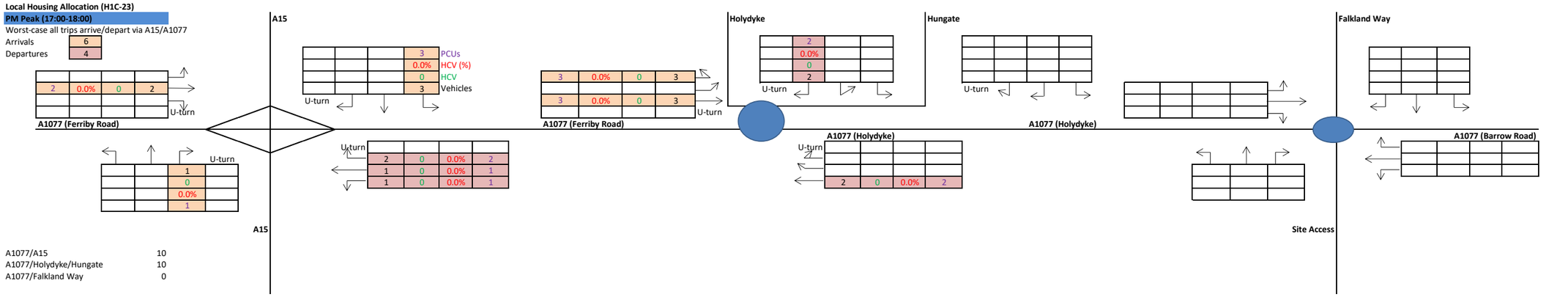
A1077/A15	19
A1077/Holydyke/Hungate	23
A1077/Falkland Way	45

Local Housing Allocation (H1C-23)

PM Peak (17:00-18:00)

Worst-case all trips arrive/depart via A15/A1077

Arrivals	6
Departures	4



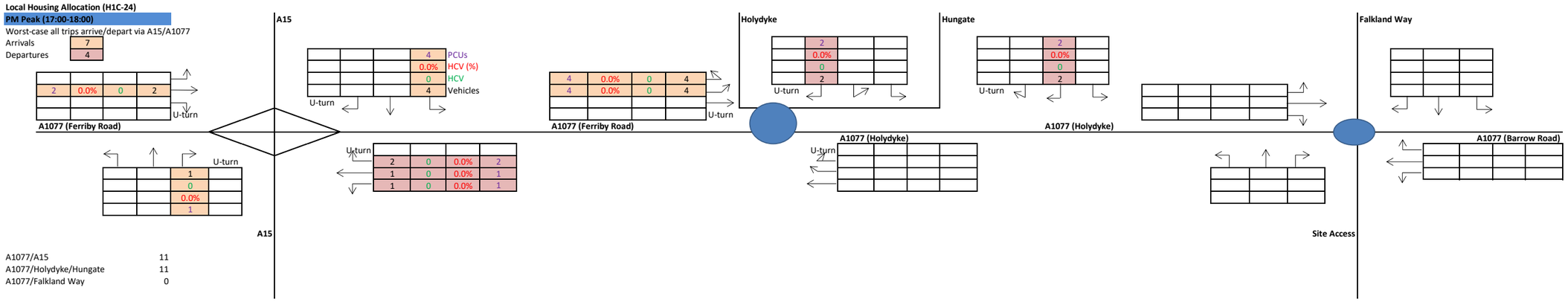
A1077/A15	10
A1077/Holydyke/Hungate	10
A1077/Falkland Way	0

Local Housing Allocation (H1C-24)

PM Peak (17:00-18:00)

Worst-case all trips arrive/depart via A15/A1077

Arrivals	7
Departures	4



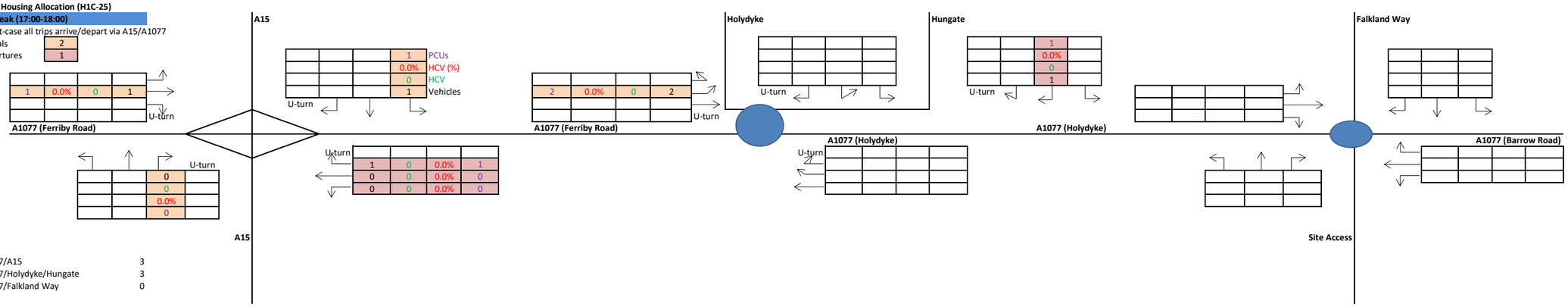
A1077/A15	11
A1077/Holydyke/Hungate	11
A1077/Falkland Way	0

Local Housing Allocation (H1C-25)

PM Peak (17:00-18:00)

Worst-case all trips arrive/depart via A15/A1077

Arrivals	2
Departures	1

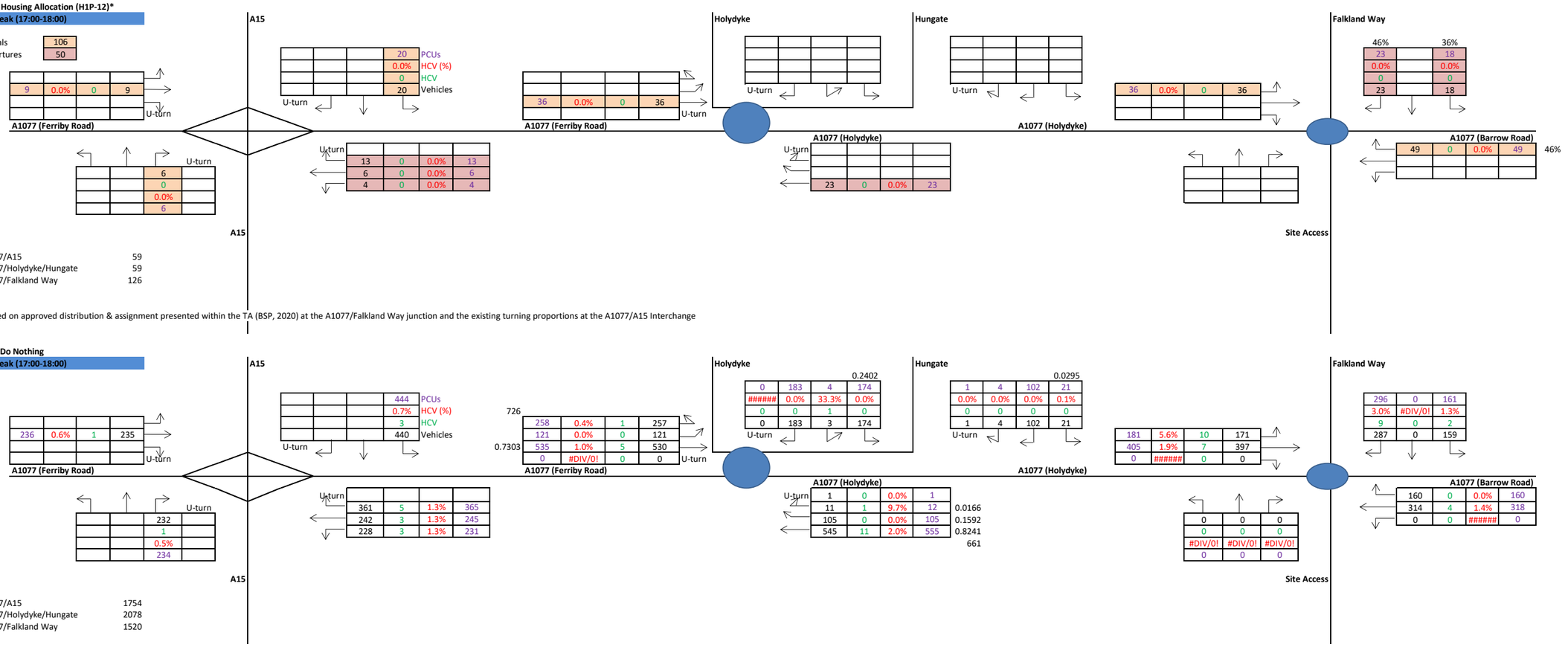


A1077/A15	3
A1077/Holydyke/Hungate	3
A1077/Falkland Way	0

Local Housing Allocation (H1P-12)*

PM Peak (17:00-18:00)

Arrivals	106
Departures	50



A1077/A15	59
A1077/Holydyke/Hungate	59
A1077/Falkland Way	126

*Based on approved distribution & assignment presented within the TA (BSP, 2020) at the A1077/Falkland Way junction and the existing turning proportions at the A1077/A15 Interchange

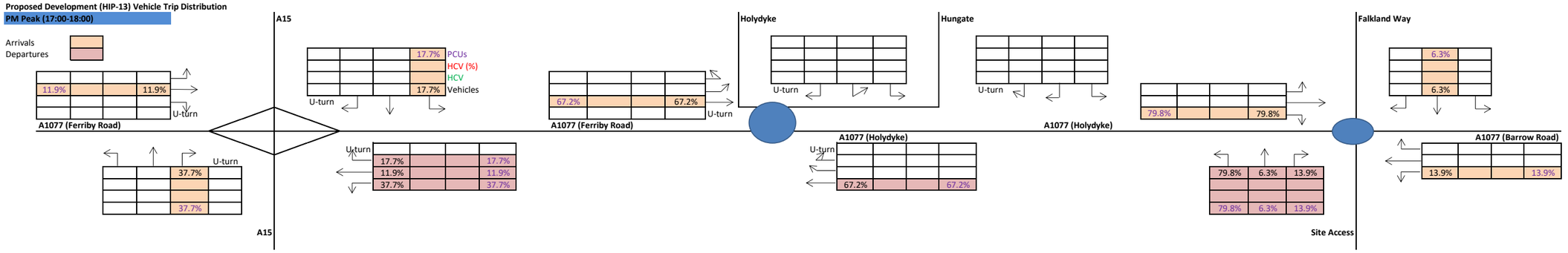
2038 Do Nothing

PM Peak (17:00-18:00)

A1077/A15	1754
A1077/Holydyke/Hungate	2078
A1077/Falkland Way	1520

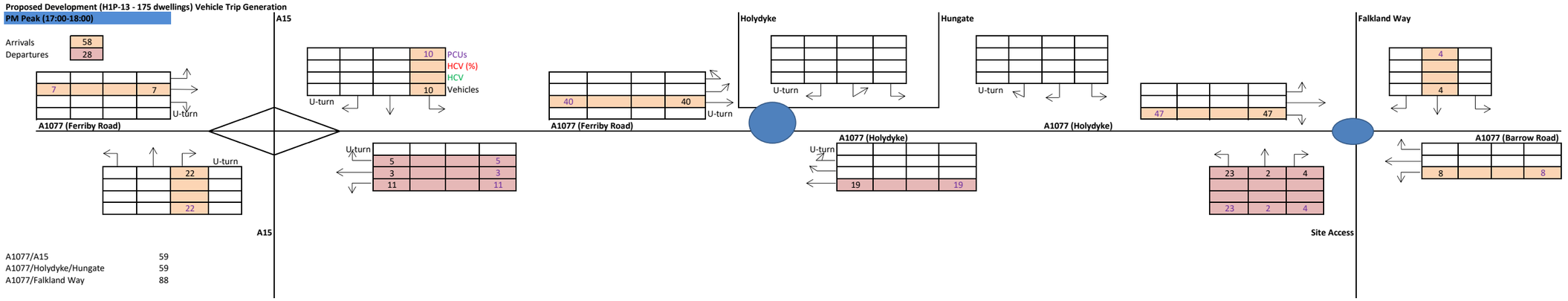
Proposed Development (HIP-13) Vehicle Trip Distribution

PM Peak (17:00-18:00)



Proposed Development (H1P-13 - 175 dwellings) Vehicle Trip Generation

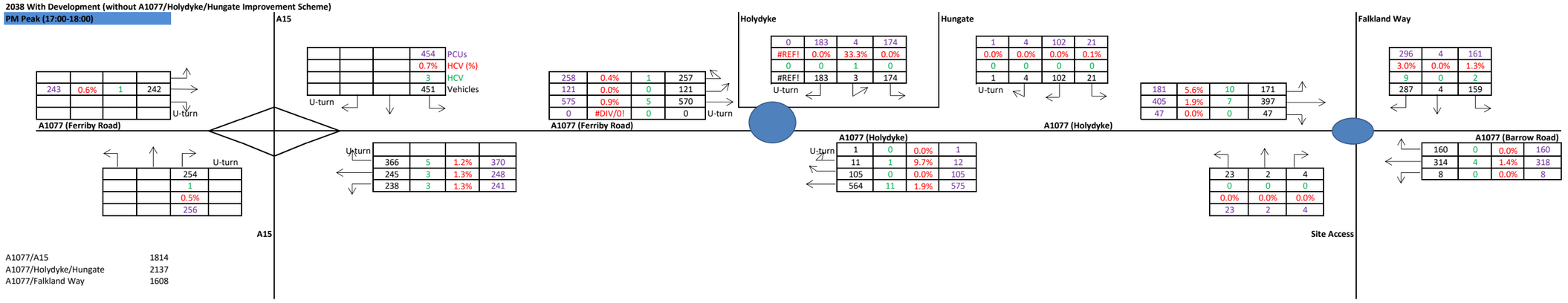
PM Peak (17:00-18:00)



A1077/A15	59
A1077/Holydyke/Hungate	59
A1077/Falkland Way	88

2038 With Development (without A1077/Holydyke/Hungate Improvement Scheme)

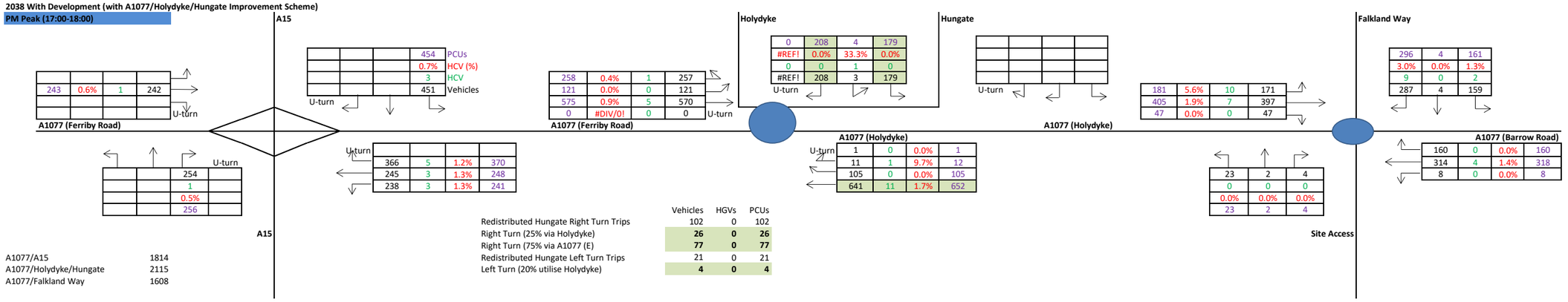
PM Peak (17:00-18:00)



A1077/A15	1814
A1077/Holydyke/Hungate	2137
A1077/Falkland Way	1608

2038 With Development (with A1077/Holydyke/Hungate Improvement Scheme)

PM Peak (17:00-18:00)



			454
			0.7%
			3
			451

243	0.6%	1	242

			254
			1
			0.5%
			256

366	5	1.2%	370
245	3	1.3%	248
238	3	1.3%	241

258	0.4%	1	257
121	0.0%	0	121
575	0.9%	5	570
0	#DIV/0!	0	0

0	208	4	179
#REF!	0.0%	33.3%	0.0%
0	0	1	0
#REF!	208	3	179

181	5.6%	10	171
405	1.9%	7	397
47	0.0%	0	47

1	0	0.0%	1
11	1	9.7%	12
105	0	0.0%	105
641	11	1.7%	652

23	2	4
0	0	0
0.0%	0.0%	0.0%
23	2	4

296	4	161	
3.0%	0.0%	1.3%	
9	0	2	
287	4	159	

160	0	0.0%	160
314	4	1.4%	318
8	0	0.0%	8

	Vehicles	HGVs	PCUs
Redistributed Hungate Right Turn Trips	102	0	102
Right Turn (25% via Holydyke)	**26**	**0**	**26**
Right Turn (75% via A1077 (E)	**77**	**0**	**77**
Redistributed Hungate Left Turn Trips	21	0	21
Left Turn (20% utilise Holydyke)	**4**	**0**	**4**

A1077/A15	1814
A1077/Holydyke/Hungate	2115
A1077/Falkland Way	1608

Appendix 7 – TEMPro Traffic Growth

Base Year:	2019
Assessment Year:	2023
Period (years):	4
Area Type:	N/A
Road Type:	Principal
Area Served:	Region
NTM Dataset:	RTF 2018 Scenario 1 - Reference
Region Data Set Version:	Yorkshire & Humber v7.2
Software Version:	TEMPRO v7.2b
Area:	North Lincolnshire 001

Scenario	Weekday AM Peak Period (07:00-09:59)	Weekday PM Peak Period (16:00-18:59)
Unadjusted	**1.0277**	**1.0268**
Unadjusted Growth Factor:	**2.8%**	**2.7%**

Base Year:	2023
Assessment Year:	2038
Period (years):	15
Area Type:	N/A
Road Type:	Principal
Area Served:	Region
NTM Dataset:	RTF 2018 Scenario 1 - Reference
Region Data Set Version:	Yorkshire & Humber v7.2
Software Version:	TEMPRO v7.2b
Area:	North Lincolnshire 001

Factor	Households (HH)	Jobs
Base Year Unadjusted	5317	4442
Forecast Year Unadjusted	5855	4629
Growth Unadjusted	538	187
Committed Developments	**358**	**300**
Do Nothing Adjusted	5497	4442
Proposed Development	**175**	
Do Something Adjusted	5322	4442

Scenario	Weekday AM Peak Period (07:00-09:59)	Weekday PM Peak Period (16:00-18:59)
Unadjusted	**1.1150**	**1.1124**
Unadjusted Growth Factor:	**11.5%**	**11.2%**

Adjusted	**1.0422**	**1.0374**
Adjusted Growth Factor:	**4.2%**	**3.7%**

Appendix 8 – Gravity Model

Proposed Trip Distribution & Assignment - Gravity Model

Origin MSOA: North Lincolnshire 001

Stage 1: Trip Distribution

Area of Workplace	Type	All people	Works mainly at or from home	Underground, metro, light rail or tram		Train	Bus, minibus or coach	Taxi or minicab	Motorcycle, scooter or moped	Driving a car or van	Passenger in a car or van	Bicycle	On foot	Other	Vehicle Trip Generating Mode	%	Description
North Lincolnshire 001	MSOA Level	1,349	0	0		1	2	10	5	558	77	153	538	5	573	20.93%	
North East Lincolnshire	Local Authority	378	0	0		6	2	0	4	340	17	1	8	0	344	12.56%	
Kingston upon Hull, City of	Local Authority	379	0	0		1	38	0	6	282	34	15	3	0	288	10.52%	
North Lincolnshire 004	MSOA Level	218	0	0		0	0	0	1	205	10	1	1	0	206	7.52%	
North Lincolnshire 011	MSOA Level	202	0	0		1	6	0	5	170	13	2	4	1	175	6.39%	
East Riding of Yorkshire	Local Authority	199	0	0		2	5	0	5	160	11	9	6	1	165	6.03%	
North Lincolnshire 007	MSOA Level	176	0	0		0	4	1	2	153	12	0	4	0	156	5.70%	
North Lincolnshire 002	MSOA Level	183	0	0		2	2	1	2	137	29	8	0	2	140	5.11%	
North Lincolnshire 010	MSOA Level	155	0	0		0	4	0	0	125	21	3	2	0	125	4.57%	
North Lincolnshire 008	MSOA Level	103	0	0		0	12	1	0	77	7	0	6	0	78	2.85%	
North Lincolnshire 003	MSOA Level	85	0	0		0	0	0	0	75	7	1	2	0	75	2.74%	
North Lincolnshire 005	MSOA Level	63	0	0		0	0	0	2	53	6	1	1	0	55	2.01%	
West Lindsey	Local Authority	52	0	0		2	0	0	0	46	2	1	1	0	46	1.68%	
North Lincolnshire 009	MSOA Level	46	0	0		0	3	0	0	38	3	0	2	0	38	1.39%	
Doncaster	Local Authority	45	0	0		0	0	0	0	38	3	1	3	0	38	1.39%	
North Lincolnshire 012	MSOA Level	43	0	0		0	0	0	1	35	3	2	2	0	36	1.31%	
North Lincolnshire 013	MSOA Level	45	0	0		0	2	0	0	31	12	0	0	0	31	1.13%	
Leeds	Local Authority	27	0	0		1	1	0	0	21	2	0	2	0	21	0.77%	
North Lincolnshire 015	MSOA Level	28	0	0		0	0	0	0	20	7	0	1	0	20	0.73%	
North Lincolnshire 022	MSOA Level	24	0	0		0	0	0	0	19	2	0	3	0	19	0.69%	
Sheffield	Local Authority	20	0	0		1	0	0	1	18	0	0	0	0	19	0.69%	
Lincoln	Local Authority	20	0	0		1	0	0	0	17	1	0	1	0	17	0.62%	
North Lincolnshire 020	MSOA Level	17	0	0		0	0	0	0	16	0	0	1	0	16	0.58%	
North Lincolnshire 019	MSOA Level	19	0	0		0	0	0	0	14	0	1	3	1	14	0.51%	
East Lindsey	Local Authority	13	0	0		0	0	0	0	12	0	0	0	1	12	0.44%	
North Lincolnshire 018	MSOA Level	11	0	0		0	0	0	0	11	0	0	0	0	11	0.40%	
Wakefield	Local Authority	14	0	0		2	0	0	0	10	1	1	0	0	10	0.37%	
Bassetlaw	Local Authority	11	0	0		0	0	0	0	10	1	0	0	0	10	0.37%	
															TOTAL:	2,738	100.00%

Stage 2: Traffic assignment for each O-D pair

Area of Workplace	Type	Route Assignment A	B	C	D	E	F	TOTAL
North Lincolnshire 001	MSOA Level	10.0%				30.0%	60.0%	100%
North East Lincolnshire	Local Authority	50.0%		50.0%				100%
Kingston upon Hull, City of	Local Authority		100.0%					100%
North Lincolnshire 004	MSOA Level			80.0%	20.0%			100%
North Lincolnshire 011	MSOA Level			100.0%				100%
East Riding of Yorkshire	Local Authority		100.0%					100%
North Lincolnshire 007	MSOA Level			50.0%	50.0%			100%
North Lincolnshire 002	MSOA Level	100.0%						100%
North Lincolnshire 010	MSOA Level			80.0%	20.0%			100%
North Lincolnshire 008	MSOA Level			50.0%	50.0%			100%
North Lincolnshire 003	MSOA Level				100.0%			100%
North Lincolnshire 005	MSOA Level			80.0%	20.0%			100%
West Lindsey	Local Authority			100.0%				100%
North Lincolnshire 009	MSOA Level			50.0%	50.0%			100%
Doncaster	Local Authority			100.0%				100%
North Lincolnshire 012	MSOA Level			50.0%	50.0%			100%
North Lincolnshire 013	MSOA Level			80.0%	20.0%			100%
Leeds	Local Authority		100.0%					100%
North Lincolnshire 015	MSOA Level			80.0%	20.0%			100%
North Lincolnshire 022	MSOA Level			100.0%				100%
Sheffield	Local Authority			100.0%				100%
Lincoln	Local Authority			100.0%				100%
North Lincolnshire 020	MSOA Level			80.0%	20.0%			100%
North Lincolnshire 019	MSOA Level			80.0%	20.0%			100%
East Lindsey	Local Authority	100.0%						100%
North Lincolnshire 018	MSOA Level			80.0%	20.0%			100%
Wakefield	Local Authority		100.0%					100%
Bassetlaw	Local Authority			100.0%				100%

Stage 3: Total zonal distribution of traffic

Area of Workplace	Type	Route Assignment A	B	C	D	E	F	TOTAL
North Lincolnshire 001	MSOA Level	2.09%	0.00%	0.00%	0.00%	6.28%	12.56%	20.93%
North East Lincolnshire	Local Authority	6.28%	0.00%	6.28%	0.00%	0.00%	0.00%	12.56%
Kingston upon Hull, City of	Local Authority	0.00%	10.52%	0.00%	0.00%	0.00%	0.00%	10.52%
North Lincolnshire 004	MSOA Level	0.00%	0.00%	6.02%	1.50%	0.00%	0.00%	7.52%
North Lincolnshire 011	MSOA Level	0.00%	0.00%	6.39%	0.00%	0.00%	0.00%	6.39%
East Riding of Yorkshire	Local Authority	0.00%	6.03%	0.00%	0.00%	0.00%	0.00%	6.03%
North Lincolnshire 007	MSOA Level	0.00%	0.00%	2.85%	2.85%	0.00%	0.00%	5.70%
North Lincolnshire 002	MSOA Level	5.11%	0.00%	0.00%	0.00%	0.00%	0.00%	5.11%
North Lincolnshire 010	MSOA Level	0.00%	0.00%	3.65%	0.91%	0.00%	0.00%	4.57%
North Lincolnshire 008	MSOA Level	0.00%	0.00%	1.42%	1.42%	0.00%	0.00%	2.85%
North Lincolnshire 003	MSOA Level	0.00%	0.00%	0.00%	2.74%	0.00%	0.00%	2.74%
North Lincolnshire 005	MSOA Level	0.00%	0.00%	1.61%	0.40%	0.00%	0.00%	2.01%
West Lindsey	Local Authority	0.00%	0.00%	1.68%	0.00%	0.00%	0.00%	1.68%
North Lincolnshire 009	MSOA Level	0.00%	0.00%	0.69%	0.69%	0.00%	0.00%	1.39%
Doncaster	Local Authority	0.00%	0.00%	1.39%	0.00%	0.00%	0.00%	1.39%
North Lincolnshire 012	MSOA Level	0.00%	0.00%	0.66%	0.66%	0.00%	0.00%	1.31%
North Lincolnshire 013	MSOA Level	0.00%	0.00%	0.91%	0.23%	0.00%	0.00%	1.13%
Leeds	Local Authority	0.00%	0.77%	0.00%	0.00%	0.00%	0.00%	0.77%
North Lincolnshire 015	MSOA Level	0.00%	0.00%	0.58%	0.15%	0.00%	0.00%	0.73%
North Lincolnshire 022	MSOA Level	0.00%	0.00%	0.69%	0.00%	0.00%	0.00%	0.69%
Sheffield	Local Authority	0.00%	0.00%	0.69%	0.00%	0.00%	0.00%	0.69%
Lincoln	Local Authority	0.00%	0.00%	0.62%	0.00%	0.00%	0.00%	0.62%
North Lincolnshire 020	MSOA Level	0.00%	0.00%	0.47%	0.12%	0.00%	0.00%	0.58%
North Lincolnshire 019	MSOA Level	0.00%	0.00%	0.41%	0.10%	0.00%	0.00%	0.51%
East Lindsey	Local Authority	0.44%	0.00%	0.00%	0.00%	0.00%	0.00%	0.44%
North Lincolnshire 018	MSOA Level	0.00%	0.00%	0.32%	0.08%	0.00%	0.00%	0.40%
Wakefield	Local Authority	0.00%	0.37%	0.00%	0.00%	0.00%	0.00%	0.37%
Bassetlaw	Local Authority	0.00%	0.00%	0.37%	0.00%	0.00%	0.00%	0.37%
	Sub-total	**13.93%**	**17.68%**	**37.71%**	**11.86%**	**6.28%**	**12.56%**	**100.00%**

Zone	Route	Distribution Split	AM 2-Way	PM 2-Way
A	A1077 (E)	13.9%	12	12
B	A15 (N)	17.7%	15	15
C	A15 (S) via A1077	37.7%	32	32
D	A1077 (W)	11.9%	10	10
E	Falkland Way	6.3%	5	5
F	A1077 (W) within Barton town centre	12.6%	11	11
	TOTAL	**100.0%**	**84**	**86**

Notes

Source: 2011 National Census - Travel to work flows

Table WU03EW - Location of usual residence and place of work by method of travel to work (MSOA level)

Based on 2011 Middle-Layer Super Output Areas (MSOA)

Neighbouring local authorities only

MSOA/LA with fewer than 10 people travelling by a vehicle trip generating modes have been excluded

Area of Workplace	Type	All people	Works mainly at or from home	Underground, metro, light rail or tram		Train	Bus, minibus or coach	Taxi or minicab	Motorcycle, scooter or moped	Driving a car or van	Passenger in a car or van	Bicycle	On foot	Other	<10 excluded
North Lincolnshire 006	MSOA Level	11	0	0		0	0	0	0	9	0	0	2	0	9
North Lincolnshire 023	MSOA Level	10	0	0		0	0	0	0	9	1	0	0	0	9
York	Local Authority	11	0	0		0	0	0	0	9	0	0	2	0	9
Rotherham	Local Authority	7	0	0		0	0	0	0	7	0	0	0	0	7
North Lincolnshire 016	MSOA Level	7	0	0		0	0	0	0	6	0	0	1	0	6
North Lincolnshire 017	MSOA Level	8	0	0		0	0	0	0	6	1	0	1	0	6
North Lincolnshire 021	MSOA Level	10	0	0		0	1	0	0	6	1	2	0	0	6
Barnsley	Local Authority	7	0	0		0	0	0	0	6	0	0	1	0	6
North Lincolnshire 014	MSOA Level	9	0	0		0	0	0	0	5	2	1	1	0	5
Rushcliffe	Local Authority	5	0	0		0	0	0	0	5	0	0	0	0	5
South Kesteven	Local Authority	5	0	0		0	0	0	0	5	0	0	0	0	5
Hambleton	Local Authority	4	0	0		0	0	0	0	4	0	0	0	0	4
Kirklees	Local Authority	8	0	0		0	0	0	0	4	1	0	3	0	4
Richmondshire	Local Authority	5	0	0		0	0	0	0	4	0	0	1	0	4
Scarborough	Local Authority	4	0	0		0	0	0	0	4	0	0	0	0	4
Chesterfield	Local Authority	4	0	0		0	0	0	0	4	0	0	0	0	4
Harrogate	Local Authority	3	0	0		0	0	0	0	3	0	0	0	0	3
Selby	Local Authority	4	0	0		0	0	0	0	3	1	0	0	0	3
North West Leicestershire	Local Authority	3	0	0		0	0	0	0	3	0	0	0	0	3
Bradford	Local Authority	2	0	0		0	0	0	0	2	0	0	0	0	2
Derby	Local Authority	2	0	0		0	0	0	0	2	0	0	0	0	2
South Derbyshire	Local Authority	2	0	0		0	0	0	0	2	0	0	0	0	2
Calderdale	Local Authority	1	0	0		0	0	0	0	1	0	0	0	0	1
Ryedale	Local Authority	2	0	0		0	0	0	0	1	1	0	0	0	1
Ashfield	Local Authority	1	0	0		0	0	0	0	1	0	0	0	0	1
Blaby	Local Authority	1	0	0		0	0	0	0	1	0	0	0	0	1
Bolsover	Local Authority	1	0	0		0	0	0	0	1	0	0	0	0	1
North Kesteven	Local Authority	2	0	0		0	0	0	0	1	0	0	1	0	1
Nottingham	Local Authority	1	0	0		0	0	0	0	1	0	0	0	0	1
Craven	Local Authority	0	0	0		0	0	0	0	0	0	0	0	0	0
Amber Valley	Local Authority	0	0	0		0	0	0	0	0	0	0	0	0	0
Boston	Local Authority	0	0	0		0	0	0	0	0	0	0	0	0	0
Broxtowe	Local Authority	0	0	0		0	0	0	0	0	0	0	0	0	0
Charnwood	Local Authority	0	0	0		0	0	0	0	0	0	0	0	0	0
Corby	Local Authority	0	0	0		0	0	0	0	0	0	0	0	0	0
Daventry	Local Authority	0	0	0		0	0	0	0	0	0	0	0	0	0
Derbyshire Dales	Local Authority	0	0	0		0	0	0	0	0	0	0	0	0	0
East Northamptonshire	Local Authority	0	0	0		0	0	0	0	0	0	0	0	0	0
Erewash	Local Authority	0	0	0		0	0	0	0	0	0	0	0	0	0
Gedling	Local Authority	0	0	0		0	0	0	0	0	0	0	0	0	0
Harborough	Local Authority	0	0	0		0	0	0	0	0	0	0	0	0	0
High Peak	Local Authority	0	0	0		0	0	0	0	0	0	0	0	0	0
Hinckley and Bosworth	Local Authority	0	0	0		0	0	0	0	0	0	0	0	0	0
Kettering	Local Authority	0	0	0		0	0	0	0	0	0	0	0	0	0
Leicester	Local Authority	0	0	0		0	0	0	0	0	0	0	0	0	0
Mansfield	Local Authority	0	0	0		0	0	0	0	0	0	0	0	0	0
Melton	Local Authority	0	0	0		0	0	0	0	0	0	0	0	0	0
Newark and Sherwood	Local Authority	0	0	0		0	0	0	0	0	0	0	0	0	0
North East Derbyshire	Local Authority	0	0	0		0	0	0	0	0	0	0	0	0	0
Northampton	Local Authority	0	0	0		0	0	0	0	0	0	0	0	0	0
Oadby and Wigston	Local Authority	0	0	0		0	0	0	0	0	0	0	0	0	0
Rutland	Local Authority	1	0	0		0	0	0	0	0	0	0	1	0	0
South Holland	Local Authority	0	0	0		0	0	0	0	0	0	0	0	0	0
South Northamptonshire	Local Authority	0	0	0		0	0	0	0	0	0	0	0	0	0
Wellingborough	Local Authority	0	0	0		0	0	0	0	0	0	0	0	0	0

Appendix 9 – J1 Modelling Results

Junctions 9

ARCADY 9 - Roundabout Module

Version: 9.5.1.7462

Filename: A1077 Falkland Way Roundabout.j9
Path: \\192.168.4.5\Data1\Projects\5136 Land South of A1077 Barton\Junction Capacity Modelling\Dec 22
Report generation date: 2/1/2023 9:36:26 AM

Summary of junction performance

	AM					PM				
	Set ID	Queue (PCU)	Delay (s)	RFC	LOS	Set ID	Queue (PCU)	Delay (s)	RFC	LOS
	Proposed Layout - 2038 With Development									
1 - Falkland Way	D1	0.2	2.94	0.19	A	D2	0.5	3.60	0.33	A
2 - A1077 (E)		0.5	3.48	0.34	A		0.5	3.64	0.35	A
3 - Link Road		0.0	2.55	0.05	A		0.0	2.61	0.02	A
4 - A1077 (W)		0.9	4.77	0.44	A		0.9	4.90	0.48	A

Values shown are the highest values encountered over all time segments. Delay is the maximum value of average delay per arriving vehicle.

File summary

File Description

Title	A1077/Falkland Way/Link Road Roundabout
Location	Barton upon Humber, North Lincolnshire
Site number	
Date	7/11/2022
Version	
Status	
Identifier	
Client	Strata
Jobnumber	5136
Enumerator	LTP
Description	

Units

Distance units	Speed units	Traffic units input	Traffic units results	Flow units	Average delay units	Total delay units	Rate of delay units
m	kph	PCU	PCU	perHour	s	-Min	perMin

Analysis Options

Vehicle length (m)	Calculate Queue Percentiles	Calculate detailed queueing delay	Calculate residual capacity	RFC Threshold	Average Delay threshold (s)	Queue threshold (PCU)
5.75				0.85	36.00	20.00

Demand Set Summary

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)	Run automatically
D1	2038 With Development	AM	ONE HOUR	07:45	09:15	15	✓
D2	2038 With Development	PM	ONE HOUR	16:45	18:15	15	✓

Analysis Set Details

ID	Name	Include in report	Network flow scaling factor (%)	Network capacity scaling factor (%)
A1	Proposed Layout	✓	100.000	100.000

Proposed Layout - 2038 With Development, AM

Data Errors and Warnings

No errors or warnings

Junction Network

Junctions

Junction	Name	Junction type	Use circulating lanes	Arm order	Junction Delay (s)	Junction LOS
1	A1077/Falkland Way Roundabout	Standard Roundabout		1, 2, 3, 4	3.87	A

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

Arms

Arms

Arm	Name	Description
1	Falkland Way	
2	A1077 (E)	
3	Link Road	
4	A1077 (W)	

Roundabout Geometry

Arm	V - Approach road half-width (m)	E - Entry width (m)	l' - Effective flare length (m)	R - Entry radius (m)	D - Inscribed circle diameter (m)	PHI - Conflict (entry) angle (deg)	Exit only
1 - Falkland Way	3.56	7.29	26.2	23.0	60.0	38.0	
2 - A1077 (E)	3.15	7.28	28.6	20.0	60.0	41.0	
3 - Link Road	3.87	7.35	27.9	30.4	60.0	36.0	
4 - A1077 (W)	3.40	6.42	16.1	20.7	60.0	40.0	

Slope / Intercept / Capacity

Roundabout Slope and Intercept used in model

Arm	Final slope	Final intercept (PCU/hr)
1 - Falkland Way	0.571	1815
2 - A1077 (E)	0.554	1741
3 - Link Road	0.594	1918
4 - A1077 (W)	0.522	1549

The slope and intercept shown above include any corrections and adjustments.

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)	Run automatically
D1	2038 With Development	AM	ONE HOUR	07:45	09:15	15	✓

Vehicle mix varies over turn	Vehicle mix varies over entry	Vehicle mix source	PCU Factor for a HV (PCU)
✓	✓	HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Profile type	Use O-D data	Average Demand (PCU/hr)	Scaling Factor (%)
1 - Falkland Way		ONE HOUR	✓	277	100.000
2 - A1077 (E)		ONE HOUR	✓	500	100.000
3 - Link Road		ONE HOUR	✓	64	100.000
4 - A1077 (W)		ONE HOUR	✓	587	100.000

Origin-Destination Data

Demand (PCU/hr)

		To			
		1 - Falkland Way	2 - A1077 (E)	3 - Link Road	4 - A1077 (W)
From	1 - Falkland Way	0	106	1	170
	2 - A1077 (E)	151	0	3	346
	3 - Link Road	4	9	0	51
	4 - A1077 (W)	295	274	18	0

Vehicle Mix

Heavy Vehicle Percentages

		To			
		1 - Falkland Way	2 - A1077 (E)	3 - Link Road	4 - A1077 (W)
From	1 - Falkland Way	0	1	0	13
	2 - A1077 (E)	2	0	0	5
	3 - Link Road	0	0	0	0
	4 - A1077 (W)	5	10	0	0

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS	Average Demand (PCU/hr)	Total Junction Arrivals (PCU)
1 - Falkland Way	0.19	2.94	0.2	A	254	381
2 - A1077 (E)	0.34	3.48	0.5	A	459	688
3 - Link Road	0.05	2.55	0.0	A	59	88
4 - A1077 (W)	0.44	4.77	0.9	A	539	808

Main Results for each time segment

07:45 - 08:00

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
1 - Falkland Way	209	52	226	1686	0.124	208	338	0.0	0.2	2.628	A
2 - A1077 (E)	376	94	142	1662	0.226	375	292	0.0	0.3	2.907	A
3 - Link Road	48	12	501	1621	0.030	48	16	0.0	0.0	2.288	A
4 - A1077 (W)	442	110	123	1485	0.298	440	426	0.0	0.5	3.685	A

08:00 - 08:15

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
1 - Falkland Way	249	62	270	1661	0.150	249	404	0.2	0.2	2.753	A
2 - A1077 (E)	449	112	170	1647	0.273	449	349	0.3	0.4	3.127	A
3 - Link Road	58	14	599	1562	0.037	58	20	0.0	0.0	2.391	A
4 - A1077 (W)	528	132	147	1472	0.359	527	509	0.5	0.6	4.078	A

08:15 - 08:30

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
1 - Falkland Way	305	76	331	1626	0.188	305	495	0.2	0.2	2.942	A
2 - A1077 (E)	551	138	208	1626	0.339	550	428	0.4	0.5	3.480	A
3 - Link Road	70	18	734	1483	0.048	70	24	0.0	0.0	2.548	A
4 - A1077 (W)	646	162	180	1455	0.444	645	624	0.6	0.8	4.758	A

08:30 - 08:45

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
1 - Falkland Way	305	76	331	1626	0.188	305	495	0.2	0.2	2.943	A
2 - A1077 (E)	551	138	208	1625	0.339	551	428	0.5	0.5	3.483	A
3 - Link Road	70	18	734	1482	0.048	70	24	0.0	0.0	2.549	A
4 - A1077 (W)	646	162	181	1455	0.444	646	624	0.8	0.9	4.770	A

08:45 - 09:00

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
1 - Falkland Way	249	62	271	1661	0.150	249	405	0.2	0.2	2.757	A
2 - A1077 (E)	449	112	170	1647	0.273	450	350	0.5	0.4	3.133	A
3 - Link Road	58	14	600	1562	0.037	58	20	0.0	0.0	2.392	A
4 - A1077 (W)	528	132	148	1472	0.359	529	510	0.9	0.6	4.092	A

09:00 - 09:15

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
1 - Falkland Way	209	52	227	1686	0.124	209	339	0.2	0.2	2.632	A
2 - A1077 (E)	376	94	142	1662	0.227	377	293	0.4	0.3	2.917	A
3 - Link Road	48	12	503	1620	0.030	48	17	0.0	0.0	2.290	A
4 - A1077 (W)	442	110	124	1484	0.298	443	427	0.6	0.5	3.702	A

Proposed Layout - 2038 With Development, PM

Data Errors and Warnings

No errors or warnings

Junction Network

Junctions

Junction	Name	Junction type	Use circulating lanes	Arm order	Junction Delay (s)	Junction LOS
1	A1077/Falkland Way Roundabout	Standard Roundabout		1, 2, 3, 4	4.11	A

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)	Run automatically
D2	2038 With Development	PM	ONE HOUR	16:45	18:15	15	✓

Vehicle mix varies over turn	Vehicle mix varies over entry	Vehicle mix source	PCU Factor for a HV (PCU)
✓	✓	HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Profile type	Use O-D data	Average Demand (PCU/hr)	Scaling Factor (%)
1 - Falkland Way		ONE HOUR	✓	461	100.000
2 - A1077 (E)		ONE HOUR	✓	486	100.000
3 - Link Road		ONE HOUR	✓	29	100.000
4 - A1077 (W)		ONE HOUR	✓	633	100.000

Origin-Destination Data

Demand (PCU/hr)

		To			
		1 - Falkland Way	2 - A1077 (E)	3 - Link Road	4 - A1077 (W)
From	1 - Falkland Way	0	161	4	296
	2 - A1077 (E)	160	0	8	318
	3 - Link Road	2	4	0	23
	4 - A1077 (W)	181	405	47	0

Vehicle Mix

Heavy Vehicle Percentages

		To			
		1 - Falkland Way	2 - A1077 (E)	3 - Link Road	4 - A1077 (W)
From	1 - Falkland Way	0	1	0	3
	2 - A1077 (E)	0	0	0	1
	3 - Link Road	0	0	0	0
	4 - A1077 (W)	6	2	0	0

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS	Average Demand (PCU/hr)	Total Junction Arrivals (PCU)
1 - Falkland Way	0.33	3.60	0.5	A	423	635
2 - A1077 (E)	0.35	3.64	0.5	A	446	669
3 - Link Road	0.02	2.61	0.0	A	27	40
4 - A1077 (W)	0.48	4.90	0.9	A	581	871

Main Results for each time segment

16:45 - 17:00

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
1 - Falkland Way	347	87	342	1620	0.214	346	257	0.0	0.3	2.886	A
2 - A1077 (E)	366	91	260	1597	0.229	365	427	0.0	0.3	2.939	A
3 - Link Road	22	5	581	1573	0.014	22	44	0.0	0.0	2.319	A
4 - A1077 (W)	477	119	125	1484	0.321	475	478	0.0	0.5	3.667	A

17:00 - 17:15

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
1 - Falkland Way	414	104	409	1581	0.262	414	308	0.3	0.4	3.153	A
2 - A1077 (E)	437	109	312	1568	0.279	437	512	0.3	0.4	3.202	A
3 - Link Road	26	7	695	1505	0.017	26	53	0.0	0.0	2.433	A
4 - A1077 (W)	569	142	149	1471	0.387	568	572	0.5	0.6	4.104	A

17:15 - 17:30

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
1 - Falkland Way	508	127	501	1529	0.332	507	377	0.4	0.5	3.600	A
2 - A1077 (E)	535	134	382	1529	0.350	534	627	0.4	0.5	3.640	A
3 - Link Road	32	8	851	1413	0.023	32	65	0.0	0.0	2.606	A
4 - A1077 (W)	697	174	183	1453	0.480	696	701	0.6	0.9	4.876	A

17:30 - 17:45

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
1 - Falkland Way	508	127	502	1529	0.332	508	378	0.5	0.5	3.604	A
2 - A1077 (E)	535	134	382	1529	0.350	535	628	0.5	0.5	3.644	A
3 - Link Road	32	8	852	1412	0.023	32	65	0.0	0.0	2.607	A
4 - A1077 (W)	697	174	183	1453	0.480	697	701	0.9	0.9	4.899	A

17:45 - 18:00

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
1 - Falkland Way	414	104	411	1581	0.262	415	309	0.5	0.4	3.158	A
2 - A1077 (E)	437	109	312	1568	0.279	438	513	0.5	0.4	3.207	A
3 - Link Road	26	7	697	1505	0.017	26	53	0.0	0.0	2.434	A
4 - A1077 (W)	569	142	149	1471	0.387	570	573	0.9	0.7	4.120	A

18:00 - 18:15

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
1 - Falkland Way	347	87	344	1619	0.214	347	259	0.4	0.3	2.897	A
2 - A1077 (E)	366	91	262	1596	0.229	366	430	0.4	0.3	2.949	A
3 - Link Road	22	5	583	1572	0.014	22	44	0.0	0.0	2.323	A
4 - A1077 (W)	477	119	125	1483	0.321	477	480	0.7	0.5	3.687	A

Appendix 10 – J2 Modelling Results (Existing Layout)

Junctions 9

ARCADY 9 - Roundabout Module

Version: 9.5.1.7462

For sales and distribution information, program advice and maintenance, contact TRL:
+44 (0)1344 379777 software@trl.co.uk www.trlsoftware.co.uk

Filename: A1077 Holydyke Hungate Mini-Roundabout Existing.j9
Path: \\192.168.4.5\Data1\Projects\5136 Land South of A1077 Barton\Junction Capacity Modelling\Dec 22
Report generation date: 2/1/2023 9:39:15 AM

Summary of junction performance

	AM					PM				
	Set ID	Queue (PCU)	Delay (s)	RFC	LOS	Set ID	Queue (PCU)	Delay (s)	RFC	LOS
	Existing Layout - 2038 With Development									
1 - B1218 (Holydyke)	D1	0.9	8.56	0.46	A	D2	1.1	9.89	0.52	A
2 - Hungate		0.8	26.26	0.44	D		1.9	50.99	0.67	F
3 - A1077 (Holydyke)		3.3	16.98	0.77	C		4.5	22.07	0.82	C
4 - A1077 (Ferriby Road)		4.4	22.08	0.82	C		81.3	293.79	1.16	F

There are warnings associated with one or more model runs - see the 'Data Errors and Warnings' tables for each Analysis or Demand Set.

Values shown are the highest values encountered over all time segments. Delay is the maximum value of average delay per arriving vehicle.

File summary

File Description

Title	A1077 Holydyke Hungate Mini-Roundabout
Location	Barton, North Lincolnshire
Site number	
Date	1/29/2021
Version	
Status	
Identifier	
Client	North Lincolnshire Council
Jobnumber	3628
Enumerator	LTP\MR
Description	

Units

Distance units	Speed units	Traffic units input	Traffic units results	Flow units	Average delay units	Total delay units	Rate of delay units
m	kph	PCU	PCU	perHour	s	-Min	perMin

Analysis Options

Mini-roundabout model	Vehicle length (m)	Calculate Queue Percentiles	Calculate detailed queueing delay	Calculate residual capacity	RFC Threshold	Average Delay threshold (s)	Queue threshold (PCU)
JUNCTIONS 9	5.75				0.85	36.00	20.00

Demand Set Summary

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)	Run automatically
D1	2038 With Development	AM	ONE HOUR	07:30	09:00	15	✓
D2	2038 With Development	PM	ONE HOUR	16:45	18:15	15	✓

Analysis Set Details

ID	Name	Include in report	Network flow scaling factor (%)	Network capacity scaling factor (%)
A1	Existing Layout	✓	100.000	100.000

Existing Layout - 2038 With Development, AM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Mini-roundabout		Mini-roundabout appears to have unbalanced flows and may behave like a priority junction; treat results with caution. See User Guide for details.[Arms 3 and 4 have 75% of the total flow for the roundabout for one or more time segments]

Junction Network

Junctions

Junction	Name	Junction type	Use circulating lanes	Arm order	Junction Delay (s)	Junction LOS
1	A1077 Holydyke Hungate	Mini-roundabout		1, 2, 3, 4	17.89	C

Junction Network Options

Driving side	Lighting	Road surface	In London
Left	Normal/unknown	Normal/unknown	

Arms

Arms

Arm	Name	Description
1	B1218 (Holydyke)	
2	Hungate	
3	A1077 (Holydyke)	
4	A1077 (Ferriby Road)	

Mini Roundabout Geometry

Arm	Approach road half-width (m)	Minimum approach road half-width (m)	Entry width (m)	Effective flare length (m)	Distance to next arm (m)	Entry corner kerb line distance (m)	Gradient over 50m (%)	Kerbed central island
1 - B1218 (Holydyke)	4.20	3.90	6.50	4.1	13.20	8.70	0.0	
2 - Hungate	3.10	2.10	5.65	7.7	6.90	2.25	0.0	
3 - A1077 (Holydyke)	3.80	3.80	4.70	10.5	18.10	15.30	0.0	
4 - A1077 (Ferriby Road)	4.10	4.10	4.70	1.6	10.90	7.20	0.0	

Slope / Intercept / Capacity

Roundabout Slope and Intercept used in model

Arm	Final slope	Final intercept (PCU/hr)
1 - B1218 (Holydyke)	0.658	1208
2 - Hungate	0.610	784
3 - A1077 (Holydyke)	0.676	1141
4 - A1077 (Ferriby Road)	0.643	996

The slope and intercept shown above include any corrections and adjustments.

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)	Run automatically
D1	2038 With Development	AM	ONE HOUR	07:30	09:00	15	✓

Vehicle mix varies over turn	Vehicle mix varies over entry	Vehicle mix source	PCU Factor for a HV (PCU)
✓	✓	HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Profile type	Use O-D data	Average Demand (PCU/hr)	Scaling Factor (%)
1 - B1218 (Holydyke)		ONE HOUR	✓	334	100.000
2 - Hungate		ONE HOUR	✓	101	100.000
3 - A1077 (Holydyke)		ONE HOUR	✓	654	100.000
4 - A1077 (Ferriby Road)		ONE HOUR	✓	687	100.000

Origin-Destination Data

Demand (PCU/hr)

		To			
		1 - B1218 (Holydyke)	2 - Hungate	3 - A1077 (Holydyke)	4 - A1077 (Ferriby Road)
From	1 - B1218 (Holydyke)	0	11	131	192
	2 - Hungate	0	0	20	81
	3 - A1077 (Holydyke)	96	7	1	550
	4 - A1077 (Ferriby Road)	125	92	470	0

Vehicle Mix

Heavy Vehicle Percentages

		To			
		1 - B1218 (Holydyke)	2 - Hungate	3 - A1077 (Holydyke)	4 - A1077 (Ferriby Road)
From	1 - B1218 (Holydyke)	0	0	3	1
	2 - Hungate	0	0	12	0
	3 - A1077 (Holydyke)	1	0	0	4
	4 - A1077 (Ferriby Road)	5	2	4	0

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS	Average Demand (PCU/hr)	Total Junction Arrivals (PCU)
1 - B1218 (Holydyke)	0.46	8.56	0.9	A	306	460
2 - Hungate	0.44	26.26	0.8	D	93	139
3 - A1077 (Holydyke)	0.77	16.98	3.3	C	600	900
4 - A1077 (Ferriby Road)	0.82	22.08	4.4	C	630	946

Main Results for each time segment

07:30 - 07:45

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
1 - B1218 (Holydyke)	251	63	425	928	0.271	250	165	0.0	0.4	5.387	A
2 - Hungate	76	19	593	422	0.180	75	82	0.0	0.2	10.576	B
3 - A1077 (Holydyke)	492	123	204	1003	0.491	488	464	0.0	1.0	7.187	A
4 - A1077 (Ferriby Road)	517	129	78	946	0.547	512	615	0.0	1.2	8.528	A

07:45 - 08:00

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
1 - B1218 (Holydyke)	300	75	510	872	0.344	300	198	0.4	0.5	6.387	A
2 - Hungate	91	23	711	350	0.260	90	98	0.2	0.4	14.140	B
3 - A1077 (Holydyke)	588	147	245	976	0.603	586	557	1.0	1.5	9.504	A
4 - A1077 (Ferriby Road)	618	154	93	936	0.660	615	737	1.2	1.9	11.527	B

08:00 - 08:15

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
1 - B1218 (Holydyke)	368	92	620	800	0.460	366	241	0.5	0.9	8.422	A
2 - Hungate	111	28	867	255	0.436	110	120	0.4	0.8	25.028	D
3 - A1077 (Holydyke)	720	180	299	939	0.767	714	678	1.5	3.2	16.061	C
4 - A1077 (Ferriby Road)	756	189	113	923	0.819	747	899	1.9	4.2	20.275	C

08:15 - 08:30

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
1 - B1218 (Holydyke)	368	92	627	796	0.462	368	243	0.9	0.9	8.556	A
2 - Hungate	111	28	874	251	0.443	111	121	0.8	0.8	26.262	D
3 - A1077 (Holydyke)	720	180	300	938	0.768	720	684	3.2	3.3	16.977	C
4 - A1077 (Ferriby Road)	756	189	114	923	0.820	755	906	4.2	4.4	22.076	C

08:30 - 08:45

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
1 - B1218 (Holydyke)	300	75	520	866	0.347	302	201	0.9	0.5	6.507	A
2 - Hungate	91	23	721	344	0.264	92	100	0.8	0.4	14.734	B
3 - A1077 (Holydyke)	588	147	247	974	0.604	595	566	3.3	1.6	9.996	A
4 - A1077 (Ferriby Road)	618	154	95	935	0.660	627	748	4.4	2.1	12.475	B

08:45 - 09:00

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
1 - B1218 (Holydyke)	251	63	432	924	0.272	252	167	0.5	0.4	5.458	A
2 - Hungate	76	19	601	417	0.182	77	83	0.4	0.2	10.810	B
3 - A1077 (Holydyke)	492	123	206	1001	0.492	495	471	1.6	1.0	7.388	A
4 - A1077 (Ferriby Road)	517	129	79	946	0.547	520	622	2.1	1.3	8.867	A

Existing Layout - 2038 With Development, PM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Mini-roundabout		Mini-roundabout appears to have unbalanced flows and may behave like a priority junction; treat results with caution. See User Guide for details.[Arms 3 and 4 have 77% of the total flow for the roundabout for one or more time segments]

Junction Network

Junctions

Junction	Name	Junction type	Use circulating lanes	Arm order	Junction Delay (s)	Junction LOS
1	A1077 Holydyke Hungate	Mini-roundabout		1, 2, 3, 4	143.10	F

Junction Network Options

Driving side	Lighting	Road surface	In London
Left	Normal/unknown	Normal/unknown	

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)	Run automatically
D2	2038 With Development	PM	ONE HOUR	16:45	18:15	15	✓

Vehicle mix varies over turn	Vehicle mix varies over entry	Vehicle mix source	PCU Factor for a HV (PCU)
✓	✓	HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Profile type	Use O-D data	Average Demand (PCU/hr)	Scaling Factor (%)
1 - B1218 (Holydyke)		ONE HOUR	✓	361	100.000
2 - Hungate		ONE HOUR	✓	128	100.000
3 - A1077 (Holydyke)		ONE HOUR	✓	693	100.000
4 - A1077 (Ferriby Road)		ONE HOUR	✓	954	100.000

Origin-Destination Data

Demand (PCU/hr)

		To			
		1 - B1218 (Holydyke)	2 - Hungate	3 - A1077 (Holydyke)	4 - A1077 (Ferriby Road)
From	1 - B1218 (Holydyke)	0	4	174	183
	2 - Hungate	4	1	21	102
	3 - A1077 (Holydyke)	105	12	1	575
	4 - A1077 (Ferriby Road)	258	121	575	0

Vehicle Mix

Heavy Vehicle Percentages

		To			
		1 - B1218 (Holydyke)	2 - Hungate	3 - A1077 (Holydyke)	4 - A1077 (Ferriby Road)
From	1 - B1218 (Holydyke)	0	33	0	0
	2 - Hungate	0	0	0	0
	3 - A1077 (Holydyke)	0	10	0	2
	4 - A1077 (Ferriby Road)	0	0	1	0

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS	Average Demand (PCU/hr)	Total Junction Arrivals (PCU)
1 - B1218 (Holydyke)	0.52	9.89	1.1	A	331	497
2 - Hungate	0.67	50.99	1.9	F	117	176
3 - A1077 (Holydyke)	0.82	22.07	4.5	C	636	954
4 - A1077 (Ferriby Road)	1.16	293.79	81.3	F	875	1313

Main Results for each time segment

16:45 - 17:00

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
1 - B1218 (Holydyke)	272	68	525	862	0.315	270	272	0.0	0.5	6.076	A
2 - Hungate	96	24	693	361	0.267	95	102	0.0	0.4	13.467	B
3 - A1077 (Holydyke)	522	130	216	995	0.524	517	572	0.0	1.1	7.609	A
4 - A1077 (Ferriby Road)	718	180	92	937	0.766	706	642	0.0	3.1	14.965	B

17:00 - 17:15

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
1 - B1218 (Holydyke)	325	81	623	798	0.406	324	324	0.5	0.7	7.590	A
2 - Hungate	115	29	825	280	0.410	114	121	0.4	0.7	21.445	C
3 - A1077 (Holydyke)	623	156	259	966	0.645	620	680	1.1	1.8	10.524	B
4 - A1077 (Ferriby Road)	858	214	110	925	0.927	836	769	3.1	8.4	34.287	D

17:15 - 17:30

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
1 - B1218 (Holydyke)	397	99	673	765	0.519	396	362	0.7	1.1	9.733	A
2 - Hungate	141	35	936	213	0.663	137	133	0.7	1.7	45.157	E
3 - A1077 (Holydyke)	763	191	315	928	0.822	753	758	1.8	4.2	19.965	C
4 - A1077 (Ferriby Road)	1050	263	134	910	1.154	902	935	8.4	45.6	121.280	F

17:30 - 17:45

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
1 - B1218 (Holydyke)	397	99	678	762	0.521	397	365	1.1	1.1	9.890	A
2 - Hungate	141	35	941	210	0.673	140	134	1.7	1.9	50.994	F
3 - A1077 (Holydyke)	763	191	319	925	0.824	762	763	4.2	4.5	22.073	C
4 - A1077 (Ferriby Road)	1050	263	135	909	1.155	908	945	45.6	81.3	260.445	F

17:45 - 18:00

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
1 - B1218 (Holydyke)	325	81	679	762	0.426	326	346	1.1	0.8	8.308	A
2 - Hungate	115	29	873	251	0.458	119	131	1.9	0.9	27.997	D
3 - A1077 (Holydyke)	623	156	265	962	0.648	633	727	4.5	1.9	11.470	B
4 - A1077 (Ferriby Road)	858	214	112	924	0.928	913	785	81.3	67.5	293.789	F

18:00 - 18:15

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
1 - B1218 (Holydyke)	272	68	684	758	0.358	273	332	0.8	0.6	7.445	A
2 - Hungate	96	24	826	280	0.345	98	130	0.9	0.5	19.937	C
3 - A1077 (Holydyke)	522	130	220	992	0.526	525	704	1.9	1.1	7.895	A
4 - A1077 (Ferriby Road)	718	180	93	936	0.767	922	652	67.5	16.5	169.089	F

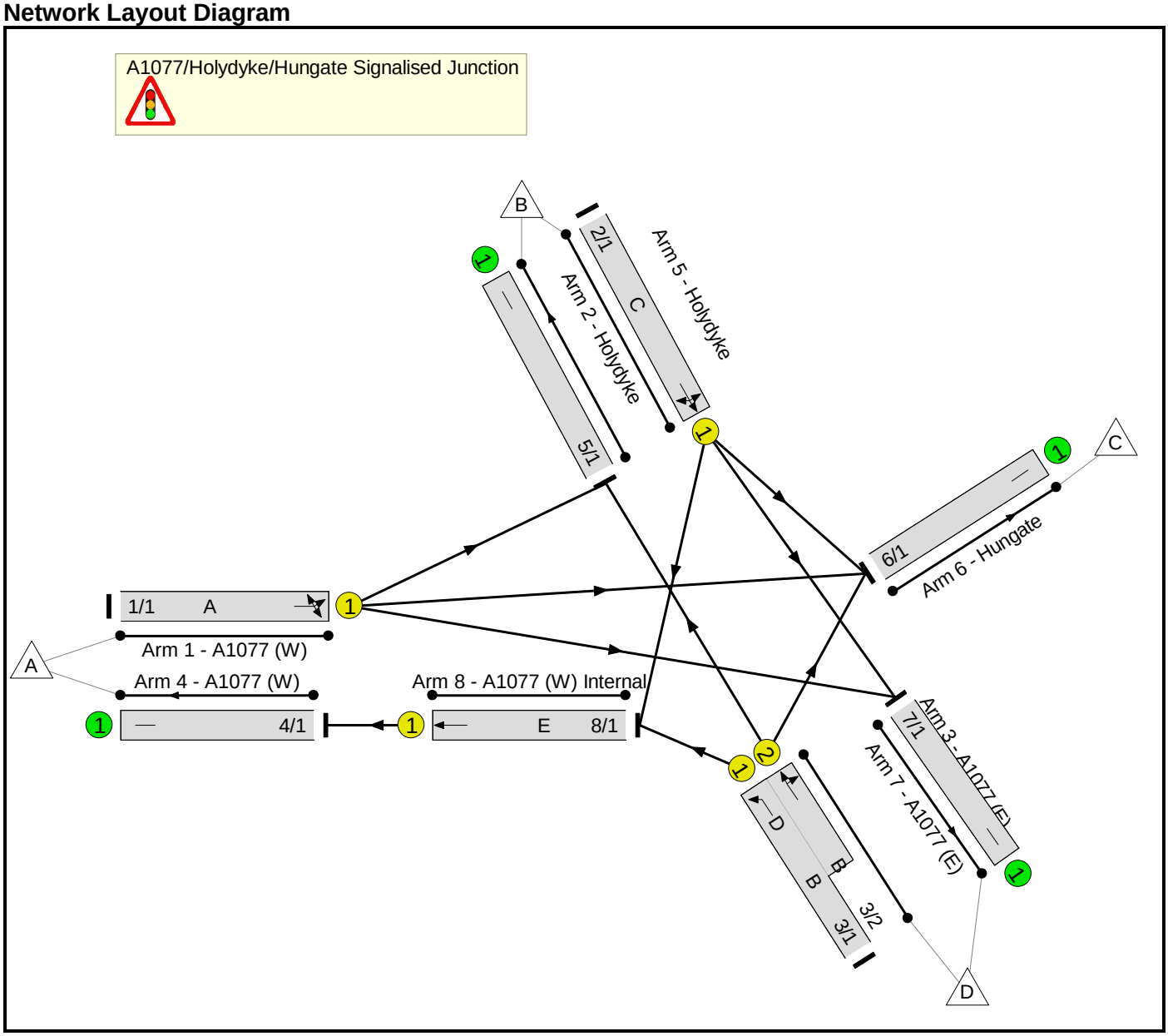
Appendix 11 – J2 Modelling Results (Improvement Scheme)

LTP LinSig Output

User and Project Details

Project:	**Land South of A1077 (Barrow Road)**
Title:	**A1077/Holydyke/Hungate Signalised Junction Option**
Location:	Barton upon Humber, North Lincolnshire
Client:	Strata
Additional detail:	
File name:	A1077 Holydyke Hungate Signalised Junction Improvement Scheme.lsg3x
Author:	
Company:	LTP
Address:	

Network Layout Diagram



Phase Input Data

Phase Name	Phase Type	Assoc. Phase	Street Min	Cont Min
A	Traffic		7	7
B	Traffic		7	7
C	Traffic		7	7
D	Filter	B	4	0
E	Traffic		7	7
F	Pedestrian		6	6
G	Pedestrian		6	6

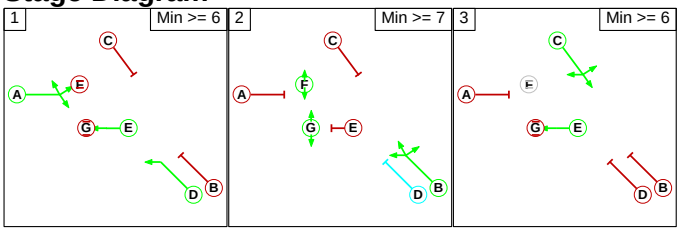
Phase Intergreens Matrix

		Starting Phase						
		A	B	C	D	E	F	G
Terminating Phase	A		5	5	-	-	5	-
	B	5		5	-	-	-	-
	C	5	5		6	-	-	-
	D	-	-	5		-	-	-
	E	-	-	-	-		-	5
	F	5	-	-	-	-		-
	G	-	-	-	-	6	-	

Phases in Stage

Stage No.	Phases in Stage
1	A D E
2	B F G
3	C E

Stage Diagram



Phase Delays

Term. Stage	Start Stage	Phase	Type	Value	Cont value
There are no Phase Delays defined					

Prohibited Stage Change

		To Stage		
		1	2	3
From Stage	1		5	X
	2	6		6
	3	6	5	

Give-Way Lane Input Data

Junction: A1077/Holydyke/Hungate Signalised Junction
There are no Opposed Lanes in this Junction

Lane Input Data

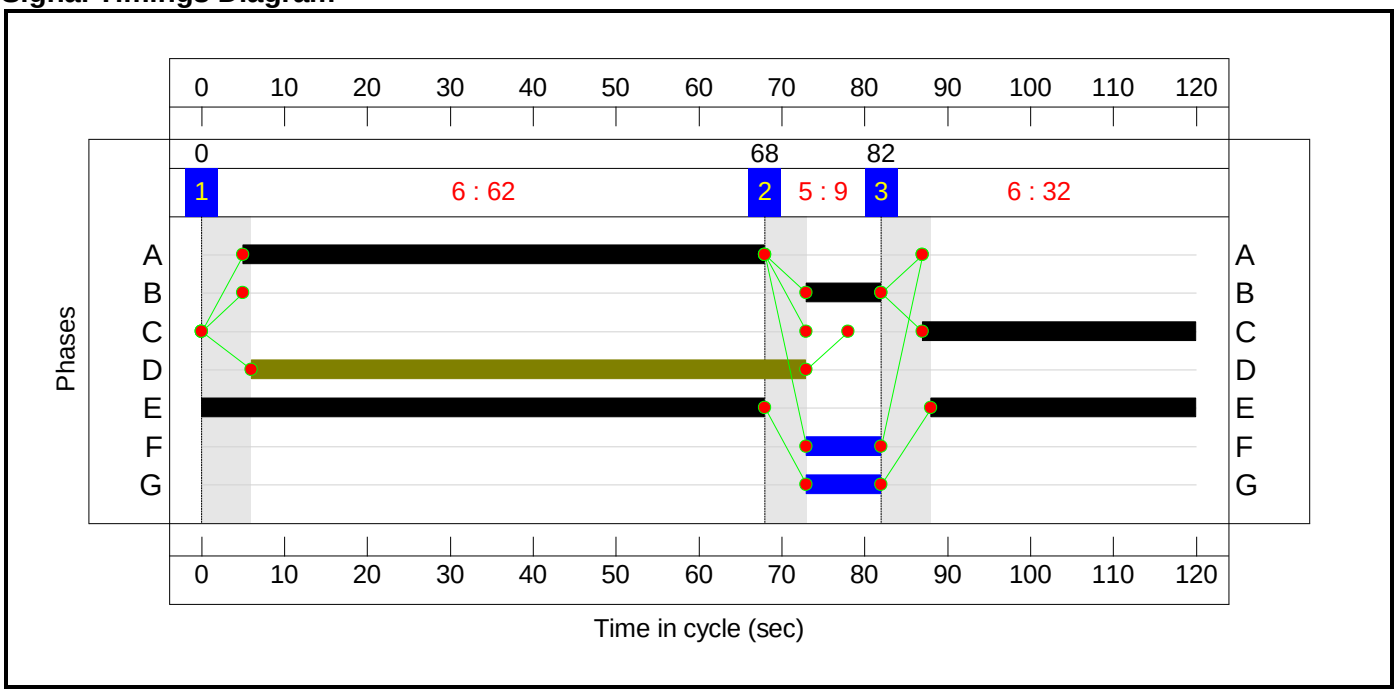
Junction: A1077/Holydyke/Hungate Signalised Junction												
Lane	**Lane Type**	**Phases**	**Start Disp.**	**End Disp.**	**Physical Length (PCU)**	**Sat Flow Type**	**Def User Saturation Flow (PCU/Hr)**	**Lane Width (m)**	**Gradient**	**Nearside Lane**	**Turns**	**Turning Radius (m)**
1/1 (A1077 (W))	U	A	2	3	60.0	Geom	-	3.50	0.00	Y	Arm 5 Left	10.41
											Arm 6 Ahead	Inf
											Arm 7 Right	28.00
2/1 (Holydyke)	U	C	2	3	60.0	Geom	-	3.85	0.00	Y	Arm 6 Left	12.00
											Arm 7 Ahead	Inf
											Arm 8 Right	12.90
3/1 (A1077 (E))	U	B D	2	3	60.0	Geom	-	3.50	0.00	Y	Arm 8 Left	27.15
3/2 (A1077 (E))	U	B	2	3	5.8	Geom	-	3.50	0.00	Y	Arm 5 Ahead	Inf
											Arm 6 Right	6.65
4/1 (A1077 (W))	U		2	3	60.0	Inf	-	-	-	-	-	-
5/1 (Holydyke)	U		2	3	60.0	Inf	-	-	-	-	-	-
6/1 (Hungate)	U		2	3	60.0	Inf	-	-	-	-	-	-
7/1 (A1077 (E))	U		2	3	60.0	Inf	-	-	-	-	-	-
8/1 (A1077 (W) Internal)	U	E	2	3	3.0	Geom	-	4.00	0.00	Y	Arm 4 Ahead	Inf

Traffic Flow Groups

Flow Group	Start Time	End Time	Duration	Formula
1: '2038 With Development AM'	07:45	08:45	01:00	
2: '2038 With Development PM'	17:00	18:00	01:00	

Scenario 1: '2038 With Development AM' (FG1: '2038 With Development AM', Plan 1: 'Network Control Plan 1')

Signal Timings Diagram



Traffic Flows, Desired

Desired Flow :

		Destination				
		A	B	C	D	Tot.
Origin	A	0	125	92	470	687
	B	212	0	11	135	358
	C	0	0	0	0	0
	D	611	96	7	0	714
	Tot.	823	221	110	605	1759

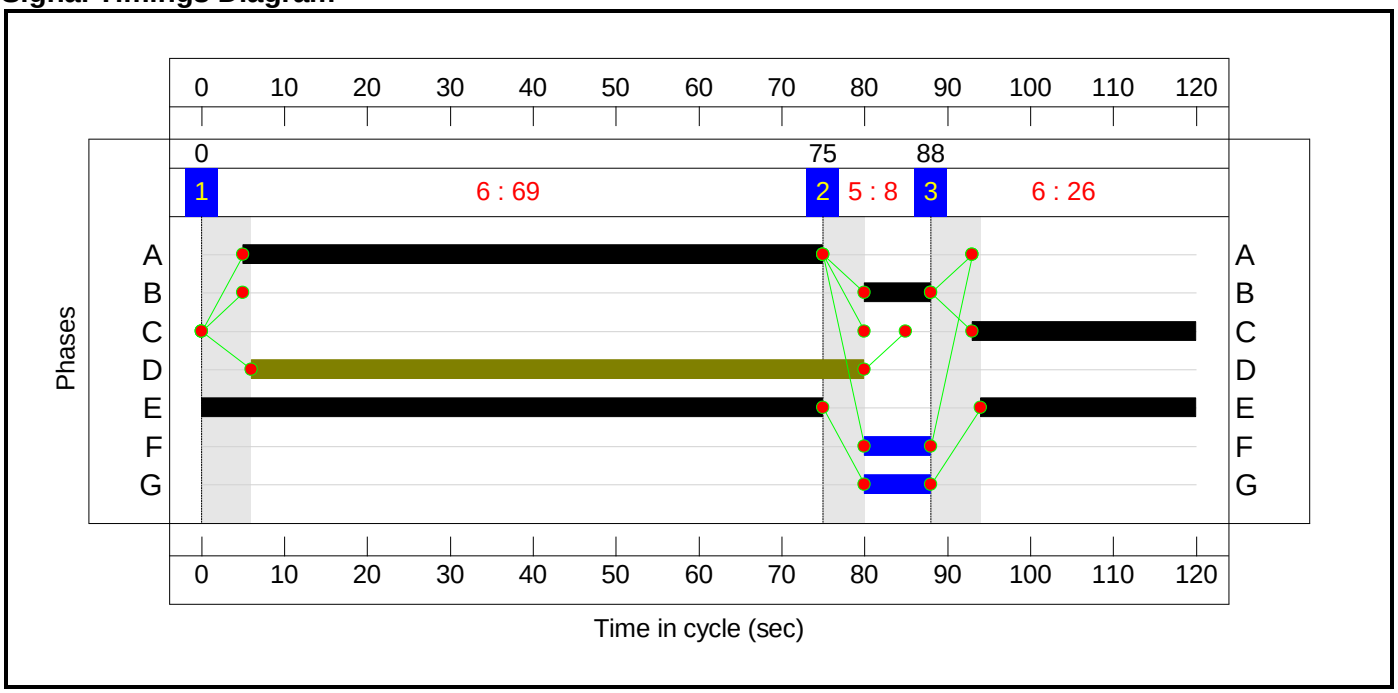
Lane Saturation Flows

Junction: A1077/Holydyke/Hungate Signalised Junction

Lane	Lane Width (m)	Gradient	Nearside Lane	Allowed Turns	Turning Radius (m)	Turning Prop.	Sat Flow (PCU/Hr)	Flared Sat Flow (PCU/Hr)
1/1 (A1077 (W))	3.50	0.00	Y	Arm 5 Left	10.41	18.2 %	1849	1849
				Arm 6 Ahead	Inf	13.4 %		
				Arm 7 Right	28.00	68.4 %		
2/1 (Holydyke)	3.85	0.00	Y	Arm 6 Left	12.00	3.1 %	1864	1864
				Arm 7 Ahead	Inf	37.7 %		
				Arm 8 Right	12.90	59.2 %		
3/1 (A1077 (E))	3.50	0.00	Y	Arm 8 Left	27.15	100.0 %	1862	1862
3/2 (A1077 (E))	3.50	0.00	Y	Arm 5 Ahead	Inf	93.2 %	1935	1935
				Arm 6 Right	6.65	6.8 %		
4/1 (A1077 (W) Lane 1)	Infinite Saturation Flow						Inf	Inf
5/1 (Holydyke Lane 1)	Infinite Saturation Flow						Inf	Inf
6/1 (Hungate Lane 1)	Infinite Saturation Flow						Inf	Inf
7/1 (A1077 (E) Lane 1)	Infinite Saturation Flow						Inf	Inf
8/1 (A1077 (W) Internal)	4.00	0.00	Y	Arm 4 Ahead	Inf	100.0 %	2015	2015

Scenario 2: '2038 With Development PM' (FG2: '2038 With Development PM', Plan 1: 'Network Control Plan 1')

Signal Timings Diagram



Traffic Flows, Desired

Desired Flow :

		Destination				
		A	B	C	D	Tot.
Origin	A	0	258	121	575	954
	B	208	0	4	179	391
	C	0	0	0	0	0
	D	652	105	12	0	769
	Tot.	860	363	137	754	2114

Lane Saturation Flows

Junction: A1077/Holydyke/Hungate Signalised Junction

Lane	Lane Width (m)	Gradient	Nearside Lane	Allowed Turns	Turning Radius (m)	Turning Prop.	Sat Flow (PCU/Hr)	Flared Sat Flow (PCU/Hr)
1/1 (A1077 (W))	3.50	0.00	Y	Arm 5 Left	10.41	27.0 %	1834	1834
				Arm 6 Ahead	Inf	12.7 %		
				Arm 7 Right	28.00	60.3 %		
2/1 (Holydyke)	3.85	0.00	Y	Arm 6 Left	12.00	1.0 %	1881	1881
				Arm 7 Ahead	Inf	45.8 %		
				Arm 8 Right	12.90	53.2 %		
3/1 (A1077 (E))	3.50	0.00	Y	Arm 8 Left	27.15	100.0 %	1862	1862
3/2 (A1077 (E))	3.50	0.00	Y	Arm 5 Ahead	Inf	89.7 %	1921	1921
				Arm 6 Right	6.65	10.3 %		
4/1 (A1077 (W) Lane 1)	Infinite Saturation Flow						Inf	Inf
5/1 (Holydyke Lane 1)	Infinite Saturation Flow						Inf	Inf
6/1 (Hungate Lane 1)	Infinite Saturation Flow						Inf	Inf
7/1 (A1077 (E) Lane 1)	Infinite Saturation Flow						Inf	Inf
8/1 (A1077 (W) Internal)	4.00	0.00	Y	Arm 4 Ahead	Inf	100.0 %	2015	2015

Network Results

Scenario 1: '2038 With Development AM' (FG1: '2038 With Development AM', Plan 1: 'Network Control Plan 1')

Item	Lane Description	Lane Type	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)	Arriving (pcu)	Leaving (pcu)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)	Mean Max Queue (pcu)
Network: A1077/Holydyke/Hungate Signalised Junction Option	-	-	-		-	-	-	-	-	-	**69.7%**	-	-	**0**	**0**	**0**	**15.1**	-	-
A1077/Holydyke/Hungate Signalised Junction	-	-	-		-	-	-	-	-	-	**69.7%**	-	-	**0**	**0**	**0**	**15.1**	-	-
1/1	A1077 (W) Left Ahead Right	U	A		1	63	-	687	1849	986	69.7%	687	687	-	-	-	5.1	26.8	18.1
2/1	Holydyke Left Ahead Right	U	C		1	33	-	358	1864	528	67.8%	358	358	-	-	-	4.8	48.6	11.6
3/1+3/2	A1077 (E) Ahead Right Left	U	B	D	1	76:9	67	714	1862:1935	957+161	63.9 : 63.9%	714	714	-	-	-	4.4	22.0	12.8
8/1	A1077 (W) Internal Ahead	U	E		1	100	-	823	2015	1696	48.5%	823	823	-	-	-	0.8	3.4	3.4

C1 PRC for Signalled Lanes (%): 29.2 Total Delay for Signalled Lanes (pcuHr): 15.08 Cycle Time (s): 120
PRC Over All Lanes (%): 29.2 Total Delay Over All Lanes(pcuHr): 15.08

Scenario 2: '2038 With Development PM' (FG2: '2038 With Development PM', Plan 1: 'Network Control Plan 1')

Item	Lane Description	Lane Type	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)	Arriving (pcu)	Leaving (pcu)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)	Mean Max Queue (pcu)
Network: A1077/Holydyke/Hungate Signalised Junction Option	-	-	-		-	-	-	-	-	-	**89.1%**	-	-	**0**	**0**	**0**	**23.7**	-	-
A1077/Holydyke/Hungate Signalised Junction	-	-	-		-	-	-	-	-	-	**89.1%**	-	-	**0**	**0**	**0**	**23.7**	-	-
1/1	A1077 (W) Left Ahead Right	U	A		1	70	-	954	1834	1085	87.9%	954	954	-	-	-	9.0	33.9	30.5
2/1	Holydyke Left Ahead Right	U	C		1	27	-	391	1881	439	89.1%	391	391	-	-	-	8.4	77.2	16.2
3/1+3/2	A1077 (E) Ahead Right Left	U	B	D	1	82:8	74	769	1862:1921	803+144	81.2 : 81.2%	769	769	-	-	-	5.5	25.7	13.5
8/1	A1077 (W) Internal Ahead	U	E		1	101	-	860	2015	1713	50.2%	860	860	-	-	-	0.8	3.3	3.4

C1

PRC for Signalled Lanes (%): 1.0 Total Delay for Signalled Lanes (pcuHr): 23.65 Cycle Time (s): 120

PRC Over All Lanes (%): 1.0 Total Delay Over All Lanes(pcuHr): 23.65