Transport Assessment

Redevelopment of the Craigforth Campus

Stirling

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1 Introduction

1.1 Background

Sweco was commissioned by Ambassador LB holdings LLP to prepare a Transport Assessment (TA) in support of a planning application for a mixed-use development at Craigforth, Stirling.

This TA covers proposals for the whole site, with the proposed development in the north site (Phase 1 within the TA) subject to a detailed planning application (PAN 2020-004) and the proposed development in the remaining central and south sites (Phases 2 and 3 in the TA) subject to an application for planning permission in principle (PPiP) (PAN 2020-003). The programme for Phases 2 and 3 is yet to be confirmed.

The full redevelopment of the Craigforth campus will provide the opportunity to live and work in the same area, offering jobs, facilities and local amenities in close proximity to a new residential area. This will reduce the need to travel and will be underpinned by high quality active travel infrastructure throughout the site.

1.2 Scoping Study

The scope of the TA was agreed with Stirling Council and Transport Scotland. The scoping correspondence is provided in **Appendix A**.

The TA was prepared in accordance with the guidelines set out in the Scottish Government publication 'Transport Assessment Guidance' and takes account of the policies within the Scottish Planning Policy document, with an assessment of the accessibility of the site by non-car modes including walking, cycling and public transport.

The TA also provides details with respect to travel planning, designed to encourage travel by sustainable modes.

1.3 Report Structure

The remainder of the report is structured as follows:

- **Chapter 2** – Development Proposals;
- **Chapter 3** – Policy Context;
- **Chapter 4** – Accessibility Review;
- **Chapter 5** – Travel Plan Framework;
- **Chapter 6** – Travel Demand and Mode Share;
- **Chapter 7** – Traffic Impact Assessment; and
- **Chapter 8** – Summary and Conclusions.

2 Development Proposals

2.1 Development Context

The overall site, known as Craigforth campus in this report, is located to the west of Stirling. It is bound by the M9(T) to the east, the A84(T) to the north, the River Forth to the west and farmland to the south.

Craigforth campus is currently occupied by 31,219m^2 GFA of Prudential/Capita Offices, with 1,396 parking spaces available.

The location of the site within the context of the surrounding area and road network is provided in **Figure 2.1**.

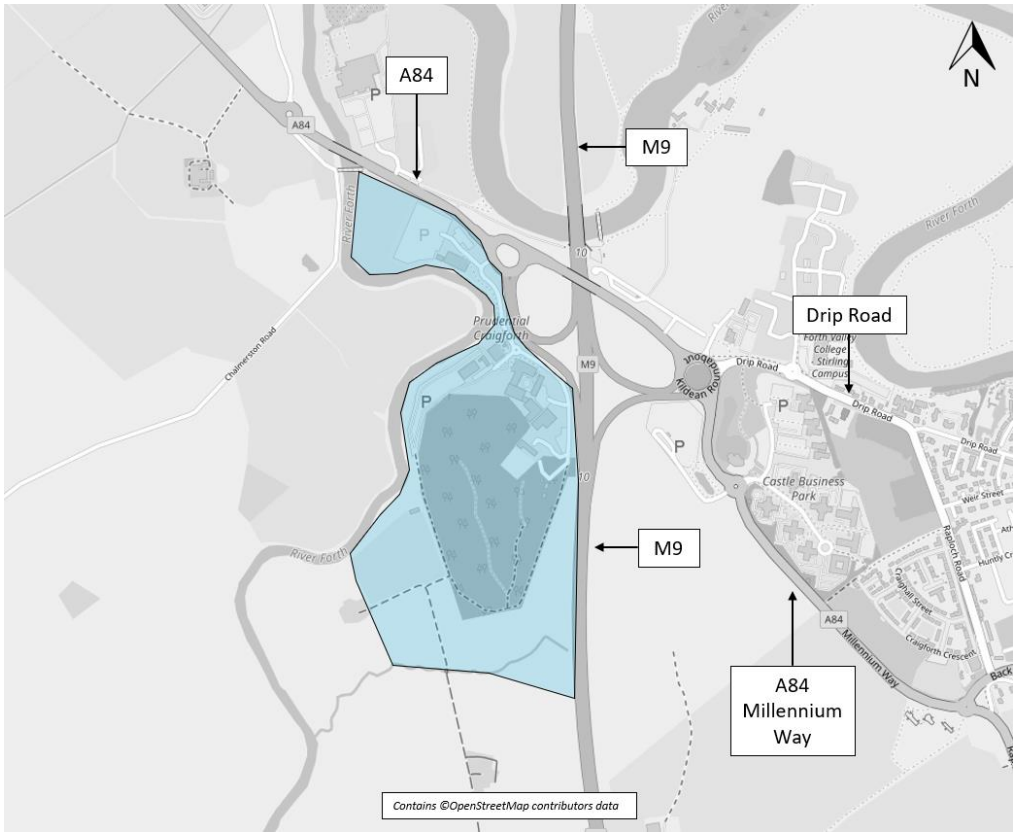


Figure 2.1. Site location

2.2 Proposed Development Content

The proposed development will take place over 3 phases, with an associated planning strategy to reflect the status of each. The following phasing has been assumed for the purpose of this assessment:

- Phase 1 (Detailed planning application) – Year of opening 2022; and
- Phases 2 and 3 (PPiP application) – Year of opening 2026 (indicative for the purpose of this assessment).

Figure 2.2 provides an illustration of the relevant phases by area and a breakdown of proposed uses associated with each is summarised in **Table 2.1**.

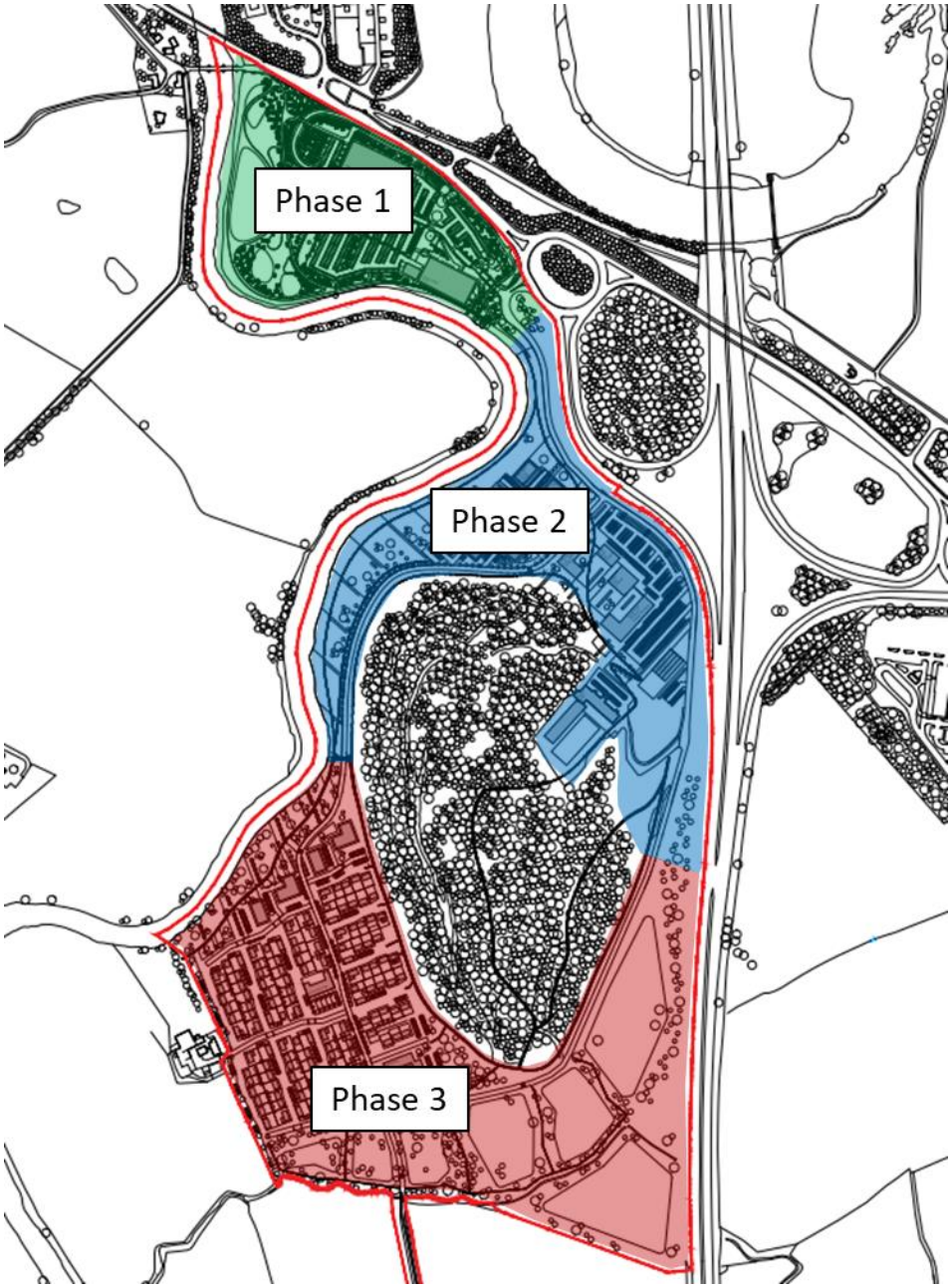


Figure 2.2 – Craigforth Phasing (plan provided by Stallan-Brand)

Site	Land Use	Area/Size (m^2 GFA unless otherwise noted)
Phase 1 – North (detailed application)	Office	16,132
Phase 2 – Central (PPP application)	Restaurant / Pub	1,480
	Retail	1,000
	Leisure / Gym	1,480
	Nursery	700
	Hotel	200 (bedrooms)
	Holiday Villas	11 (units)
	Residential (Flatted units)	135 (units)
Phase 3 – South (PPP application)	Residential (Mixed private)	175 (units)
	Retirement Home	30 (flatted units)
	Sheltered Housing	20 (units)
	Care Home	60 (beds)
	Retail / Community / Pub	350

Table 2.1. **Development proposals by phase**

Please note that whilst Phase 1 shows an accurate development area, Phases 2 and 3 provide an upper development limits at this stage, with the delivery strategy/timings still to be fully confirmed.

Provision for Phase 1 and Phases 2/3 is summarised below.

2.3 Phase 1

As part of the Phase 1 proposals, existing office space on the campus (31,219m^2) will be reduced by c.15,000m^2 GFA. This will be achieved by demolishing most existing buildings, retaining the Lomond View building and constructing a new building.

Parking provision will also be reduced overall as part of the Phase 1 proposals, requiring any future occupier to adopt robust and effective parking management and travel planning practice. This will include, but not be restricted to, supporting active travel, continued onsite bus service provision, agile working and car sharing.

A detailed site layout for Phase 1 is provided in **Figure 2.3**.

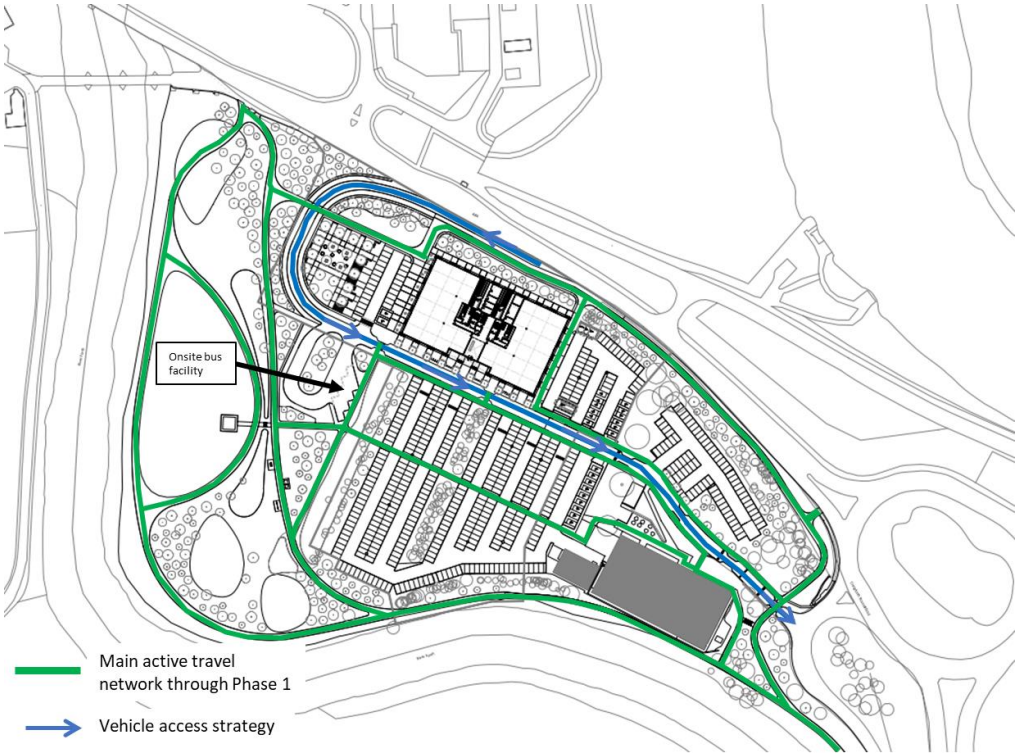


Figure 2.3 Phase 1 site layout (plan provided by Stallan-Brand)

2.3.1 Active travel provision

Figure 2.3 shows a clearly defined active travel network throughout Phase 1, which will:

- Provide connections to the existing routes to the south of Phase 1, which will in turn provide access to the wider network and towards Stirling. At the appropriate time, routes to the south will be upgraded and new routes introduced as part of Phases 2 and 3;
- Link to westbound bus stop provision on the A84(T);
- Links to the existing uncontrolled pedestrian crossing on the A84(T) west approach to the Craigforth Roundabout;
- Connect the buildings with car parking and the onsite bus facility.

To establish an appropriate level of cycle parking for Phase 1 of the development, reference was made to Stirling Council's parking. The minimum standards are outlined in **Table 2.2**.

Site	Type of Development	GFA / Rooms	Minimum Standard	Minimum Provision
Phase 1 - North	Office	16,132m^2	1 space + 1 space per 20 staff + 1 space per 400m^2	c.100

Table 2.2. Development cycle parking standards

Cycle parking for Phase 1 will be agreed with the Council.

2.3.2 Bus service provision

As with current arrangements, Phase 1 has been designed to allow bus services to enter the site. A bus stopping facility will be introduced, catering for up to 4 bus services at any one time, as illustrated in **Figure 2.3**. It is anticipated that bus services will continue to run between the site, Castleview Park & Ride, Stirling (including the railway station) and other settlements in the Stirling area (see **Chapter 4** for details).

2.3.3 Vehicle Access Strategy

The Phase 1 vehicle access strategy will comprise a left turn only entry from a new slip road on the A84(T) westbound carriageway, with a one-way system provided through Phase 1 and exit only onto the Craigforth roundabout, via the current Craigforth campus exit arm. The Phase 1 junction onto the Craigforth campus internal road will be exit only and signage will be provided to that effect. There will be no demand to the south of Phase 1 until Phases 2 and 3 are introduced, however the physical bollards on the Craigforth internal road will prohibit Phase 1 vehicles from turning right into the southern parts of the site.

Figure 2.3 provides details of the Phase 1 vehicle access strategy, which will be supported by a signage strategy on the external road network. This strategy will direct eastbound drivers on the A84(T) wishing to access Phase 1 around the Craigforth Roundabout to enter via the slip road.

The slip road is designed to DMRB standards for a design speed of 100 kph, as shown in **Figure 2.4**. A physical measure along the A84(T) will be introduced in the vicinity of the slip road to prohibit right turning. The final format of this will be agreed with Transport Scotland at the detailed design stage. A slip road diverge operational assessment is also provided in **Chapter 7**.

A Stage 2 Road Safety User Audit of the proposed access strategy will be undertaken to support the proposals, the timescales for the submission of the Audit will be agreed with Transport Scotland.

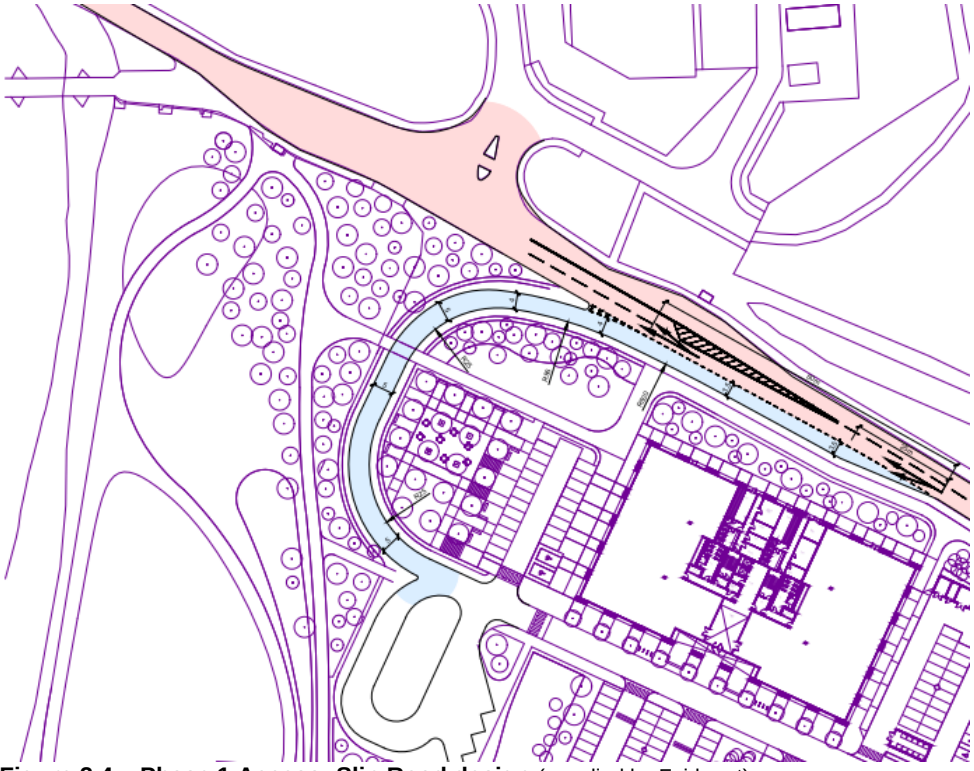


Figure 2.4 – Phase 1 Access: Slip Road design (supplied by Fairhurst)

Physical measures will be provided on the internal campus road to prohibit a right turn movement into Phase 1 from the Craigforth Roundabout, as shown in **Figure 2.5**.

Figure 2.5 Existing Craigforth internal road physical barrier (view from Craigforth Roundabout)

No further changes will be made to the internal road network until Phases 2 and 3 are introduced as negligible demand is anticipated from this part of the site until then.

The one-way system will be used by all traffic entering Phase 1 and will give access to the car park, servicing area and on-site bus facility.

Swept path analysis for bus services and servicing vehicles is provided in **Appendix B**.

2.3.4 Vehicle Parking

To establish an appropriate level of parking, reference was made to Stirling Council parking standards. Applying the maximum standards for each land use type would give the parking requirements, as summarised in **Table 2.3**.

Table 2.3. Development vehicle parking standards

Site	Type of Development	GFA / Rooms	Maximum Standard	Maximum Provision	Proposed Provision
Phase 1 - North	Office	16,132m^2	1 space per 30m^2	**538**	**538**

As shown in **Table 2.3**, the proposed parking provision matches the maximum allowable provision.

With a more agile workforce anticipated as part of the Phase 1 proposals, plus continued travel planning activity (see Chapter 5), this will reduce the demands on parking provision and assist in removing any potential for offsite car parking.

2.4 Phases 2 and 3

The indicative Masterplan illustrating the full development at the Craigforth Campus is provided in **Figure 2.6**.

Figure 2.6 – Wider Masterplan (plan provided by Stallan-Brand)

Figure 2.6 shows the relationship between Phase 1 and the later Phases 2 and 3. It provides a framework from which the detail of the latter two phases will be developed at the detailed application stage.

2.4.1 Active travel provision

The Phase 2 and 3 active travel strategy will be developed to tie in with the Phase 1 strategy. It will seek to provide a network of internal routes offering easy active travel access between all elements of Phases 2 and 3 and the office development in Phase 1.

The access strategy will also tie-in with any planned routes being promoted by the Council, including a potential access under the M9(T) and links along Dumbarton Road to the south of the site.

To establish an appropriate level of parking for Phase 2 and 3 of the development, reference was made to Stirling Council. The minimum standards are outlined in **Table 2.4**.

Site	Type of Development	GFA / Rooms	Minimum Standard
Phase 2 - Central	Restaurant	1,480m^2	1 space+1 space per 20 staff + 1 space + 1 space per 100m^2 public floorspace
	Retail	1,000m^2	1 space + 1 space per 20 staff + 1 space + 1 space per 250m^2 GFA
	Leisure	1,480m^2	1 space + 1 space per 10 staff + 1 space per 100m^2
	Nursery	700m^2	1 space per 10 classrooms + 4 spaces per classrooms
	Hotel	230 rooms	1 space + 1 space per 20 staff + 1 space per 10 beds
	Holiday Villa	75m^2	See hotel
	Residential	135 units	1 space per dwelling
Phase 3 - South	Residential	200 units	
	Retirement Home	30 units	None
	Sheltered Housing	20 units	None
	Care Home	60 beds	None
	Retail	350m^2	1 space + 1 space per 20 staff + 1 space + 1 space per 250m^2 GFA

Table 2.4. Development cycle parking standards

Cycle parking for Phases 2 and 3 will be brought forward in compliance with the standards outlined in **Table 2.4**.

2.4.2 Bus service provision

The current road network through the campus can accommodate bus services. The road network serving Phases 2 and 3 will integrate with this and be designed to accommodate bus service provision. Discussions will be held with the bus operators at the detailed design stage to agree bus service provision.

2.4.3 Vehicle access

Vehicle access for Phases 2 and 3 will be via the existing Craigforth campus approach to the Craigforth Roundabout. The physical barrier will be retained between the north

and south bound carriageway preventing vehicles turning right into Phase 1 from the Craigforth Roundabout.

As part of the future detailed supporting information for Phases 2 and 3, consideration will be given to management of the traffic at the Phase 1 / Phases 2/3 internal junction. This will be developed to suit movement by all transport modes and will ensure there is no queuing impacts on the Craigforth Roundabout. Initial assessments would suggest an uncontrolled junction will be sufficient. However, this is likely to support by the traffic management measures such as the narrowing and realignment of the Phase 1 junction bellmouth, the introduction of physical kerbing and lining on exit from Phase 1, supported by signage at the junction to prevent traffic from Phases 2 and 3 turning left into Phase 1. This will be addressed at the detailed application stage.

In addition, the current location of the bollards on the Craigforth campus internal road not only prohibits vehicles turning into the north site from the Craigforth Roundabout, but also prohibits vehicle turning right out of the north site towards the southern parts of the campus. This physical intervention will be retained as part of the proposals.

2.4.4 Vehicle Parking

To establish an appropriate level of parking for Phases 2 and 3, reference was made to the Stirling Council parking standards. Applying the maximum standards for each land use type would give the parking requirements, as summarised in **Table 2.5**.

Site	Type of Development	GFA / Rooms	Maximum Standard
Phase 2 - Central	Restaurant	1,480m^2	1 space per 10m^2
	Retail	1,000m^2	1 space per 20m^2
	Leisure	1,480m^2	1 space per 10m^2
	Nursery	700m^2	1 space per full-time staff + drop-off / pick-up facilities
	Hotel	230 rooms	1 space per bedroom + 1 space per 3 staff
	Holiday Villa	11 units	See hotel
	Residential	135 units	1–2 bedrooms – 1.5 space per dwelling
			3-4 bedrooms – 2.25 spaces per dwelling
			5 or more bedrooms – 3.25 spaces per dwelling
Phase 3 - South	Residential	175 units	1–2 bedrooms – 1.5 space per dwelling
			3-4 bedrooms – 2.25 spaces per dwelling
			5 or more bedrooms – 3.25 spaces per dwelling
	Retirement Home	30 units	1.25 spaces per dwelling
	Sheltered Housing	20 units	1.25 spaces per dwelling
	Care Home	60 units	1 space per 4 residents
	Retail	350m^2	1 space per 20m^2

Table 2.5. Development vehicle parking standards

2.5 Summary

The development proposals show a clear access strategy for all modes of transport for Phase 1, while future proofing for the later Phases 2 and 3. This has been developed in discussion with Stirling Council and Transport Scotland, with further engagement planned as Phases 2 and 3 are brought forward. This will ensure that the access strategy associated with all Phases will easily integrate with onsite routes, but also external planned routes.

3 Policy Context

3.1 Introduction

The following policy and guidance documents were considered from the outset in preparing the Travel Plan. All these policy/guidance documents encourage developments to be designed to a standard which is safe, attractive, and sustainable. A review of the following documents was undertaken:

- Scottish Planning Policy;
- Planning Advice Note (PAN) 75 – Planning for Transport;
- Transport Assessment Guidance;
- SESplan Strategic Development Plan;
- Stirling Local Development Plan; and
- Stirling's Local Transport Strategy.

3.2 Scottish Planning Policy

SPP is the Scottish Government's policy and guidance on nationally important land use planning matters. This states that to contribute to achieving Scottish Government greenhouse gas emission targets a shift to more sustainable modes of transport is required. For people this involves a shift from car-based travel to walking, cycling, and public transport. The planning system should support a pattern of development which:

- Reduces the need to travel;
- Facilitates travel by public transport; and
- Provides safe and convenient opportunities for walking and cycling.

Personal travel should be prioritised by mode in the following order- walking, cycling, public transport, car, and other motorised vehicles. Buildings should be accessible on foot and by cycle. Accessibility issues and street layout and design should be part of the design and planning process from the outset to create areas which are safe and attractive for pedestrians and cyclists.

3.3 Planning Advice Note (PAN) 75 – Planning for Transport

Planning Advice Note (PAN) 75 accompanies SPP and acts as a good practice guide on measures that planning authorities, developers and others should carry out in their policy development, proposal assessment and project delivery.

Paragraph 24 states that:

"development plan policy should encourage development of significant travel generating proposals at locations which are key nodes on the public transport network", and "locations should encourage modal shift of people and freight by providing good linkages to rail, walking and cycling networks".

PAN 75 provides guidance on accessibility thresholds and walking distances as follows:

- Walking distances from new developments should be no greater than 400 metres to bus stops and 800 metres to rail stations; and
- The maximum acceptable walking distance to local facilities is 1,600 metres.

3.4 Transport Assessment Guidance

This document accompanies SPP and PAN75 and aims to provide a good practice guide for the Transport Assessment of new development and redevelopment. The document provides a general guide to Transport Assessments' along with some detailed information on the criteria which should be considered.

Chapter 5 states:

- Journey times of 20-30 minutes are appropriate for walking and 30-40 minutes for cycling;
- Public transport journey times can be calculated by a combination of analysis of timetables and maps. This should be complemented by observation of walking times to actual (or potential) bus stops. A 30-minute door to door travel time is an appropriate choice of time-band by public transport although it may also be helpful to consider a 45-minute door to door travel time; and,
- For developments of national or regional importance, public transport journey times of 1 hour may be appropriate.

3.5 Stirling Local Development Plan

The current Stirling Local Development Plan was published in 2018 and aims to 'encourage and control the future use and development of land to assist in addressing the wider economic, environmental and social challenges'.

The document sets out a policy on *Addressing the Travel Demands of New Development*, which states that new developments should:

- Be located where safely and conveniently accessible by walking, cycling, and public transport as well as by motor vehicles;
- Wherever possible, connect to existing, or provide new links to, sustainable transport options; and
- Aim to reduce its travel demands and to ensure that residual demands are met in a manner which ensures a safe and realistic choice of access by walking, cycling, public transport, and motor vehicles.

3.6 Stirling's Local Transport Strategy

Stirling's current Local Transport Strategy (LTS) sets out aims and actions for the development of Stirling's transport system for the period 2017-2027, and beyond. It states that improvements to transport will help to achieve economic, environmental and social objectives.

The LTS sets out objectives for:

- A safer Stirling with fewer accidents and casualties;
- A connected Stirling with better journey times and travel options to, within and beyond Stirling;
- An active and sustainable Stirling where walking, cycling and public transport trips are encouraged and enabled;
- An inclusive Stirling where the transport network enables everyone to access jobs, services and opportunities;
- A quality place where our streets enhance the quality of Stirling and add to people's experience of it; and

- A quality transport network which is well maintained, managed and integrated.

3.7 Assessment against Policy Context

The development complies with the criteria set out within Scottish Planning Policy as it is located within proximity of walking, cycling and public transport infrastructure. A Travel Plan Framework has been developed to encourage sustainable travel practice. The TA was prepared in accordance with the Scottish Government's document 'Transport Assessment Guidance', with specific reference to the guidance on walking and cycling journey times. The development can promote and prioritise sustainable travel through its proximity to walking and cycling links and bus facilities.

Through the long-term development of the wider Craigforth Campus with various mixed landuses, the proposals can meet with the principles and aspirations of the local transport planning and policy guidance.

4 Accessibility Review

A baseline accessibility assessment was undertaken to establish existing transport provision relevant to the development site. The assessment considers travel by all relevant modes of transport and provides details of available infrastructure and service provision. The assessment recognises the importance of both local and regional trips. It recognises that walking and cycling are main modes of transport but are also secondary modes of travel for public transport users.

An assessment of existing pedestrian and cycle facilities serving the site was undertaken together with an assessment of the walk/cycle and public transport catchment areas. The following sections describe the existing infrastructure and facilities together with the opportunities that the development proposals would bring to enhance these facilities.

4.1 Walking

It is anticipated that the majority of pedestrian trips will be internal and therefore emphasis has been placed on ensuring that a high quality and permeable active travel network is introduced throughout Phase 1 and onwards to Phases 2 and 3 at the appropriate time.

Notwithstanding this, footways are currently provided along the A84(T) to the north of the site. These provide a connection over the M9(T), as shown in **Figure 4.1,** and continue onto Drip Road and the A84 (south). The footways are present on both sides of Drip Road and the eastern side of A84 (south) providing access from local residential areas in Raploch.

Figure 4.1. Footways on A84(T) over the M9(T)

Access to the Craigforth campus from the A84(T) will be via an uncontrolled crossing on the A84(T) eastbound approach to the Craigforth Roundabout. This connects to a network of footpaths running through the campus, an example of the internal footpaths is provided in **Figure 4.2**.

Figure 4.2. Existing footpath within Craigforth

Figures 4.3 and 4.4 highlight the pedestrian catchments for the Phase 1 and Phase 2/3 respectively. National transport policy and guidance specifies that 400m is a reasonable walking distance to the nearest bus stops and 1.6km to the nearest local amenities.

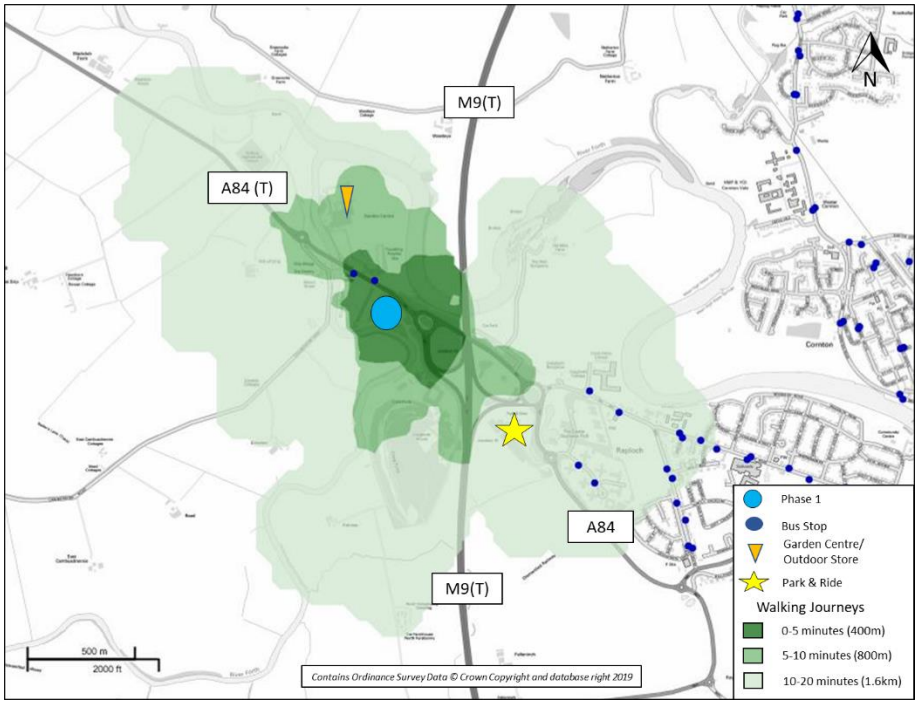


Figure 4.3. 20minute (1.6km) walking catchment from Phase 1 of the development

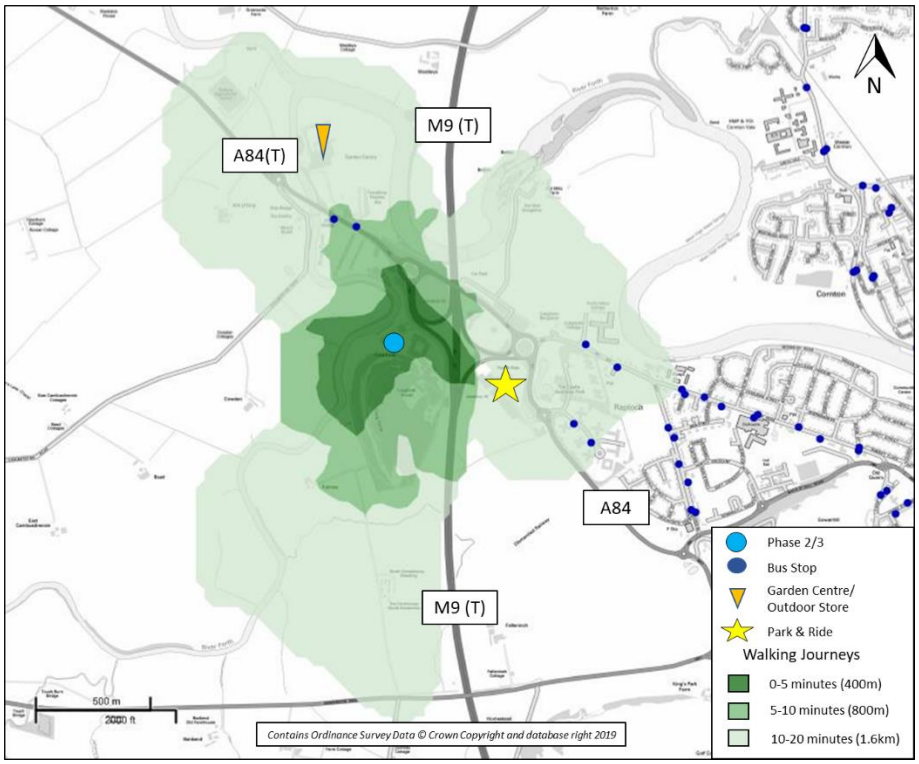


Figure 4.4. 20minute (1.6km) walking catchment from Phases 2/3 of the development

Figures 4.3 and **4.4** show that this site is within 400metres of onsite bus provision. As the site is built out, the mixed-use development will promote active travel between landuses, reducing the need to travel by vehicle during the day.

The nearest primary education is at Allan's Primary School to the east (c.3km) and Cambusbarron Primary School to the south (c.25km). The nearest secondary education is at Stirling High School (c.4.5km). On this basis, it is unlikely that travel to education will be made on foot, however these schools are within a reasonable cycle of Phases 2 and 3.

4.2 Cycling

National Cycle Route (NCR) 765 is located east of Craigforth and can be accessed at the Customs Roundabout east of Drip Road, approximately 2.5km (8-minute) cycle from the development. Signage for NCR 765 is provided on Drip Road, as shown in **Figure 4.5**.

Figure 4.5. NCR 765 signage on Drip Road

NCR 765 provides access to Dunblane to the north and to Stirling to the south. In Stirling, NCR 765 connects NCR 76 which provides access from various surrounding towns such as Alloa, Clackmannan and Kincardine and further into Edinburgh and Fife. Other cycle routes such as NCR 767 and 768 also connect with NCR 76.

Figures 4.6 and **4.7** highlight the catchment within an approximate 30-minute cycle (c.8km) of the development, which is identified within '*Transport Assessment Guidance'* as a reasonable cycle time for a local trip.

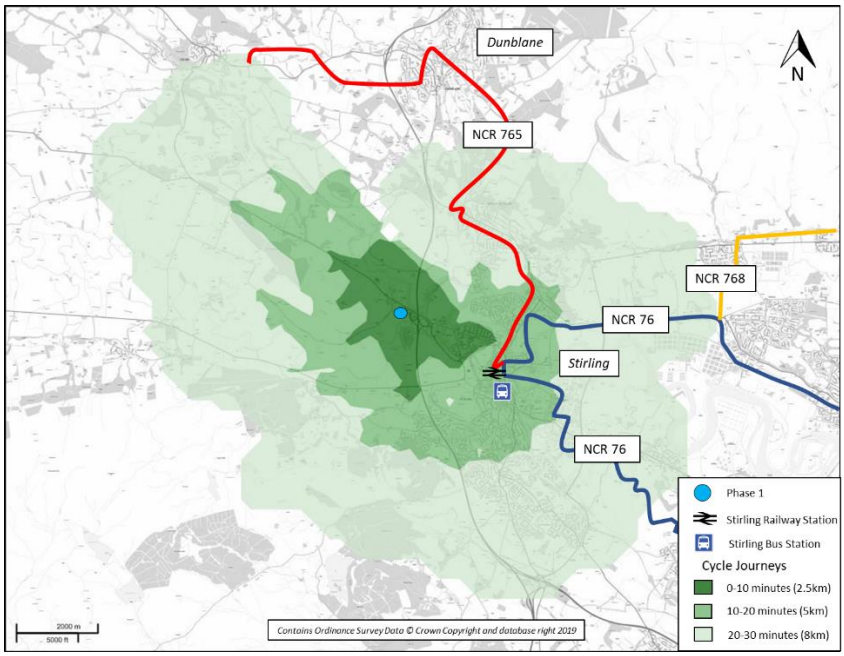


Figure 4.6. 30minute (8km) cycling catchment from the Phase 1 section of the development

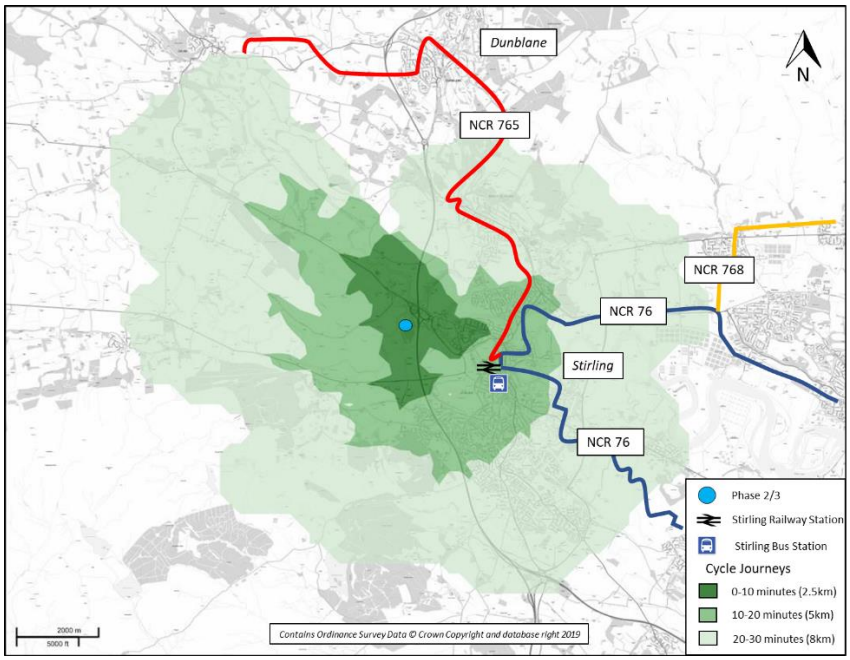


Figure 4.7. 8km (30minute) cycling catchment from the Phase 2/3 of the development

Figures 4.6 and **4.7** show that Craigforth is within a reasonable cycle of Stirling and surrounding towns such as Raploch, Bridge of Allan, Cornton and Bannockburn. This means that large areas of population will be within a cycle-commute of the jobs provided in Phase 1, and that residents of future phases will be able to cycle to employment in the surrounding areas. This will be important as and when planned routes linking to the proposed development are implemented, offering safe cycle provision between the site and Stirling.

With respect to Phases 2 and 3, whilst the education falls within a reasonable cycle, it is unlikely that a high proportion of trips will be made by this mode of transport. Discussions will be held with Stirling Council to agree suitable improvements to support cycle trips to education.

4.3 Public Transport Access

4.3.1 Bus Provision

Buses currently enter the site offering direct access to public transport.

There are several shuttle bus services provided for Prudential staff, as summarised in **Table 4.1**.

Route	Bus Operator	Locations Served	Frequency
1	Mackies	Linlithgow / Bo'ness / Grangemouth	1 in morning and evening peaks
2	Hunters	Braehead	1 in morning and evening peaks
3	Mackies	Polmont	1 in morning and evening peaks
4	Mackies	Falkirk / Camelon / Bonnybridge / Dennyloanhead / Denny / Auchenbowie	1 in morning and evening peaks
5	Mitchells	Dennyloanhead / Denny / Dunipace	1 in morning and evening peaks
6	Hunters	Falkirk / Bainsford / Larbert	1 in morning and evening peaks
7	Mitchells	Westquarter / Laurieston / Falkirk / Camelon	1 in morning and evening peaks
8	Hunters	Skinflats / Carronshore / Stenhousemuir / Larbert / Torwood / Plean	1 in morning and evening peaks
9	Hunters	Polmont / Westquarter	1 in morning and evening peaks
10	Mitchells	Stenhousemuir / Larbert	1 in morning and evening peaks
11	Hunters	Stirling / Fallin / Cowie / Bannockburn / St Ninians / Stirling	1 in morning and evening peaks
12	Mackies	Alloa / Sauchie / Devonside / Tillicoutry	1 in morning and evening peaks
13	Mackies	Alva / Menstrie	1 in morning and evening peaks
14	Mackies	Alloa / Tullibody / Bridge of Allan	1 in morning and evening peaks
15	Hunters	Clackmannan / Alloa	1 in morning and evening peaks
16	Mackies	Dunblane	1 in morning and evening peaks
17	Mitchells	Stirling	1 in morning and evening peaks
18	Hunters	Whins of Milton / St Ninians / Cambusbarron / Stirling	1 in morning and evening peaks
19	Hunters	East Kilbride / Motherwell	1 in morning and evening peaks
20	Mitchells	Stirling Railway Station Shuttle Service	1 in morning and evening peaks
22	-	Railway Station Shuttle Bus	2 per hour throughout day

Table 4.1. Existing Craigforth shuttle bus services (pre-COVID19 timetable)

Table 4.1 shows that shuttle bus services are provided from Stirling and various towns and villages in the area. A direct and regular link is also provided between Craigforth campus and Stirling railway station via a Castleview Park & Ride, which is located approximately 1.2km from the Craigforth Campus. The bus service connecting to the Park & Ride currently offers two services per hour throughout the day. Continuing this service as part of the Phase 1 proposals, will offer access to various bus services serving the Park & Ride.

The onsite bus service provision coverage ties in with the distribution of employee home locations, therefore reducing/minimising the need for employees to access bus services on the A84(T).

Notwithstanding this, the nearest bus stops external to the site are available on the A84(T), west of Craigforth Roundabout, as shown in **Figure 4.8**. These stops are served by approximately two buses per hour during weekday, one bus per hour on Saturdays and one bus every two hours on Sundays. First Bus service 59 offers a connection between Callander and Stirling, providing one service per hour on weekdays and Saturdays and one service every two hours on Sundays. First Bus service c11 provides a connection between Aberfoyle and Stirling, offering one bus per hour on weekdays and Saturdays and none on Sundays. Access to/from the westbound services will be via the active travel network running through Phase 1. Access to eastbound bus services will be via the existing uncontrolled crossing on the A84(T) west approach to the Craigforth Roundabout.

Figure 4.8. Bus stop located on A84(T)

Travel demands associated with public transport (bus and rail) are provided in Chapter 6. Dialogue will continue with bus operators as the development progresses to ensure continued provision and coordination of services. This will include consideration of connections to the nearest education provision.

4.3.2 Rail Provision

Stirling Railway Station is located south east of the development and can be accessed within 4km (15minute cycle). The station is on ScotRail's Central Belt line, offering services to and from Edinburgh and Glasgow. There are approximately two services per hour for Edinburgh and four per hour for Glasgow. Rail services also connect Stirling to Perth and Aberdeen and other towns in the Falkirk and Clackmannanshire Council areas.

Figure 4.10 shows the 60minute public transport catchment for the development.

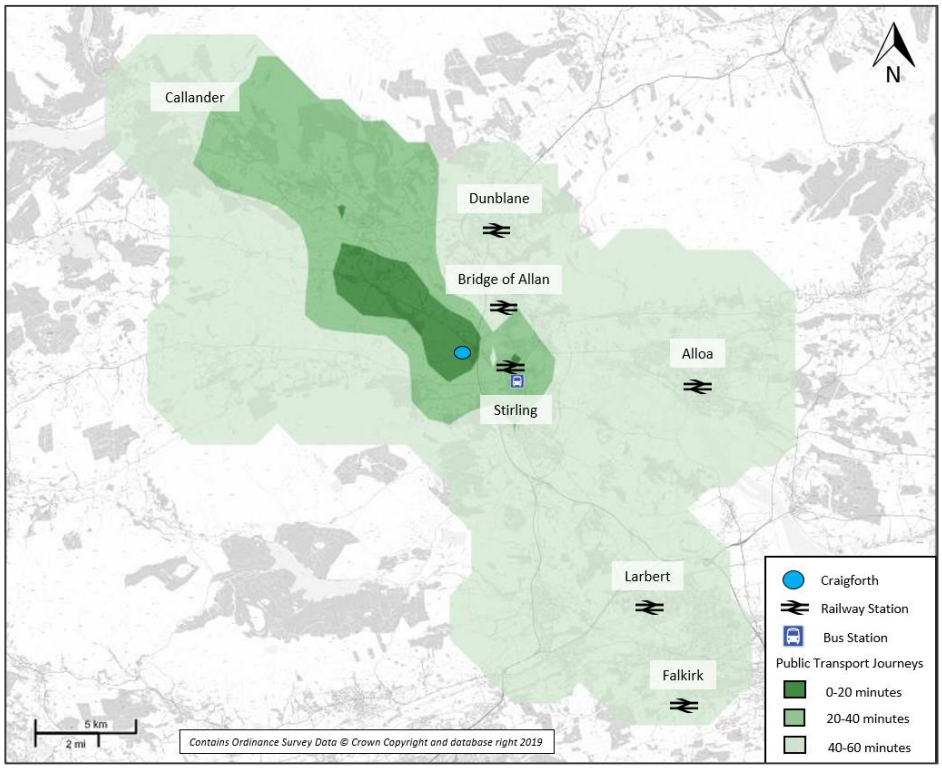


Figure 4.10. 60-minute public transport catchment (excludes shuttle service)

4.4 Access by Road

The proposed development will be accessed from the A84(T) and it is near to the M9 Junction 10, therefore the key roads in the vicinity of the site are:

- A84(T);
- M9(T);
- A84 (local road within Stirling); and
- Drip Road.

Table 4.2 describes the above routes.

Road network Characteristics					
Road	**Layout**	**Width**	**Speed Limit**	**Street Lighting**	**Connectivity**
A84 (T)	Two-Way Single-Carriageway	6.3m	40 mph	Yes	Raploch Various towns to the west
A84 (Local Road)	Two-Way Single-Carriageway	12m	40mph	Yes	A84 (T) M9
M9(T)	Two-Way Dual Carriageway Motorway	25m	70 mph	Yes	M8, M80, M876, M90 and various A-roads Craigforth Roundabout
Drip Road	Two-Way Single-Carriageway	6m – 8.3m	30 mph 20 mph Through Town Centre	Yes	Main Route Through Raploch M9 A84

Table 4.2 Road network surrounding the site

5 Craigforth Campus Travel Plan

5.1 Background

A travel plan exists for the current office use, which is implemented by Prudential and comprises measures associated with promoting active and sustainable travel. The measures also include subsidy onsite bus service provision.

This Chapter provides a Travel Plan which could be adopted by any occupier of Phase 1. Given that Phase 1 is subject to a detailed planning application and Phases 2 and 3 to an application for PPiP, a more detailed Travel Plan (TP) has been developed for Phase 1 and a Framework (TPF) for Phases 2 and 3.

5.2 Context

National and local transport policy increasingly places an emphasis on Travel Plans (TPs) to support new developments in Scotland. Above certain thresholds and depending on the type of development and local authority, a TP is required to support planning applications. The TP is the mechanism for identifying measures to support sustainable travel. These measures could range from providing cycle parking to establishing a journey sharing scheme or promoting video conferencing. Increasingly a large number of organisations now provide TPs voluntarily. For example, hospitals and financial institutions have a proven track record in reducing single occupancy vehicle trips and thereby improving staff health and productivity.

5.3 Travel Plan Benefits

Travel Plans are management tools designed to enable people to make more informed decisions about their travel while minimising the adverse impacts of travel on the environment. This is achieved by setting out a strategy which reduces barriers preventing people from using sustainable travel and public transport modes and seeks to reduce single occupancy car use.

Travel plans can also:

- Improve the environmental credentials of the occupying organisations;
- Alleviate car parking shortages;
- Reduce the carbon footprint of the organisation / development;
- Reduce the traffic impact on the surrounding road network;
- Improve the health and wellbeing of the workforce through the formation of active travel patterns; and
- Reduce adverse impacts on local residents and businesses.

5.4 Phase 1 Office Travel Plan

5.4.1 Aim, Objectives and Targets

The aim of the TP is to minimise the transport impacts of the development proposals on the surrounding area. Effective travel planning for Phase 1 is essential given the proposal to reduce parking provision and implement agile working patterns.

The objectives are:

- To enable and encourage staff and visitors to access the office by sustainable modes of transport;
- To promote the health and environmental benefits of travel by non-car modes; and
- To promote the TP to staff and keep them informed of its development.

5.4.2 Travel Plan Co-ordinator (TPC)

A nominated member of staff will take responsibility for the implementation and monitoring of measures broadly set out in this Travel Plan. The TPC will increase staff awareness of the available sustainable modes of transport and provide details of the environmental, social and commercial benefits to be gained.

The role of the TPC will include the following:

- Maintain and implement the Travel Plan;
- Co-ordinate a staff travel survey and analyse the results to monitor effectiveness and help target resources;
- Provide public transport information to staff covering services relevant to the office;
- Establish and co-ordinate links with the public transport operators in the surrounding area to share information, improve service provision and maintain up to date information for staff and visitors;
- Collate staff details and locations to aid in the potential for car-sharing opportunities and relate specific employees to bus, cycle and pedestrian routes;
- Promote active travel.

5.4.3 Travel Plan Measures

The following measures are proposed:

5.4.3.1 Walking and Cycling

Active travel (walking and cycling) is beneficial for health, cheap, offers reliable journey times, and is environmentally friendly. It can lead to a healthier, more productive workforce while, for visitors, it can ease the burden of navigating an unknown public transport or road network and create a more relaxed travel experience.

In addition to the introduction of active travel infrastructure within Phase 1, the following measures are proposed to support walking and cycling:

- Provide information on walking and cycling and its benefit and on walking and cycling routes in the local area;
- Provide cycle parking spaces that are secure, well-lit and visible;
- Liaise with local bike shops to negotiate deals on servicing and equipment;

- Provide cycle parking in line with relevant parking standards; and
- Provide shower and locker facilities.

5.4.3.2 Public Transport

For many employees who live further than a reasonable walking or cycling distance from the development, public transport will be a viable alternative. The measures that will be introduced to encourage travel by public transport are as follows:

- Negotiate with bus operators to continue to bring as many relevant services as possible into the Phase 1 area;
- Provide bus timetables and information on the intranet/noticeboards on access to the onsite bus facility; and
- Provide an induction pack containing information on public transport routes, timetables, and prices to new employees.

5.5 Travel Plan Mode Share

Targets are useful for monitoring the progress and success of the Travel Plan and will be 'SMART' – specific, measurable, achievable, realistic, and time-related.

The initial mode share targets for Phase 1 reflect existing observed mode share at Craigforth and therefore provide a reasonable starting point, as shown in **Table 5.1**.

Mode	% mode share
Car (Driver)	67%
Car (Passenger)	8%
Taxi	0%
Bus	20%
Train	2%
Cycle	2%
Motorcycle / Moped	0%
Walk	0%
Run	0%
Park & Ride	1%
Total	**100%**

Table 5.1. Phase 1 Mode Share

When Phases 2 and 3 come forward, there will be opportunities to influence and encourage active travel trips between the Phases, thereby potentially reducing reliance on private car travel. The Travel Plan will continue to develop and take account of these opportunities at the appropriate stage, setting targets to cover the overall development.

5.6 Communication Strategy

Effective communication about travel options is essential and it is important to encourage and update building users on available sustainable modes of transport. The dissemination of information about the Travel Plan is vital to raising awareness of the various travel options and the benefits of travelling in a sustainable way, as well as setting out the purpose and benefits of the Travel Plan.

To communicate travel planning to employees, the provision of an App, information on an intranet and regular emails will be investigated.

Information provided will include:

- Benefits of walking and cycling;
- Walking distances/times to key destinations;
- Cycling distances/times to key destinations;
- Cycle parking provision;
- Links to walking/cycling mapping and journey planners;
- Onsite bus timetable information;
- Links to public transport timetables;
- Links to online journey planners;
- Information on, and a links to, car sharing services; and
- Information on, and a links to, car club services.

There is also opportunity to investigate the use real-time public transport systems, providing live information of services from Craigforth.

5.7 Implementation, Strategy and Monitoring

A Travel Plan is a continuous and evolving document requiring implementation, monitoring, and review, to ensure that it remains relevant to all users. The responsibility for the implementation of the TP would rest with the TPC.

The TPC would undertake an annual staff travel survey, which would take the form of a short, online questionnaire which would allow building users to provide feedback on travel issues and suggestions for improvement. This would also provide information on mode share and catchment.

5.7.1 Action Plan

An Action Plan, summarising all the measures to be considered as part of the TP, is provided in **Table 5.2**.

Measures	Timescale
Dedicated pedestrian and cycle access points will be provided via the main access points	Prior to initial occupation
Links to external walking and cycling routes and public transport connections	Prior to initial occupation
Secure cycle parking spaces will be provided for staff as well as changing and showering facilities	Prior to initial occupation
Promotion of www.sustrans.org.uk and www.cyclingscotland.org in the App/ Email for further information on cycling and cycle routes.	Prior to initial occupation
Encourage staff to consider alternative methods of business travel to the private car.	Ongoing
Provision of information within an App/ Email, including maps, directions and walking times to key destinations such as public transport links.	Ongoing
Maps and timetable information of local bus, tram & train services and information on walking/cycle times to interchanges provided in the Travel Options Leaflet	Ongoing
Promote www.travelinescotland.com via Email or the App which provides public transport information and journey planning facilities, as well as providing contact information for local public transport operators.	Prior to initial occupation
Promote car sharing websites such as www.liftshare.com/uk to help find car sharers who might make similar journeys.	Ongoing
TPC to investigate current Car Club opportunities in Stirling	Ongoing

Table 5.2. Action Plan

5.8 Phase 2 and 3 Travel Plan Framework

Phases 2 and 3 will see a mixed-use development delivered including retail, leisure and residential uses.

5.8.1 Employment uses

With respect to employment uses, the main elements of the Phase 1 Travel Plan will be relevant, including the communication of travel plan measures. At the appropriate stage a campus wide Travel Plan for employment uses will developed.

5.8.2 Residential development

Travel planning for residential developments has the potential to help achieve more sustainable communities by improving accessibility and travel choice. It is acknowledged that this Residential Travel Plan (RTP) is an 'origin based' Travel Plan (TP) which requires being flexible and meeting the needs and requirements of future residents travelling on various types of journey, as opposed to a typical 'destination based' TP which considers people travelling to a specific destination. A formal site wide RTP would therefore be difficult to implement and ultimately control. Key elements of the RTP are therefore focused around education and the promotion of appropriate transport information.

This RTP framework should be considered as guidance and an available resource which identifies objectives and measures aimed at improving sustainability and choice. The effectiveness of the RTP will be increased if adopted by a resident's group or committee. The benefits of residential travel planning can be summarised as follows:

- Reducing the need for car use and carbon emissions;
- Education with respect to sustainable travel;
- Improve accessibility and travel choice for reaching local facilities and amenities;
- Complement nearby existing Travel Plans;
- Achieving a more attractive and safer development by reducing car use;
- Increasing marketability of the development as more households seek to change their travel behaviour;
- Improving the health of residents; and
- Improve knowledge of residents in relation to travel routes and locations of facilities.

It is proposed at this stage that opportunities for sustainable travel will be promoted through a residential travel leaflet, to be provided within a residents' 'Welcome Pack'. The 'Welcome Pack' will include a travel leaflet incorporating the following:

- Public transport information specific to the site. This will include bus timetables and maps, and a map of bus stop locations and pedestrian routes accessing these;
- Information on public transport fares, this could include proposed discounts in the form of bus vouchers;
- Contact information for public transport providers, including internet addresses for up-to-date public transport information;
- A map of pedestrian and cycle routes;
- Details of existing or potential car sharing schemes;
- Contact information for local taxi services; and
- Information on local supermarkets and home delivery services they provide.

The leaflet will provide the new residents with detailed information in relation to a range of transport facilities and travel choices within the area, including sustainable travel alternatives to the car.

6 Travel Demand and Mode Share

6.1 Introduction

As indicated in **Chapter 2**, the site is currently occupied by 31,219m^2 of Prudential Offices and some ancillary uses which generate significant travel activity. This existing activity has been taken account of when estimating the net change associated with the proposed development.

6.2 Existing travel demands

To understand current travel demands associated with the existing uses, a two-way traffic count was undertaken at the existing Craigforth Campus entrance on Tuesday 29th October 2019. The peak hour traffic flows are provided in **Table 6.1**.

Morning Peak		Evening Peak	
Arr (veh)	Dep (Veh)	Arr (Veh)	Dep (Veh)
703	92	92	660

Table 6.1. Existing vehicle flows at Craigforth Campus

Based on an office space of 31,219m^2, this results in the following existing vehicle trip rates per 100m^2 GFA, shown in **Table 6.2**. It is assumed that all travel demand associated with ancillary uses is generated by people already on site at the office.

Land Use	Units	Morning Peak		Evening Peak	
		Arr (veh)	Dep (Veh)	Arr (Veh)	Dep (Veh)
Office	Per 100m^2	2.252	0.295	0.295	2.114

Table 6.2. Existing vehicular trip rate

A travel survey was undertaken for Prudential staff in 2017 which provides the current mode share for travel to/from the campus and is presented in **Table 6.3**.

Mode	Every Day	3-4 days a week	Once a week	Once a month	Once or twice a year	Never
Car (Driver)	50%	23%	9%	3%	2%	13%
Car (Passenger)	3%	6%	7%	5%	15%	64%
Taxi	0%	0%	0%	1%	12%	87%
Bus	9%	13%	6%	7%	17%	49%
Train	1%	1%	2%	3%	15%	79%
Cycle (private)	1%	1%	1%	4%	17%	76%
Cycle (rented)	0%	0%	0%	0%	11%	89%
Motorcycle / Moped	0%	0%	0%	0%	11%	88%
Walk	0%	0%	2%	0%	12%	86%
Run	0%	0%	0%	0%	12%	87%
Park & Ride	0%	1%	0%	0%	12%	87%

Table 6.3. Existing Prudential staff mode share, based on 2017 travel survey data

This is based upon the existing walking, cycling, and public transport provision, including shuttle bus services, and parking provision which totals 1,396 spaces.

Using the existing vehicle travel demands and the mode share associated with those employees who access Craigforth (using an average of those accessing the site every day and those who access it 3 to 4 times a week), then **Table 6.4** provides an indication of the existing morning and evening peak people trip generation by mode of transport.

Mode	%	Morning Peak		Evening Peak	
		Arrivals	Departures	Arrivals	Departures
Car (Driver)	67%	703	92	92	660
Car (Passenger)	8%	84	11	11	79
Taxi	0%	0	0	0	0
Bus	20%	210	27	27	197
Train	2%	21	3	3	20
Cycle	2%	21	3	3	20
Motorcycle / Moped	0%	0	0	0	0
Walk	0%	0	0	0	0
Run	0%	0	0	0	0
Park & Ride	1%	10	1	1	10
Total	**100%**	**1049**	**137**	**137**	**985**

Table 6.4. Existing people trip generation by mode of transport

6.3 Phase 1 Travel Demand and Distribution

Phase 1 development proposals are summarised in **Table 6.5**. Phase 1 is supported by reduced parking provision, agile working and onsite bus service provision, promoting reduced vehicle impacts in the traditional commuter peaks.

Site	Land Use	GFA(m^2)
Phase 1 - North	Office	16,132

Table 6.5. Phase 1 development proposals

6.3.1 Travel Demand

Using vehicle trip rates derived from existing vehicle trip generation and current mode share, **Table 6.6** sets out the potential vehicle trip generation associated with Phase 1.

Land Use	Units	Morning Peak		Evening Peak	
		Arr (veh)	Dep (Veh)	Arr (Veh)	Dep (Veh)
Office	16,132m^2	363	48	48	341

Table 6.6. Proposed Phase 1 vehicle trip generation

Table 6.6 shows that Phase 1 is anticipated to generate 411 two-way vehicle trips in the morning peak and 389 to-way vehicle trips in the evening peak.

Through reduced parking provision, travel planning and more agile working, there is an opportunity to reduce the Phase 1 vehicle mode share for journeys to work. However, to provide a robust assessment, no mode share reduction has been introduced at this stage.

The people trip generation by mode of transport set out in **Table 6.7** is based on the current mode share for the campus (as summarised in **Table 6.4**).

Mode	%	Morning Peak		Evening Peak	
		Arrivals	Departures	Arrivals	Departures
Car (Driver)	67%	363	48	48	341
Car (Passenger)	8%	45	6	6	42
Taxi	0%	0	0	0	0
Bus	20%	109	14	14	103
Train	2%	10	1	1	9
Cycle	2%	10	1	1	9
Motorcycle / Moped	0%	0	0	0	0
Walk	0%	0	0	0	0
Run	0%	0	0	0	0
Park & Ride	1%	5	1	1	5
Total	**100%**	**542**	**72**	**72**	**509**

Table 6.7. Phase 1 development mode share and multi-modal trip generation

It can be seen in **Table 6.7** that it is anticipated that there will be c.100 arrivals by bus in the morning peak, the second highest arrivals to the private car. The Phase 1 proposals include for onsite bus service provision, including a direct bus connection to Stirling Railway station and the Castleview Park & Ride, offering good public transport connections to additional bus routes and longer distance public transport services.

6.3.2 Trip Distribution

The Phase 1 vehicle trip distribution is based on 2017 travel survey data, as shown in **Table 6.8**.

Location	%
Dundee	0%
Midlothian	0%
East Renfrewshire	1%
Fife	2%
East Dunbartonshire	3%
Perth & Kinross	3%
Glasgow	3%
West Lothian	3%
North Lanarkshire	4%
South Lanarkshire	5%
Edinburgh	5%
Clackmannanshire	10%
Falkirk	27%
Stirling	34%
Total	**100%**

Table 6.8. Employment trip distribution

Table 6.8 shows that the highest proportion of employees originate from Stirling and Falkirk.

Table 6.9 translates the vehicle trip distribution into morning and evening peak vehicle demands by area.

Type of Use	Location	%	Vehicle trip gen	
			Morning Peak	Evening Peak
Employment	**Dundee**	0%	2	2
	Midlothian	0%	2	2
	East Renfrewshire	1%	5	5
	Fife	2%	7	7
	East Dunbartonshire	3%	11	10
	Perth & Kinross	3%	11	10
	Glasgow	3%	13	12
	West Lothian	3%	14	14
	North Lanarkshire	4%	18	17
	South Lanarkshire	5%	20	19
	Edinburgh	5%	22	20
	Clackmannanshire	10%	39	37
	Falkirk	27%	109	104
	Stirling	34%	138	131
	Total	**100%**	**411**	**389**

Table 6.9. Phase 1 vehicle distribution

The Phase 1 travel demands, and trip distribution set out in the above section has considered the reduced parking and agile working. There are further opportunities to reduce vehicle travel through travel planning, as presented in **Chapter 5**. The net change in travel demands, taking account of the current operation of the site, is presented in **Section 6.5** of this Chapter.

6.4 Phases 2 and 3 Travel Demand and Distribution

The upper development parameters for Phases 2 and 3 are presented in **Table 6.10**.

Site	Land Use	GFA(m^2) unless otherwise stated
Phase 2 - Central	Restaurant / Pub	1,480
	Retail	1,000
	Leisure / Gym	1,480
	Nursery	700
	Hotel	200 (bedrooms)
	Holiday Villas	11 (units)
	Residential (flatted units)	135 (units)
Phase 3 - South	Residential (mixed private)	175 (units)
	Retirement Home	30 (flatted units)
	Sheltered Housing	20 (units)
	Care Home	60 (beds)
	Retail / Community / Pub	350

Table 6.10. Phase 2 and 3 upper development quantum

6.4.1 Phases 2 and 3 Combined Travel Demand

To establish the potential number of vehicle trips generated in Phases 2 and 3 during the weekday morning and evening peak hours, reference was made to the TRICS database. Vehicular trip rates were extracted for the variety of uses included in the proposals. Peak morning hour (between 07:00 and 10:00) and evening hour (between

15:00 and 19:00) were determined separately for each element of the development to calculate an overall peak vehicle trip generation. Resulting trip rates and corresponding trip generation for Phases 2/3 are shown in **Tables 6.11** and **6.12** respectively. TRICS output data is shown in **Appendix C**.

Land Use	Units	Morning Peak		Evening Peak	
		Arrivals	Departures	Arrivals	Departures
Restaurant	Per 100m^2	0.571	0.571	3.282	3.282
Retail	Per 100m^2	8.266	8.203	10.937	11.552
Gym	Per 1 hectare	42.713	25.108	54.978	52.525
Nursery	Per 100m^2	3.345	2.734	2.459	2.978
Hotel	Per 100m^2	0.288	0.330	0.284	0.237
Holiday Accommodation	Per 1 unit	0.056	0.043	0.137	0.121
Private Flat	Per 1 unit	0.061	0.214	0.204	0.104
Mixed Residential	Per 1 unit	0.112	0.337	0.315	0.163
Retirement / Sheltered Housing	Per 1 unit	0.081	0.091	0.075	0.051
Care Home	Per 1 unit	0.109	0.060	0.083	0.123

Table 6.11. Proposed Phase 2/3 vehicular trip rates

Land Use	Units	Morning Peak		Evening Peak	
		Arr (veh)	Dep (Veh)	Arr (Veh)	Dep (Veh)
Restaurant / Cafe	1,480m^2	8	8	49	34
Retail	1,350m^2	112	111	147	156
Leisure / Gym	0.148 hectares	6	4	8	8
Nursery	700m^2	23	19	17	21
Hotel	8,327m^2	24	27	24	20
Holiday Accommodation	11 units	1	0	2	1
Private Flats	135 units	8	29	28	14
Mixed Residential	175 units	20	59	55	29
Retirement / Sheltered Housing	50 units	4	5	4	3
Care Home	60 beds	7	4	5	7
Total		**213**	**266**	**338**	**292**

Table 6.12. Phase 2/3 upper vehicular trip generation

To provide an indication of the potential number of trips by all modes for Phase 2/3, reference was made to Travel to Work or study data from the Scotland 2011 Census for the Kings Park and Torbrex area. This modal split and associated people trip generation by mode of transport is provided in **Table 6.13**.

Mode	%	Morning Peak		Evening Peak	
		Arrivals	Departures	Arrivals	Departures
Working from home	11%	44	55	70	61
Car Driver	53%	213	266	338	292
Car Passenger	3%	12	15	19	17
Walk	15%	60	75	96	83
Cycle	2%	8	10	13	11
Bus	5%	20	25	32	28
Taxi	0%	0	0	0	0
Rail	9%	36	45	57	50
Other	2%	8	10	13	11
Total	**100%**	**402**	**502**	**638**	**551**

Table 6.13. Phases 2/3 development mode share and multi-modal trip generation

6.4.2 Phases 2 and 3 Vehicle Trip Distribution

To calculate the distribution of traffic travelling to and from the site on weekday mornings and evenings, 2011 Census data gathered from DataShine Scotland Commute and information within the Prudential 2017 travel survey was used. Numbers of commuters travelling to and from Kings Park and Torbrex areas were taken to determine employment and residential distributions respectively.

Trip distribution for employment uses within the development are based on 2017 travel survey data, as shown in **Table 6.14**.

Location	%
Dundee	0%
Midlothian	0%
East Renfrewshire	1%
Fife	2%
East Dunbartonshire	3%
Perth & Kinross	3%
Glasgow	3%
West Lothian	3%
North Lanarkshire	4%
South Lanarkshire	5%
Edinburgh	5%
Clackmannanshire	10%
Falkirk	27%
Stirling	34%
Total	**100%**

Table 6.14. Employment trip distribution

For the residential elements of the development, reference was made to Datashine Travel to Work data for Kings Park and Torbrex, as shown in **Table 6.15**.

Location	%
Stirling	76%
Falkirk	5%
Clackmannanshire	2%
Glasgow	1%
Work from Home	17%
Total	**100%**

Table 6.15. Residential trip distribution

Tables 6.16 translates the vehicle trip distribution for Phases 2 and 3 into morning and evening peak vehicle demands by area.

Type of Use	Location	%	Vehicle trip gen	
			Morning Peak	Evening Peak
Employment	Dundee	0%	1	2
	Midlothian	0%	1	2
	East Renfrewshire	1%	5	6
	Fife	2%	6	8
	East Dunbartonshire	3%	10	13
	Perth & Kinross	3%	10	13
	Glasgow	3%	11	14
	West Lothian	3%	12	17
	North Lanarkshire	4%	16	21
	South Lanarkshire	5%	17	24
	Edinburgh	5%	18	25
	Clackmannanshire	10%	34	47
	Falkirk	27%	91	130
	Stirling	34%	115	163
	Total	**100%**	**345**	**487**
Residential	Stirling	76%	102	110
	Falkirk	5%	7	7
	Clackmannanshire	2%	3	3
	Glasgow	1%	1	1
	Work from Home	17%	22	24
	Total	**100%**	**134**	**144**

Table 6.16. Phases 2/3 vehicle distribution

6.5 Combined Phases vehicle trip generation estimates

Cumulative trip generation estimates were calculated by combining predicted traffic volumes for Phase 1 and the overall proposed development. The cumulative vehicle trip generation is presented in **Table 6.17**. Please note that whilst Phase 1 provides detailed proposals, Phases 2 and 3 provide upper development quantum.

Site	Morning Peak		Evening Peak	
	Arr (veh)	Dep (Veh)	Arr (Veh)	Dep (Veh)
Phase 1	363	48	48	341
Phase 2+3	213	266	338	292
Full development	**576**	**314**	**386**	**633**

Table 6.17. Cumulative proposed development vehicular trip generation

6.5.1 Net Change in Travel Demands

Taking account of the existing travel demands, the net change in traffic is presented in **Table 6.18** and change in people trips by mode of transport in **Tables 6.19** and **6.20**.

Scenario	Morning Peak		Evening Peak	
	Arr (veh)	Dep (Veh)	Arr (Veh)	Dep (Veh)
Existing	703	92	92	660
Phase 1 dev Net Change	-340	-44	-44	-319
Full development Net Change	**-127**	**222**	**294**	**-27**

Table 6.18. Predicted net change in traffic

Mode	Morning Peak		Evening Peak	
	Arrivals	Departures	Arrivals	Departures
Car (Driver)	-340	-44	-44	-319
Car (Passenger)	-39	-5	-5	-37
Taxi	0	0	0	0
Bus	-101	-13	-13	-94
Train	-11	-2	-2	-11
Cycle	-11	-2	-2	-11
Motorcycle / Moped	0	0	0	0
Walk	0	0	0	0
Run	0	0	0	0
Park & Ride	-5	0	0	-5
Total	**-507**	**-65**	**-65**	**-476**

Table 6.19. Phase 1 predicted net change in people trips by mode of transport

Mode	Morning Peak		Evening Peak	
	Arrivals	Departures	Arrivals	Departures
Car (Driver)	-127	222	294	-27
Car (Passenger)	-27	10	14	-20
Taxi	0	0	0	0
Bus / Park & Ride	-76	13	19	-61
Train	25	43	56	39
Cycle	-3	8	11	0
Walk	60	75	96	83
Other	52	65	83	72
Total	**-95**	**437**	**573**	**85**

Table 6.20. Full development predicted net change in people trips by mode of transport

Table 6.20 provides the net change taking account of residents being present onsite. Therefore, the increase in walking is expected to be a result of the mixed-sue nature of the development encouraging shorter distance trips. In addition, it should be noted that with the "other" category are those residents who may work from home.

6.5.2 Traffic flow diagrams

The following traffic flow diagrams for the weekday morning and evening peaks are provided in Appendix **D:**

- Existing Craigforth campus traffic flows;
- Phase 1 total traffic flows;
- Phase 1 net change in traffic flows;
- Full development total traffic flows; and
- Full development net change in traffic flows.

7 Traffic Impact Assessment

7.1 General Approach

This chapter describes the methodology used to assess the impact of the traffic generated by the proposed development on the road network.

Phase 1 is subject to a detailed planning application therefore sufficient detail exists on quantum and programme to allow full consideration of traffic impact. An opening year of 2022 is assumed.

Phases 2 and 3 will be covered by a PPiP application, with any consideration based on upper parameters, with the programme not confirmed at this stage and the long-term effects of the current COVID19 situation unknown. Notwithstanding this, an opening year of 2026 has been applied and the traffic impacts on the nearest junctions to the proposed development will be considered. Further assessments will be undertaken at the appropriate detailed stage, to account for any changes in traffic patterns in the intervening period.

7.2 Phase 1

7.2.1 Scope of Assessment

It was agreed with Stirling Council and Transport Scotland during the pre-application process that the scope of assessment would consider the following junctions:

- A84(T) / Chalmerston Road roundabout;
- A84(T) / Dobbies entrance priority junction;
- M9 Junction 10 (Craigforth Roundabout);
- M9 Junction 10 (Kildean roundabout);
- Drip Road / Dougal Graham Road roundabout;
- A84 / Castleview Park and Ride entrance roundabout;
- Back O' Hill Road / Raploch Road priority junction;
- A84 / Raploch Road roundabout; and
- A811 / Raploch Road / Dumbarton Road roundabout.

7.2.2 Base Traffic Flows

Classified traffic counts were commissioned by Sweco and undertaken by MHC Traffic on Tuesday 29th October between 06:00 and 10:00 and between 15:00 and 19:00. The following network peak hours were identified from the traffic surveys:

- Morning peak: 08:00 to 09:00; and
- Evening peak: 16:30 to 17:30.

NRTF Central Growth has been used to factor base traffic flows to the 2022 opening year. Base traffic flow diagrams are provided in **Appendix D**.

7.2.3 Committed Developments

The following have been taken into consideration as Committed Developments:

- Orchard House: Planning Reference 17/00694/FUL;
- Raploch (various sites): Planning Reference 18/00127/MSC/16/00771/PPP; and
- Kildean: Planning Reference 20/00291/FUL.

The morning and evening peak committed development traffic flow diagrams are provided in **Appendix D.**

The morning and evening peak complete traffic flows for Phase 1 are also presented in **Appendix D**.

7.2.4 Assessment Scenarios

To determine the impacts of Phase 1 on the above junctions, the following scenarios have been considered, assuming a year of opening of 2022:

- 2019 Base Traffic Flows;
- 2022 Base Traffic Flows;
- 2022 Base + Committed Development Traffic Flows; and
- 2022 Base + Committed Development + Phase 1 Traffic Flows.

7.2.5 Phase 1 Threshold Analysis

A threshold analysis was undertaken on all junctions across the study area, based on a 5% increase on any approach to a junction. **Table 7.1** provides the threshold analysis for Phase 1.

Junction	Morning Peak		Evening Peak		Detailed Capacity Analysis?
	Max Change on any approach %	Average Change %	Max Increase on any approach %	Average Increase %	
A84 / Chalmerston Road roundabout	+2%	+1%	-1%	0%	No
A84 / Dobbies entrance priority junction	+2%	+1%	-1%	0%	No
M9 Junction 10 Craigforth Roundabout	-49%	-21%	-54%	-15%	No
M9 Junction 10 Kildean Roundabout	-14%	-6%	-15%	-4%	No
Drip Road / Dougal Graham Road roundabout	-5%	-2%	-3%	-1%	No
A84 / Castleview Park and Ride entrance roundabout	-1%	0%	-9%	-2%	No
Back O' Hill Road / Raploch Road priority junction	-10%	-4%	-6%	-3%	No
A84 / Raploch Road roundabout	-10%	-5%	-7%	-4%	No
A811 / Raploch Road / Dumbarton Road roundabout	-4%	-2%	-2%	-1%	No
Drip Road / Back 'O' Hill Road roundabout	-17%	-6%	-6%	-3%	No
A9 Causewayhead Roundabout	-5%	-2%	-5%	-1%	No

Table 7.1. **Phase 1 Threshold Analysis**

As a result of the Phase 1 proposals, it is anticipated that there will be a net decrease in traffic on all junctions except for a negligible increase on junctions to the west in the morning peak. Therefore, except for the proposed slip road entry on the A84(T) and the Craigforth Roundabout, no junctions have been taken forward for modelling as part of the Phase 1 planning application. Note that the Craigforth Roundabout has been modelled to test changes in the characteristics of flows rather than increase e.g. traffic approaching Phase 1 from the west on the A84(T) will be expected to carry out a U-turn at the roundabout.

7.2.6 Modelling Assessment

7.2.6.1 Slip Road assessment

A summary of the "with Phase 1" traffic flows for the A84(T) is provided in **Table 7.2**.

Scenario	Period	A84(T) Eastbound	A84(T) Westbound (before slip road)	Phase 1 slip road	A84(T) Westbound (after slip road)
2022 Base + Ctted + Phase 1	AM	468	913	363	508
	PM	554	574	48	524

Table 7.2. Traffic flow summary

Using the data in **Table 7.2**, the highest flow, namely the morning peak for diverging traffic has been plotted on Figure 3.26b for motorway diverges of the DMRB document to establish the required slip road type. The plot results are shown in **Figure 7.1** below.

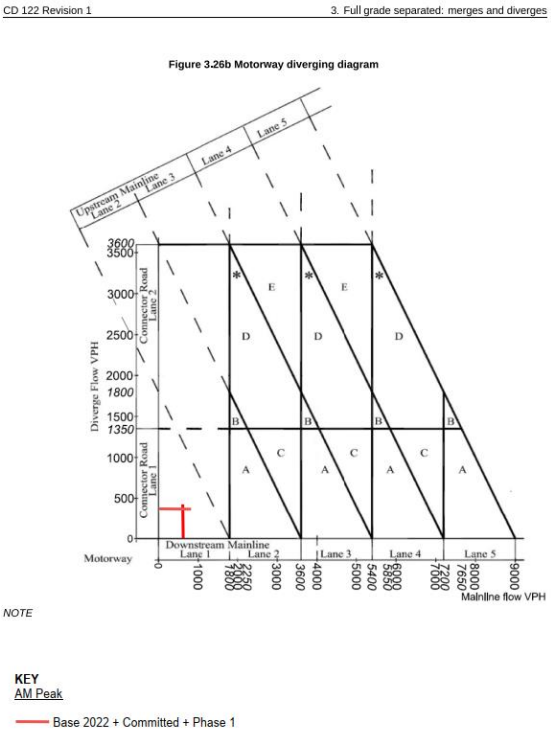


Figure 7.1 – Phase 1 diverge assessment

Whilst not a motorway, this approach provides the best assessment method to determine the suitability of the proposed slip road access. The results of the diverge assessment show that the proposed slip road layout proposed will accommodate traffic associated with Phase 1 with no impact on the operation of the A84(T).

7.2.6.2 M9 Junction 10 Craigforth Roundabout

The capacity of M9 Junction 10 Craigforth Roundabout was assessed using TRL Software Junctions 9 'ARCADY'. Results of the analysis were presented in terms of the ratio of flow to capacity (RFC) and the corresponding maximum queue. A roundabout is predicted to operate within 'reserve capacity' where an RFC of 0.85 or below is recorded. Where an RFC of over 1.00 is predicted the roundabout is considered to operate over capacity.

The modelling results for the Craigforth Roundabout are summarised in **Table 7.3** and **Table 7.4.**

Approach Arm	2019 Base		2022 Base		2022 Base + Committed		2022 Base + Committed + Phase 1	
	RFC	MMQ	RFC	MMQ	RFC	MMQ	RFC	MMQ
A84(T) East	0.40	1	0.42	1	0.42	1	0.34	1
M9 Slip	0.95	14	0.99	23	1.02	37	0.82	5
Craigforth Access	0.13	0	0.14	0	0.14	0	0.10	0
A84(T) West	0.54	1	0.56	1	0.56	1	0.58	1

Table 7.3. Craigforth Roundabout AM

Approach Arm	2019 Base		2022 Base		2022 Base + Committed		2022 Base + Committed + Phase 1	
	RFC	MMQ	RFC	MMQ	RFC	MMQ	RFC	MMQ
A84(T) East	0.39	1	0.41	1	0.43	1	0.40	1
M9(T) slip	0.38	1	0.39	1	0.41	1	0.40	1
Craigforth Access	0.78	3	0.81	4	0.83	5	0.39	1
A84(T) West	0.83	5	0.88	6	0.90	7	0.72	3

Table 7.4. Craigforth Roundabout PM

Tables 7.3 and **7.4** indicated that as a result of the Phase 1 proposals, it is anticipated that the Craigforth Roundabout will have marginally improved operation compared to the existing scenario and the operation will not be impacted on by the predicted U-turn movements.

7.3 Full development

This section considers the impacts of the full development, (using the upper development quantum) on the road network in the immediate vicinity of the site.

A 2026 opening year has been considered for the purpose of this assessment and the relevant weekday morning and evening peak traffic flow diagrams are provided in **Appendix D**. This assumes a NRTF Central growth factor on background traffic flows and includes for traffic associated with the committed developments identified in section 7.2.3.

It should be noted that in the "Full Development" scenario, an allowance has been made for a proportion of evening peak Phase 1 traffic departing the development on the way home, going via Phase 2 where leisure and retail facilities will be available to employees. Whilst it is likely that in the region of 10% will potentially choose to do this (c. 30 vehicles), for robustness the assessment considers up to 100 vehicles travelling between Phases 1 and 2/3 via the Craigforth Roundabout in the evening peak. It is anticipated that demand between the Phases during the day and from Phases 2/3 to Phase 1 can be made actively, given the short distances involved.

The impacts of the full development have been considered on the following junctions:

- A84(T) / Chalmerston Road roundabout;
- A84(T) / Dobbies entrance priority junction;
- M9 Junction 10 (Craigforth Roundabout); and
- M9 Junction 10 (Kildean roundabout).

7.3.1 Threshold Analysis

A threshold analysis was undertaken on the above junctions, based on a 5% increase on any approach to a junction. **Table 7.5** provides the threshold analysis for the full development.

Junction	Morning Peak		Evening Peak		Detailed Capacity Analysis?
	Max Change on any approach %	Average Change %	Max Increase on any approach %	Average Increase %	
A84 / Chalmerston Road roundabout	4%	2%	3%	1%	No
A84 / Dobbies entrance priority junction	4%	2%	2%	1%	No
M9 Junction 10 Craigforth Roundabout	73%	14%	19%	6%	Yes
M9 Junction 10 Kildean Roundabout	14%	2%	4%	3%	Yes

Table 7.5. Full Development Threshold Analysis

It can be seen in **Table 7.5** that as a result of the introduction of the fill development (based on the upper development quantum), that the M9 Junction 10 roundabouts are anticipated to see an increase of more than 5% on any one approach, albeit the average increase only exceed 5% at one junction, with some approaches experiencing a reduction.

7.3.2 Modelling Assessment

The M9 Junction 10 Craigforth and Kildean Roundabouts have been taken forward for detailed analysis with summaries of the results presented in **Tables 7.6** to **7.9**.

Approach Arm	2019 Base		2022 Base		2022 Base + Committed		2022 Base + Committed + Phase 1		2026 Base + Committed + Full Development	
	RFC	MMQ	RFC	MMQ	RFC	MMQ	RFC	MMQ	RFC	MMQ
A84(T) East	0.40	1	0.42	1	0.42	1	0.34	1	0.41	1
M9 Slip	0.95	14	0.99	23	1.02	37	0.82	5	0.97	18
Craigforth Access	0.13	0	0.14	0	0.14	0	0.10	0	0.65	2
A84(T) West	0.54	1	0.56	1	0.58	1	0.58	1	0.64	2

Table 7.6. Craigforth Roundabout AM

Approach Arm	2019 Base		2022 Base		2022 Base + Committed		2022 Base + Committed + Phase 1		2026 Base + Committed + Full Development	
	RFC	MMQ	RFC	MMQ	RFC	MMQ	RFC	MMQ	RFC	MMQ
A84(T) East	0.39	1	0.41	1	0.43	1	0.40	1	0.52	1
M9 Slip	0.38	1	0.39	1	0.41	1	0.40	1	0.56	1
Craigforth Access	0.78	3	0.81	4	0.83	5	0.39	1	0.92	9
A84(T) West	0.83	5	0.88	6	0.90	7	0.72	3	0.98	15

Table 7.7. Craigforth Roundabout PM

It can be seen from **Tables 7.6** and **7.7** that with the introduction of full development, the Craigforth Roundabout is predicted to have improved operation in comparison to the existing situation (Pre-COVID19).

Approach Arm	2019 Base		2022 Base		2022 Base + Committed		2022 Base + Committed + Phase 1		2026 Base + Committed + Full Development	
	RFC	MMQ	RFC	MMQ	RFC	MMQ	RFC	MMQ	RFC	MMQ
Highland Gate	0.03	0	0.03	0	0.05	0	0.05	0	0.05	0
Drip Road	0.77	3	0.83	4	0.96	11	0.89	6	1.10	28
A84 (South)	0.64	2	0.67	2	0.72	3	0.62	2	0.72	3
M9 off-slip	0.63	2	0.65	2	0.69	2	0.65	2	0.7	3
A84 (T) North	0.82	4	0.86	6	0.93	11	0.90	8	1.14	106

Table 7.8. Kildean Roundabout AM

Approach Arm	2019 Base		2022 Base		2022 Base + Committed		2022 Base + Committed + Phase 1		2026 Base + Committed + full development	
	RFC	MMQ	RFC	MMQ	RFC	MMQ	RFC	MMQ	RFC	MMQ
Highland Gate	0.03	0	0.03	0	0.27	0	0.24	0	0.29	0
Drip Road	0.96	11	1.03	20	1.18	48	0.98	14	1.36	85
A84 (South)	0.95	13	0.99	20	1.01	28	0.44	1	1.14	92
M9 off-slip	0.24	0	0.25	0	0.26	0	0.26	0	0.28	0
A84 (T) North	0.89	7	0.92	10	0.94	13	0.80	4	1.01	33

Table 7.9. Kildean Roundabout PM

Traffic surveys undertaken in October 2019 indicated that queuing currently occurs at the Kildean roundabout during peak periods. This data was used to calibrate base models of the roundabout, which have then been used to test the operation of the junction, with the introduction of committed development traffic and Craigforth development traffic. The models indicate that queuing will increase as a result of both committed development and Craigforth development traffic, as shown in Tables 7.8 and 7.9. Note that the data used, and subsequent model results reflect pre-COVID19 traffic conditions.

Given that the programme for development of the Phases 2 and 3 has yet to confirmed, **section 7.4** sets out an approach to dealing with traffic impacts at the detailed application stage, as agreed with Transport Scotland.

Junction modelling files are provided in **Appendix E**.

7.4 Phases 2 and 3: Assessment Strategy

While the general development quantum for all phases has been identified at this stage, the programme for Phases 2 and 3 is yet to be established.

Whilst it is expected that Phases 2 and 3 will result in some additional traffic on the network, the programme is yet to be defined. Taking account of this and the current COVID19 situation potentially changing long term background traffic patterns, it is proposed to undertake a representative cumulative impact assessment on the junctions in the study network at the Phase 2 and 3 detailed application stage. This assessment will take account of traffic flows at that point and any committed developments to be accounted for.

It is therefore proposed that a planning condition should be applied, which requires new assessments to be undertaken as part of the Phase 2 and 3 detailed planning applications. These assessments will need to consider the cumulative impacts of all developments and a strategy identified for contributions of a level relative to the scale and kind of the impact, should mitigation be required.

7.5 Accident Analysis

A review was undertaken of accidents since 2014 on the road network surrounding the site. Specifically, the review focuses on the A84(T) between the A84(T)/Chalmerston Road roundabout and M9(T) Junction 10 Kildean Roundabout. Information was extracted from www.crashmap.co.uk, and is illustrated in **Figure 7.2** and summarised in **Table 7.10**.

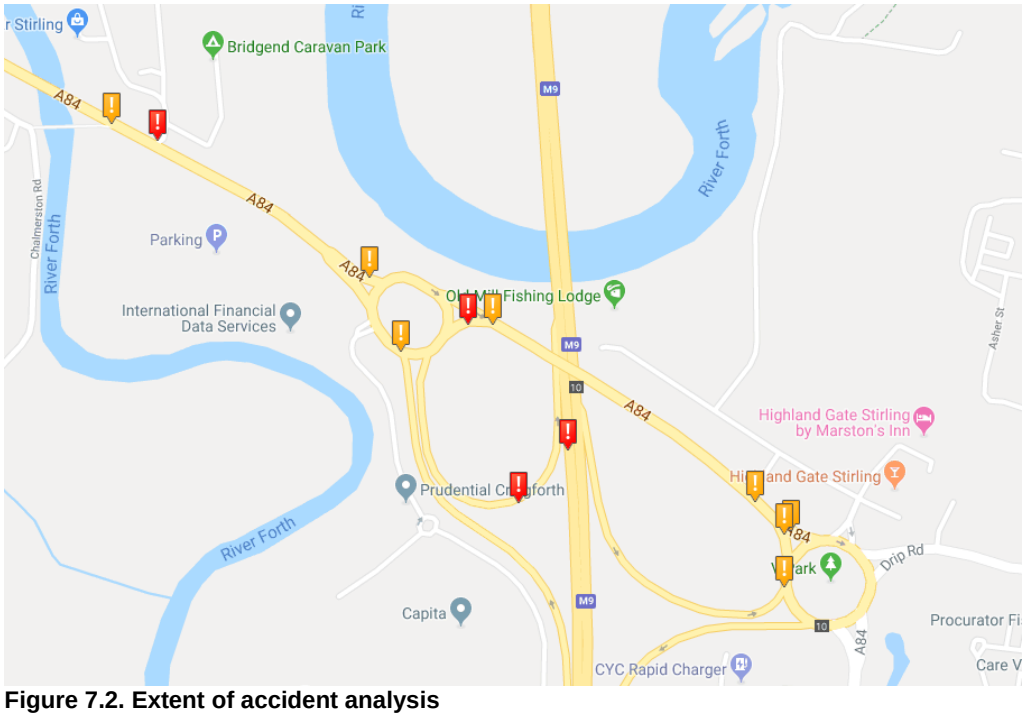


Figure 7.2. Extent of accident analysis

Year	A84(T) (between Chalmerston Road Roundabout and Kildean Roundabout)		
	S1 (Slight)	S1 (Serious)	F (Fatality)
2014	2	-	-
2015	2	-	-
2016	2	-	-
2017	1	-	-
2018	1	2	-
Note: S1-Slight, S2-Serious, F-Fatal			

Table 7.10. Accident Statistics

It can be seen from **Table 7.10** that most of the accidents occurring on the A84(T) are classified as 'slight' and there are no specific accident clusters at the location of the proposed accesses that would be exacerbated by the introduction of the new junction.

8 Summary and Conclusions

8.1 Summary

Sweco was commissioned by Ambassador LB holdings LLP to prepare a Transport Assessment (TA) in support of a planning application for a mixed-use development at Craigforth, Stirling.

This TA covers proposals for the whole site, with the proposed development in the north site (Phase 1) subject to a detailed planning application (PAN 2020-004) and the proposed development in the remaining central and south sites (Phases 2 and 3) subject to an application for planning permission in principle (PPP) (PAN 2020-003). The delivery strategy and programme for Phases 2 and 3 is yet to be confirmed.

As part of the Phase 1 proposals, existing office space at Craigforth (31,219m^2) will be reduced by c.15,000m^2 GFA. This will be achieved by demolishing most existing buildings, retaining the Lomond View building and constructing a new building. Phases 2 and 3 will see the introduction of new uses, including residential, retail and leisure land uses.

The scope of the TA was agreed with Stirling Council and Transport Scotland. Development proposals were reviewed in relation to national, regional and local transport planning policy.

An accessibility review was undertaken to assess access to the site by relevant modes of travel and review existing walking, cycling and public transport infrastructure and provision in the surrounding areas. This takes account of new infrastructure associated with the proposed development.

A Travel Plan has been provided for Phase 1 and a Travel Plan Framework for Phases 2 and 3, outlining measures to encourage staff and visitors to use sustainable modes of travel. This includes the commitment to continue the provision of onsite bus service provision and the introduction of a network of active travel routes throughout the site, connecting to the existing and planned external network.

People trip generation estimates were prepared, split by Phase to understand the net change in travel demands associated with the Craigforth Campus. Phase 1 proposals will result in a reduction in peak hour travel demands, with the full proposed development, as per current proposals, resulting in an increase in the peak hour travel demands.

Traffic impact analysis has been undertaken for Phase 1 and the full development, where appropriate supplemented by a position statement for Phases 2 and 3. This acknowledges the level of information available for each at the time of writing and supports the detailed and PPiP applications associated with each Phase.

8.2 Conclusions

The site complies with relevant transportation policies. It is accessible by bicycle, public transport and car. While pedestrian infrastructure is in place, there is currently very limited residential development within a reasonable walk. However, the full redevelopment of the Craigforth campus will provide the opportunity to live and work in

the same area, offering jobs, facilities and local amenities in close proximity to a new residential area. This will reduce the need to travel and will be underpinned by high quality active travel infrastructure throughout the site.

Proposals include for onsite bus service provision and improvements to the active travel network, offering connections towards Stirling and railway services.

Parking provision for Phase 1 will represent a reduction from what is currently provided on site for office use. This reflects the reduction in office floor space and when combined with active travel provision, public transport and effective travel planning, will encourage sustainable travel patterns.

Vehicle access to Phase 1 will be provided via a new slip road on the A84(T), which has been designed to comply with the relevant standards. Phases 2 and 3 will be accessed via the existing arm on the Craigforth Roundabout. The vehicular access strategy has been designed to reduce conflict at the access points, reducing the risk of any queuing back onto the trunk road network.

As a result of the Phase 1 proposals, it is anticipated that there will be a net decrease in traffic on all junctions. The access arrangements associated with Phase 1 have been modelled and it is predicted that they will operate sufficiently with the introduction of Phase 1 development. Phase 1 will be implemented with no impacts or mitigation needed on the road network.

Traffic impact associated with Phases 2 and 3 will be assessed at an appropriate time when the programme is known. These phases will be subject to future detailed applications which will include associated traffic impact assessments. Future assessments will need to consider the cumulative impacts of all relevant developments in the area and if appropriate, a strategy identified by Transport Scotland and Stirling Council to collect contributions towards coordinate mitigation. The level of contribution should be relative to the scale and kind of the traffic impact associated with each development, should mitigation be required.

Appendix A – Scoping Correspondence

Craigforth – Transport Input Scoping Note

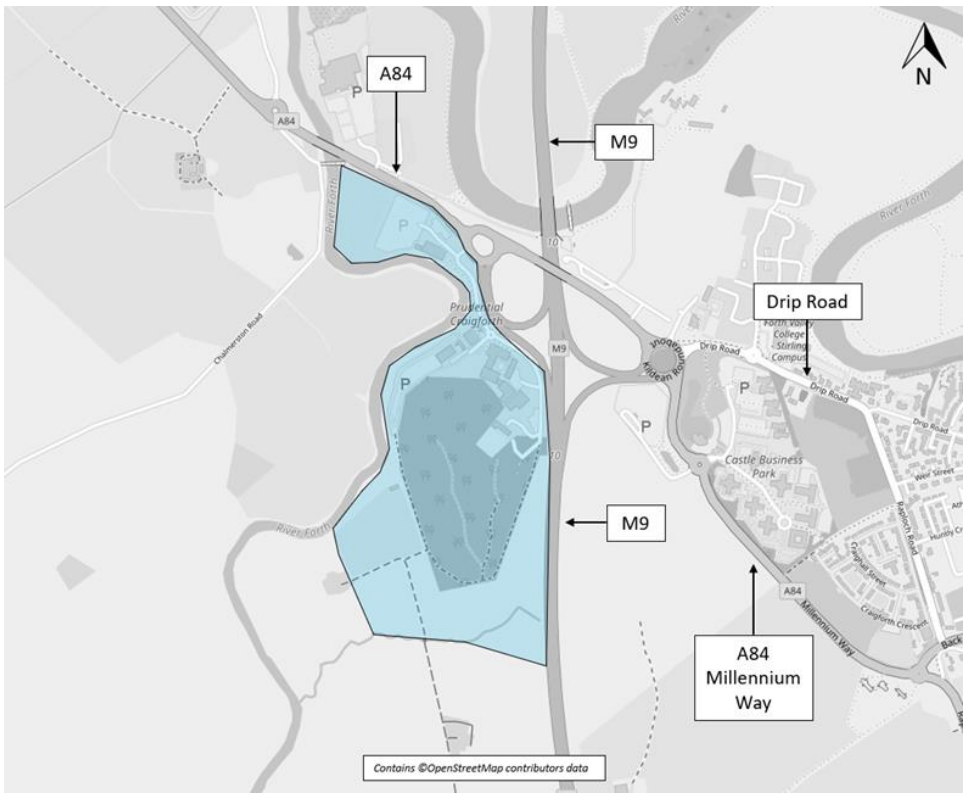
Date: 10/04/20
Document Reference: Craigforth Scoping Note Revision: 65201031/001

1 Context

Following our recent scoping discussions regarding the proposed mixed-use development at Craigforth, Stirling, please find below our proposed scope for the transport input to the planning application.

The site will be delivered in three phases, with the first subject to a detailed planning application and the remaining two phases under an application for planning in principle.

A site location plan is shown in **Figure 1**.



All three phases will be covered in a single Transport Assessment (TA), which will consider the following elements:

1. Existing Site;
2. Development Proposals;
3. Travel Demands Estimates:
    a. Phase One;
    b. Phase Two;
    c. Phase Three
4. Accessibility Assessment;
5. Travel Planning;
6. Traffic Impact Assessment:
    a. Extent of network
    b. Committed developments
    c. Assessment Scenarios;
    d. Traffic Impact Assessment Methodology;

Details of the relevant parameters which will be covered in the TA are set out below.

2 Existing Site Characteristics

The site is located in Craigforth, Stirling and is bound by the M9 to the east, the A84(T) to the north, the River Forth to the west and farmland to the south, as can be seen in **Figure 1**. It is currently occupied by 31,219m^2 of Prudential Offices and some ancillary uses. Currently there are 1,357 people based at Craigforth with 1,396 parking spaces available. Information recently provided by Prudential indicates that c.1,000 employees drive/lift share to work. They also confirmed that there are no formal offsite parking arrangements in place.

There are currently 20 shuttle bus services that offer connections between various local towns and the Craigforth site. These offer one morning service and one evening service and have a capacity of approximately 50 seats. An additional service offers a connection between the Craigforth site and Stirling Railway Station twice per hour throughout the day.

The nearest public bus stops to the development are located on the A84(T), west of Craigforth Roundabout. These stops are served by approximately two buses per hour during weekday, one bus per hour on Saturdays and one bus every two hours on Sunday. They provide connections from Stirling and other local towns.

2.1 2017 Prudential employee travel survey

An online employee travel survey was undertaken in 2017, which was completed by 18% of employees and covered mode share for the journey to work amongst other travel statistics. **Table 1** provides the travel to work mode share information from the survey.

Table 1: Existing Prudential staff mode share, based on 2017 travel survey data

Mode	Every Day	3-4 days a week	Once a week	Once a month	Once or twice a year	Never
Car (Driver)	50%	23%	9%	3%	2%	13%
Car (Passenger)	3%	6%	7%	5%	15%	64%
Taxi	0%	0%	0%	1%	12%	87%
Bus	9%	13%	6%	7%	17%	49%
Train	1%	1%	2%	3%	15%	79%
Cycle (private)	1%	1%	1%	4%	17%	76%
Cycle (rented)	0%	0%	0%	0%	11%	89%
Motorcycle / Moped	0%	0%	0%	0%	11%	88%
Walk	0%	0%	2%	0%	12%	86%
Run	0%	0%	0%	0%	12%	87%
Park & Ride	0%	1%	0%	0%	12%	87%

The results are based upon the existing walking, cycling, and public transport provision, including shuttle bus services, and parking provision which totals 1,396 spaces.

The travel survey results also provided details on employee home locations, which are presented in **Table 2**.

Table 2: Existing employee home locations

Origin	
Dundee	0.4%
Midlothian	0.4%
East Renfrewshire	1.3%
Fife	1.7%
East Dunbartonshire	2.6%
Perth & Kinross	2.6%
Glasgow	3.1%
West Lothian	3.5%
North Lanarkshire	4.4%
South Lanarkshire	4.8%
Edinburgh	5.2%
Clackmannanshire	9.6%
Falkirk	26.6%
Stirling	33.6%
Total	**100%**

Table 2 shows that the highest proportion of employees currently originate from the south and east of the site from Stirling and Falkirk.

2.2 2019 Traffic Count at site entrance

In addition, current vehicle peak hour demands where determined using data collected from a traffic count (undertaken in October 2019) at the main site entrance on the A84(T). The existing morning and evening peak hour vehicle demands are presented in **Table 3**.

Table 3: Existing vehicle trip generation

Morning Peak		Evening Peak	
Arrivals	Departures	Arrivals	Departures
703	92	92	660

Using the existing vehicle trip generation and office GFA, a vehicle trip rate has been calculated, as shown in **Table 4**.

Table 4: Existing vehicular trip rate

Land Use	Units	Morning Peak (08:00 to 09:00)		Evening Peak (16:30 to 17:30)	
		Arr	Dep	Arr	Dep
Office	Per 100m^2	2.252	0.295	0.295	2.114

The vehicle trip rate is based on current work patterns, parking provision and sustainable travel opportunities.

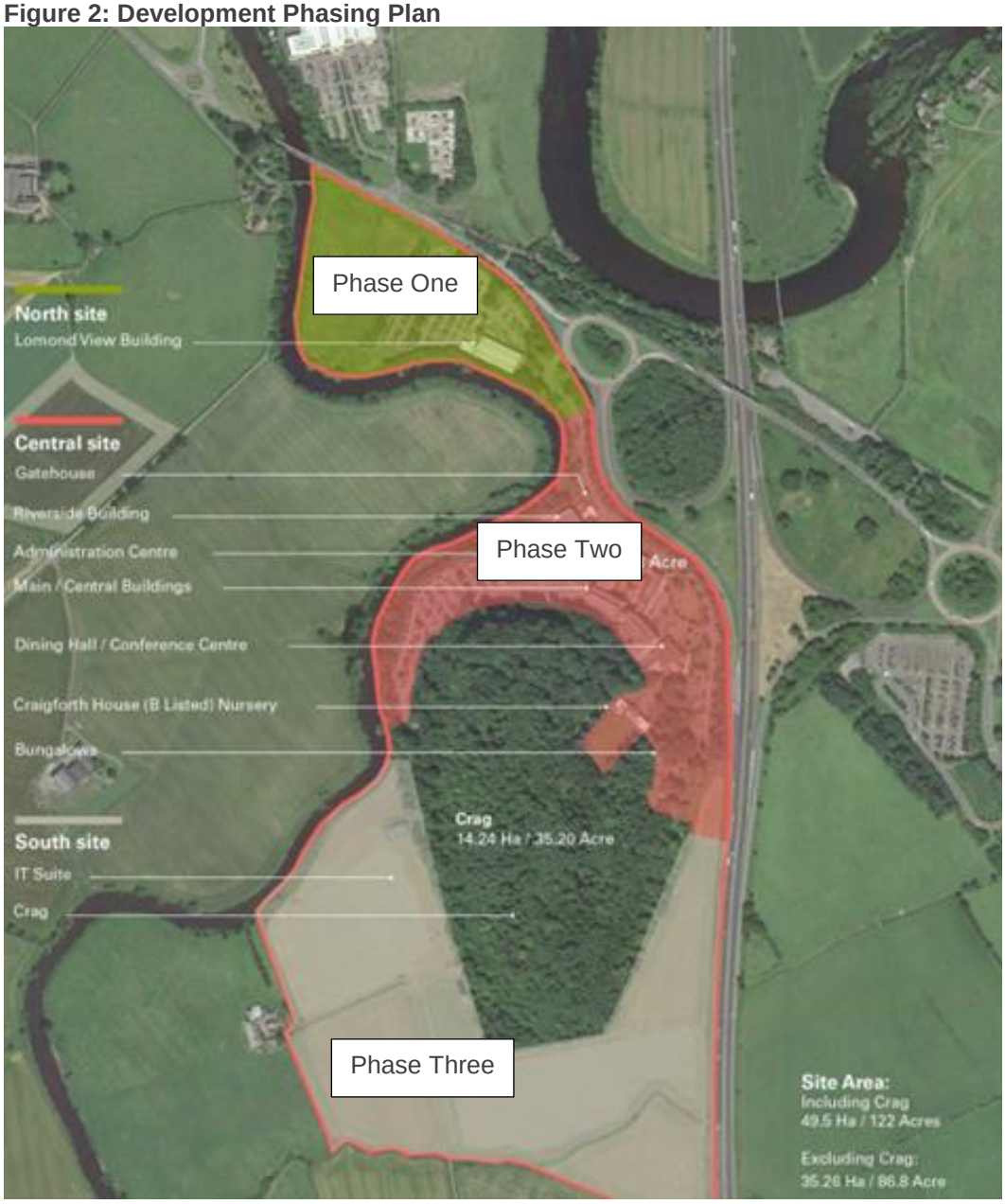
3 Development Proposals

It is proposed to deliver the development in three phases, with the relevant phases and associated uses presented in **Table 5** and illustrated in **Figure 2**. It should be noted that as part of the proposals, the current Prudential offices will be demolished and replaced with a new, smaller office, in Phase One of the development. A total of 979 employees are anticipated to be accommodated within the new Phase One office.

Table 5: Development Phases

Site	Land Use	GFA (m^2)
Phase One - North	Office	12,324
Phase Two - Central	Restaurant / Pub	1,480
	Retail	1,000
	Leisure / Gym	1,480
	Nursery	700
	Hotel	8,327
	Holiday Villas	825
	Cafe	740
	Residential	7,341
Phase Three - South	Residential	30,000
	Retail / Community / Pub	500

Figure 2: Development Phasing Plan



The planning strategy will see Phase One coming forward under a detailed planning application with Phases Two and Three under a planning application in principle. However, it is proposed that the TA will cover the cumulative impacts of both.

3.1 Parking and Access

3.1.1 Phase One

A total of 1,479 parking spaces will be provided across the development, with the breakdown as follows:

- Phase One – 538 spaces
- Phase Two – 491 spaces
- Phase Three – 455 spaces

The parking numbers are subject to change as the masterplan layout evolves, however the proposed parking provision will be tested against current Stirling Council standards. It is noted that Stirling Council refer to the SCOTS National Roads Development Guide in this respect.

The full development will see an increase of 83 spaces over what is currently provided. However, it can be seen above that this will be split over three phases, with Phase One showing a reduction in spaces from that currently associated with office uses.

3.1.2 Phase One Vehicle Access

Main vehicle access to Phase One is proposed via a new junction on the A84(T). It is anticipated that this will be facilitated via an upgrade to the A84(T) / Dobbies three arm priority junction. A four-arm roundabout offers the most appropriate solution at this location with the final form determined as a result of a capacity assessment, consideration of local constraints and suitability with respect to connections to the current and planned active travel routes in the area.

The current access from the Craigforth roundabout will offer service access and the layout of Phase One will afford the opportunity for bus services to route through this part of the development between the Phase One Access and the Craigforth roundabout. This will be detailed within the Masterplan layout submitted as part of the planning application.

3.1.3 Phase Two and Three vehicle access

Main vehicle access to Phases two and three will be via the current vehicle access on the Craigforth roundabout. There is potential for a further vehicle access to the south onto Dumbarton Road, however this does not form part of the proposals at this stage. Should this come forward, we would be grateful if you could confirm any objection in principle.

Opportunities for continued access to the development by public transport, walking and cycling will be investigated within the TA.

Travel Demand and trip distribution estimations for each Phase are dealt with in turn below.

4 Travel Demands

4.1 Phase One

Proposals are for an agile workforce of 979 employees that will have more flexible working hours than the current working practice. The client that the proportion of employees travelling during the traditional commuter peaks will reduce as a result of this work practice.

As the development progresses, there will be opportunities for employees to utilise the onsite amenities for food and leisure, reducing the need to travel offsite during the working day.

The proposals for Phase One will see the delivery of a 12,324sq.m office space with 538 vehicle parking spaces. This is a reduction from the current office operation of 5,288sq.m and a reduction in parking spaces of 841 from the 1,379 currently provided.

Using the existing site vehicle trip rates set out in **Table 3**, the Phase One peak weekday peak hour vehicle trip generation estimates are shown in **Table 6**.

Table 6: Proposed Phase One vehicular trip generation

Land Use	Units	Morning Peak		Evening Peak	
		Arr	Dep	Arr	Dep
Office	12,324m^2	278	36	36	261

If comparing Phase One to the current operation, the forecasted net change in vehicle demands is presented in **Table 7**.

Table 7: Comparison of projected Phase One vehicle demands to existing vehicle demands

Scenario	Morning Peak		Evening Peak	
	Arr (veh)	Dep (veh)	Arr (veh)	Dep (veh)
Existing	703	92	92	660
Phase One	278	36	36	261
Net Change	-425	-56	-56	-399

Table 7 shows an anticipated net reduction in vehicle demands in Phase One of the development.

On this basis, except for the proposed Phase One access junction, no junction modeling is proposed to support Phase One of the development. Please note, Phase One will only become operational when existing office uses cease operation.

However, further proposals will be provided with respect to active and sustainable travel opportunities, as detailed later within this scoping note.

4.2 Phase Two

Phase Two will see a mixture of land uses, as summarised previously in **Table 5**.

To establish the potential number of vehicle trips generated by Phase Two during the weekday morning and evening peak hours, reference was made to the TRICS database. Vehicular trip rates were extracted for the variety of uses included in the proposals.

A morning peak hour within 07:00 and 10:00 and an evening peak hour within 15:00 and 19:00 were determined separately for each element of the development to calculate an overall peak vehicle trip generation. Resulting vehicle trip rates and associated trip generations are shown in **Tables 8** and **9** below. If the same single peak hour was used for all landuses, the overall trip rates would only be marginally lower than that predicted within **Table 8**. Please find attached the TRICS output for your information.

Table 8: Phase Two proposed vehicle trip rates

Land Use	Rate	Morning Peak			Evening Peak		
		Hour	Arr (veh)	Dep (veh)	Hour	Arr (veh)	Dep (veh)
Restaurant	Per 100m^2	0900-10:00	0.571	0.571	18:00-19:00	3.282	2.300
Retail	Per 100m^2	08:00-09:00	8.266	8.203	18:00-19:00	10.937	11.552
Gym	Per 1 hectare	0900-10:00	42.713	25.108	18:00-19:00	54.978	52.525
Nursery	Per 100m^2	08:00-09:00	3.345	2.734	17:00-18:00	2.459	2.978
Hotel	Per 100m^2	08:00-09:00	0.288	0.330	18:00-19:00	0.284	0.237
Holiday Accommodation	Per 1 unit	0900-10:00	0.056	0.043	16:00-17:00	0.137	0.121
Private Flat	Per 1 unit	08:00-09:00	0.061	0.214	17:00-18:00	0.204	0.104

Table 9 Phase Two proposed vehicle trip generation

Land Use	Rate	Morning Peak		Evening Peak	
		Arr (veh)	Dep (veh)	Arr (veh)	Dep (veh)
Restaurant / Cafe	2,180m^2	12	12	73	50
Retail	1,000m^2	83	82	109	116
Leisure / Gym	0.148 hectares	6	4	8	8
Nursery	700m^2	23	19	17	21
Hotel	8,327m^2	24	27	24	20
Holiday Accommodation	11 units	1	0	2	1
Private Flats	81 units	5	17	17	8
Total		**155**	**163**	**249**	**223**

If comparing the cumulative Phase One and Phase Two vehicles demands to the current operation, the forecasted net change in vehicle demands is presented in **Table 10**.

Table 10: Phase One + Two Vehicle Demands vs Existing Vehicle Demands

Scenario	Morning Peak		Evening Peak	
	Arr (veh)	Dep (veh)	Arr (veh)	Dep (veh)
Existing	703	92	92	660
Phase One + Two	432	199	286	483
Net Change	-271	+107	+194	-177

Table 10 shows with the introduction of Phase Two that a net increase in traffic is anticipated on some movements and therefore it is proposed to take the cumulative impacts forward to be considered within the traffic impact assessment.

4.2.1 Phase One + Two trip distribution

4.2.1.1 Phase One vehicle trip distribution

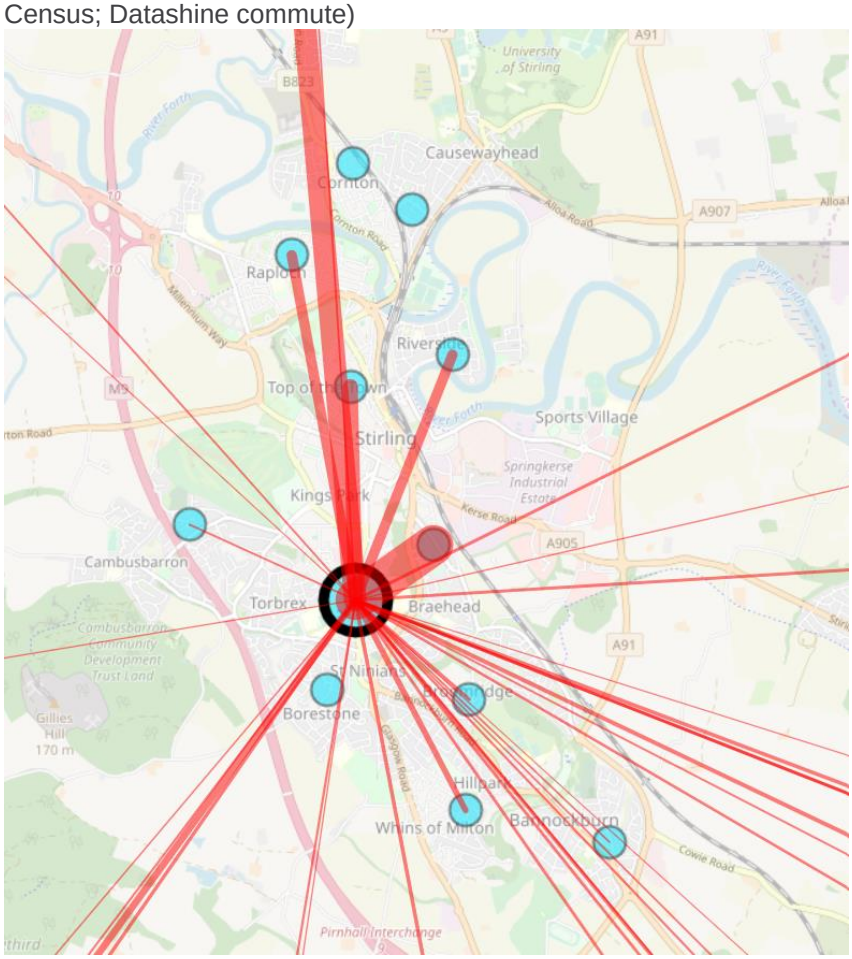
To calculate the trip distribution associated with office uses within Phase One, it is proposed to base this on the existing employee home locations, summarised in **Table 2**. This results in the majority of trip originating within the Stirling and Falkirk areas.

4.2.1.2 *Phase Two vehicle trip distribution*

To calculate the trip distribution associated with employment uses in Phase Two, the same distribution will be used as that within Phase One.

To calculate the trip distribution associated with residential uses to be provided in Phase Two, it is proposed to use information from the 2011 Scottish Census; Datashine Commute for the Raploch and Kings Park/Torbrex areas, an extract of the latter is shown in **Figure 2**. This suggests most trips associated with the residential development will be to destinations within the Stirling area. This may also include employment within the Craigforth site.

Figure 2: Proposed Phase Two residential distribution (extract from 2011 Scottish Census; Datashine commute)



4.3 Phase Three

Phase three of the development is largely residential with some associated retail, as per **Table 5**.

As with Phase Two, to establish the potential number of vehicle trips generated for Phase Three during the weekday morning and evening peak hours, reference was made to the TRICS database. A morning peak hour within 07:00 and 10:00 and an evening peak hour

within 15:00 and 19:00 were determined separately for each element of the development to calculate an overall peak vehicle trip generation. Resulting vehicle trip rates and associated trip generations are shown in **Tables 11** and **12** below. Please find attached the TRICS output for your information.

Table 11: Phase Three proposed vehicle trip rates

Land Use	Units	Morning Peak			Evening Peak		
		Hour	Arr (veh)	Dep (veh)	Hour	Arr (veh)	Dep (Veh)
Mixed Residential	Per 1 unit	08:00-09:00	0.112	0.337	17:00-18:00	0.315	0.163
Retail	Per 100m2	08:00-09:00	8.266	8.203	08:00-09:00	10.937	11.552

Table 12: Phase Three proposed vehicle trip generation

Land Use	Units	Morning Peak		Evening Peak	
		Arrivals	Departures	Arrivals	Departures
Mixed Residential	200 units	23	67	63	33
Retail	500m^2	41	41	55	58
Total		**64**	**108**	**118**	**90**

If comparing the cumulative impacts of the full development vehicles demands to the current operation, the forecasted net change in vehicle demands is presented in **Table 13**.

Table 13: Full Development Vehicle Demands vs Existing Vehicle Demands

Scenario	Morning Peak		Evening Peak	
	Arr (veh)	Dep (veh)	Arr (veh)	Dep (veh)
Existing	703	92	92	660
Full Development	496	308	403	574
Net Change	**-207**	**+216**	**+311**	**-86**

Table 13 shows with the introduction of Phase Three, completing the development, that a net increase in traffic is anticipated and therefore it is proposed to take the cumulative impacts forward to be considered within the traffic impact assessment.

4.3.1 Trip Distribution

It is proposed that the trip distribution associated with Phase Three will be the same as the Phase Two residential trip distribution, which will be determined using information from the 2011 Scottish Census; Datashine Commute for the Raploch, Kings Park and Torbrex area.

4.4 Sustainable travel

As per relevant guidance, the TA will identify person trips by mode of travel. It is proposed to use the mode share set out in **Table 1** of this note as the initial mode share for the employment uses. With respect to the residential development, it is anticipated that there will be proportion of residents living and working within the Craigforth site. The mode share for the 2011 Census: travel to work in the Kings Park & Torbrex area (FK8 2) has been used, as summarised in **Table 14**.

Table 14: Proposed mode share for residential development

Mode	%
Working from home	11%
Car Driver	53%
Car Passenger	3%
Walk	15%
Cycle	2%
Public Transport (Bus and Rail	14%
Taxi	0%
Other	2%
Total	**100%**

Given that a proportion of residents will likely live and work within the Craigforth site and there are very good opportunities for improved walking, cycling and public transport provision to the site, then it is considered that **Table 14** provides a representative mode share for journeys to work and study.

4.5 Travel Demands summary

Given that the site currently generates vehicle demand, it is proposed to test the net change in traffic following completion of Phases Two and Three within the Traffic Impact Assessment, the details of which are confirmed in **Table 15**.

Table 15: Net Change in Vehicle Demands to be taken forward within the TIA

Scenarios to be considered in TIA	Morning Peak		Evening Peak	
	Arr (veh)	Dep (veh)	Arr (veh)	Dep (veh)
Phases One + Two	-271	+107	+194	-175
Total Development	-207	+216	+311	-86

5 Accessibility Analysis

Opportunities for access to the development by public transport, walking and cycling will be investigated for each Phase within the Transport Assessment, following relevant standards in national policy documents such as Scottish Planning Policy, PAN75 and Transport Assessment Guidance.

6 Travel Plan Framework

A Travel Plan Framework for the development will be included within the Transport Assessment and will consider the phased approach to development.

It will consider current provision, including travel planning activity already undertaken by Prudential. It will also consider any planned improvements to support active and sustainable travel in the area. This will include improvements to the existing subsidised public transport provision serving the site, opportunities associated with the nearby Castleview Park & Ride and future aspirations for an active travel network along the A84(T) and the northern boundary of the site.

Mode share targets will be identified, showing potential reductions in vehicle mode share as the development progresses.

7 Traffic Impact Assessment

7.1 Extent of road network

As per recent correspondence and meetings, the following junctions will be considered within the Traffic Impact Assessment (location plan attached):

- A84(T) / Chalmerston Road;
- A84(T) / Dobbies entrance;
- M9(T) Junction 10 (west roundabout);
- M9(T) Junction 10 (east roundabout);
- Drip Road / Dougal Graham Road;
- Drip Road / Raploch Road;
- A84(T) / Castleveiw Park & Ride entrance;
- Drip Road / Back O'Hill Road;
- Customs Roundabout;
- Back O' Hill Road / Raploch Road;
- A84(T) / Raploch Road; and
- A811 / Raploch Road / Dumbarton Road.

Also considered will be the relevant on and off-slips at the M9 Junction 10.

Junction counts & queue surveys were undertaken by MHC on Tuesday 29th October 2019 between the hours of 06:00 and 10:00 and 15:00 and 19:00. The following network peak hours were identified:

- Morning Peak: 08:00 – 09:00; and
- Evening Peak: 16:30 – 17:30.

7.2 Committed developments

The following have been taken into consideration as Committed Developments in the TA:

- Orchard House: Planning Reference 17/00694/FUL – mixed retail and residential development;
- Raploch (various sites): Planning Reference 18/00127/MSC/16/00771/PPP – mixed residential development; and
- Kildean, Barratt: Planning Reference 16/00774/MSC.

It was discussed with Stirling Council that the closure of the level crossing over the B823 may have implications with respect to traffic, however this falls outside of the agreed study network and therefore is anticipated to have a minimal impact on the operation of the tested network.

7.3 Assessment Scenarios

The following scenarios will be developed for the traffic impact study:

- 2019 Base Traffic Flows;
- 2022 Base Traffic Flows;
- 2022 Base + Committed Development Traffic Flows;
- 2022 Base + Committed Development + Phase One Traffic Flows;
- 2024 Base + Committed Development + Phase One & Phase Two Traffic Flows; and
- 2026 Base + Committed Development + Total Development Traffic Flows.

We propose that NRTF Central growth will be applied to factor 2019 surveys to future base years. We would be grateful if you could confirm acceptance of this.

7.4 Threshold Analysis

We propose to undertake a threshold analysis on the relevant junctions, taking junctions with any link experiencing a 5% increase in traffic forward for detailed analysis. We will provide the outcomes of the threshold analysis prior to taking the relevant junctions forward for modelling.

7.5 Traffic Modelling

Following discussions with both roads' authorities, it was suggested that the Paramics model is relatively old and possibly not suitable for use. Therefore, it is proposed that the assessment of the impact of the development traffic flows will be undertaken using isolated junction modelling. The packages to be used will be the TRL software Junctions 9 for roundabouts and priority junctions and LinSig for signalised junctions.

7.6 Accident Analysis

A review of accidents since 2014 on the road network surrounding the site will be undertaken, with specific focus on the A84(T) between the A84(T)/Chalmerston Road roundabout and Kildean Roundabout.

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A84 – MIXED USE PRUDENTIAL, STIRLING
TRANSPORT ASSESSMENT SCOPING
TS REF: SW191367
LA REF: PREAPP

29th April 2020

Dear Sirs,

Further to your Craigforth – Transport Input Scope Note, I now include a response on behalf of Transport Scotland Development Management, as follows:

1. Context

It is noted that the site will be delivered in three phases, with the first subject to a detailed planning application and the remaining two phases under an application for planning in principle and that all three phases will be covered in a single Transport Assessment (TA). This is considered to be acceptable.

2. Existing Site Characteristics

It is noted that the site is located in Craigforth, Stirling and is bound by the M9 to the east, the A84(T) to the north, the River Forth to the west and farmland to the south and is currently occupied by 31,219m2 of Prudential Offices and some ancillary uses with 1,357 people based at Craigforth with 1,396 parking spaces available.

It is also noted that currently 20 shuttle bus services offer one morning and one evening service to the Craigforth site from various local towns, that a regular service links the Craigforth Site with Stirling railway station and that public bus stops are located on the A84(T).

2017 Prudential Employee Travel Survey

It is noted that an online employee travel survey undertaken in 2017 showed that the highest proportion of employees originated from the south and east of the site from Stirling and Falkirk.

2019 Traffic Count at Site Entrance

It is noted that existing AM and PM peak vehicle trip rates have been obtained using current vehicle peak hour demands using data collected from a traffic count at the main site entrance on the A84(T); undertaken in October 2019. This is considered to be acceptable, however, this highlights that the level of trips to the existing development site undertaken by vehicular transport are significantly higher than predicted using TRICS trip rates for employment sites.

3. Development Proposals

It is acknowledged that the proposals are to deliver the development in three phases, with the relevant phases and associated uses presented in Table 5 of the Scoping Note. It also acknowledged that as part of the proposals, the current Prudential offices will be demolished and replaced with a new, smaller office, in Phase One of the development with a total of 979 employees.

Table 5: Development Phases

Site	Land Use	GFA (m^2)
Phase One - North	Office	12,324
Phase Two - Central	Restaurant / Pub	1,480
	Retail	1,000
	Leisure / Gym	1,480
	Nursery	700
	Hotel	8,327
	Holiday Villas	825
	Cafe	740
	Residential	7,341
Phase Three - South	Residential	30,000
	Retail / Community / Pub	500

Parking and Access

It is noted that the proposed parking provision will be in line with Stirling Council standards and the SCOTS National Roads Development Guide and that the parking numbers could be subject to change as the masterplan layout evolves.

The Scoping Note identifies that a total of 1,479 parking spaces will be provided across the development, with Phase One – 538 spaces, Phase Two – 491 spaces and Phase Three – 455 spaces. This would suggest, however, a total of 1,484 parking spaces.

It is stated that the full development will see an increase of 83 spaces over what is currently provided. This is considered to be generally acceptable, however, the proposed parking should be tested against National Maximum Parking Standards for New Development contained within Scottish Planning Policy, where appropriate: ie. Business Use Class 4.

Phase One Vehicle Access

It is noted that the main vehicle access to Phase One is proposed via a new junction on the A84(T) and that this is an upgrade to the A84(T) / Dobbies three arm priority junction to a four-arm roundabout.

The primary purpose of the strategic transport network is to provide the safe and efficient movement of strategic long-distance traffic between major centres, although in rural areas it also performs important local functions. When carrying out any alterations or improvements to the trunk road, the changes must be designed and constructed to meet or surpass the trunk road design standards set out in the Design Manual for Roads and Bridges (DMRB) (http://www.standardsforhighways.co.uk/ha/standards/dmrb/index.htm) .

It is recommended that agreement in principle on the new junction on the A84(T) is agreed with Transport Scotland prior to reference within the Transport Assessment or the detailed planning application.

It is noted that the current access from the Craigforth roundabout will offer service access and that the layout of Phase One will afford the opportunity for bus services to route through this part of the development between the Phase One Access and the Craigforth roundabout.

Phase Two and Three Vehicle Access

It is noted that the main vehicle access to Phases two and three will be via the current vehicle access on the Craigforth roundabout and that there is potential for a further vehicle access to the south onto Dumbarton Road. This does not form part of the proposals at this stage and should this come forward, we would refer consultation on this matter to the Local Roads Authority.

4. Travel Demands

Phase One Trip Generation

It is noted that proposals are for an agile workforce of 979 employees, that will have flexible working hours and that the proportion of employees travelling during the traditional commuter peaks will reduce as a result of this work practice. The Scoping Note proposes that the change in operation will equate to a reduction in the AM and PM peak hour vehicle trips.

In reviewing the supporting information, it should be noted that consideration will be given to the land use and not just the occupier of the development. On this basis it is recommended that the operation of the four- arm roundabout includes a sensitivity assessment using the existing measured trip rates for the Office development.

Phase Two Trip Generation

It is noted that Phase Two will see a mix of land uses and that the predicted vehicular trip rates for the AM and PM peak hour have been extracted from TRICS.

LAND USE	RATE	MORNING PEAK			EVENING PEAK		
		Arr (veh)	Dep(veh)	Total(veh)	Arr (veh)	Dep(veh)	Total(veh)
Rest/Cafe	2,180m2	12	12	24	73	50	123
Retail	1,000m2	83	82	165	109	116	225
Gym	0.148H	6	4	10	8	8	16
Nursery	700m2	23	19	42	17	21	38
Hotel	8,327m2	24	27	51	24	20	44
Holiday Homes	11 units	1	0	1	2	1	3
Flats	81 units	5	17	22	17	8	25
Total		155	163	318	249	223	472

The predicted Vehicular Trip Rates are generally acceptable although it is observed that the number of sites available in TRICS for some of the proposed land uses is limited and that the Total Vehicular trip rate is subject to rounding.

Phase One and Two Trip Distribution
The proposal to base the proposed trip distribution for Phase One and Phase Two upon figures derived the existing employee home locations is considered to be acceptable.

Phase Three Trip Generation
It is noted that Phase Three is largely residential with some associated retail and that the potential number of vehicle trips has been extracted from the TRICS database.

LAND USE	MORNING PEAK			EVENING PEAK		
	Arr (veh)	Dep (veh)	Total(veh)	Arr (veh)	Dep (veh)	Total(veh)
Mixed Housing	**23**	**67**	**90**	**63**	**33**	**96**
Retail	**41**	**41**	**82**	**55**	**58**	**113**
Total	**64**	**108**	**172**	**118**	**90**	**208**

The Full Development Vehicle Demand is forecast to be:

SCENARIO	MORNING PEAK			EVENING PEAK		
	Arr (veh)	Dep (veh)	Total(veh)	Arr (veh)	Dep (veh)	Total(veh)
Phase 1	**278**	**36**	**314**	**36**	**261**	**297**
Phase 2	**155**	**163**	**318**	**249**	**223**	**472**
Phase 3	**64**	**108**	**172**	**118**	**90**	**208**
Phase 1+2+3	**497**	**307**	**804**	**403**	**574**	**977**

Phase Three Trip Distribution
The proposal to base the proposed residential trip distribution for Phase Three upon information extracted from the 2011 Scottish Census: Datashine Commute for the Raploch, Kings Park and Torbex area is considered to be acceptable.

Sustainable Travel

It is noted that the TA will initially identify person trips by mode of travel extracted from the existing Prudential Staff Mode Share based on 2017 travel survey data. The Phase Three residential mode share has been extracted from the 2011 Scottish Census: travel to work in the Kings Park and Torbex area. This is considered to be generally acceptable in this instance for the proposed level of residential development.

MODE	HOME WORKER	CAR DRIVER	CAR PASSENGER	WALK	CYCLE	PUBLIC TRANSPORT	OTHER	TOTAL
Percentage	11%	53%	3%	15%	2%	14%	2%	**100%**

Travel Demands Summary

It is noted that as the site currently generates vehicle demand that it is proposed to test the net change in traffic for Phase One and Phase Two within the Transport Assessment. Whilst this would seem to be appropriate under usual circumstances, I would highlight that in this instance the change in traffic demand needs to take cognisance of the change in the development access strategy, ie. the traffic assessment needs to identify both the potential reduction in traffic using the existing A84(T) access and the predicted new traffic using the new A84(T) access. It is unclear why a focus on net change in vehicle demand would be of benefit in this instance.

5. Accessibility Analysis

It is noted that opportunities for access to the development by public transport, walking and cycling will be investigated for each Phase within the Transport Assessment.

An integral part of this assessment will be the identification of the number of person trips for each of the proposed land uses for the development. This information should have been provided within the Scoping Note.

6. Travel Plan Framework

It is noted that a Travel Plan Framework for the development will be included within the Transport Assessment and will consider the phased approach to development and that this will consider current provision, including travel planning activity already undertaken by Prudential and it will consider any planned improvements to support active and sustainable travel in the area.

Mode share targets will be identified, showing potential reductions in vehicle mode share as the development progresses and will may include implications from improvements to the existing subsidised public transport provision serving the site, opportunities associated with the nearby Castleview Park & Ride and future aspirations for an active travel network along the A84(T) and the northern boundary of the site.

It should be noted that the identification of mode share targets related to the offset of trunk road infrastructure may be the subject of a planning condition.

7. Traffic Impact Assessment

Extent of Road Network

It is noted that a number of trunk road junctions will be considered within the Traffic Impact Assessment, including:

- A84(T) / Chalmerston Road;
- A84(T) / Dobbies entrance;
- M9(T) Junction 10 (west roundabout);
- M9(T) Junction 10 (east roundabout);

It is also noted that the on and off-slips at the M9 Junction 10 will also be considered.
This is considered to be acceptable.

Committed Developments

It is noted that the following will be been taken into consideration as Committed Developments in the TA:

- Orchard House: Planning Reference 17/00694/FUL – mixed retail and residential development;
- Raploch (various sites): Planning Reference 18/00127/MSC/16/00771/PPP – mixed residential development; and
- Kildean, Barratt: Planning Reference 16/00774/MSC.

On the basis that this information has been provided by Stirling Council, this is considered to be acceptable.

Assessment Scenarios

It is noted that the following scenarios will be developed for the traffic impact study:

- 2019 Base Traffic Flows;
- 2022 Base Traffic Flows;
- 2022 Base + Committed Development Traffic Flows;
- 2022 Base + Committed Development + Phase One Traffic Flows;
- 2024 Base + Committed Development + Phase One & Phase Two Traffic Flows; and
- 2026 Base + Committed Development + Total Development Traffic Flows.

It is also noted that NRTF Central growth will be applied to factor 2019 surveys to future base years.
The proposed assessment scenarios are considered to be acceptable, however, it would be usual practice to require the application of High Growth NRTF to through movements on the trunk road in the absence of supporting information.

Threshold Analysis

It is noted that you propose to undertake a threshold analysis on the relevant junctions, taking junctions with any link experiencing a 5% increase in traffic forward for detailed analysis and that the outcome of the threshold analysis will be provided prior to taking the relevant junctions forward for modelling.
This approach is considered to be acceptable.

Traffic Modelling

It is noted that the assessment of the impact of the development traffic flows will be undertaken using isolated junction modelling. The packages to be used will be the TRL software Junctions 9 for roundabouts and priority junctions and LinSig for signalised junctions.
This approach is considered to be acceptable.

Accident Analysis

It is noted that a review of accidents since 2014 on the road network surrounding the site will be undertaken, with specific focus on the A84(T) between the A84(T)/Chalmerston Road roundabout and Kildean Roundabout.

This approach is considered to be acceptable.

I trust that the above comments allow you to progress work on the Transport Assessment. Please do not hesitate to contact me at the SYSTRA Glasgow office to discuss, if necessary.

Yours faithfully

George Smith
Associate

Mustard, Ruth

From:	Neil Pirie
Sent:	30 April 2020 11:18
To:	Mustard, Ruth; SMITH George; 'Gerard McPhillips'; Kevin Argue
Cc:	Heggie, Neil
Subject:	RE: Craigforth - transport planning scope
Follow Up Flag:	Follow up
Flag Status:	Flagged

Hi Ruth,

Stirling Council have now concluded our review of the TA scoping note for the proposed development at Craigforth, Stirling, and I can offer the following comments:

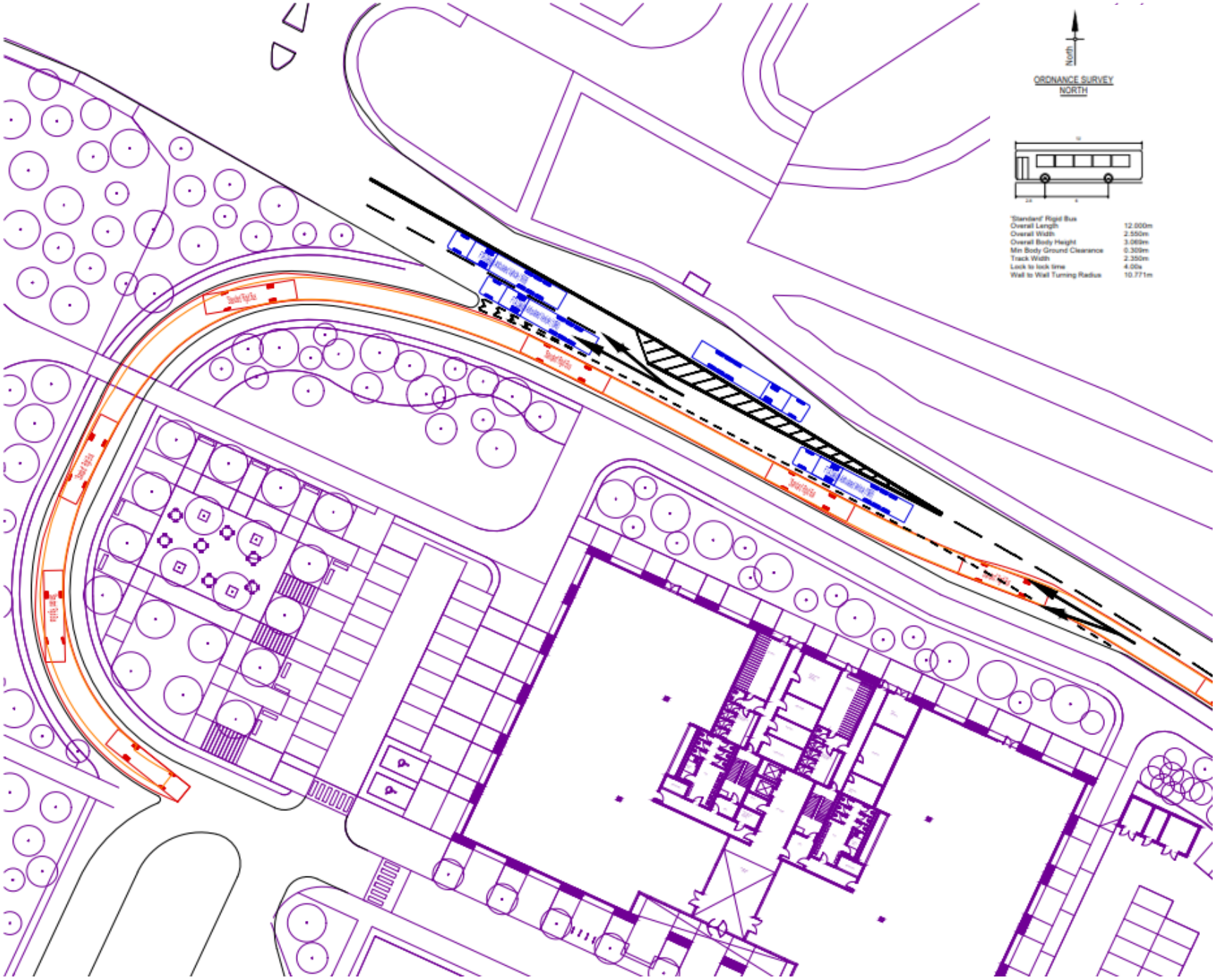
- 3.1.1 - It should be noted that Stirling Council have their own parking standards which should be referenced when calculating parking provision: https://www.stirling.gov.uk/media/8822/dsg-transport-and-access.pdf
- 3.1.3 – The general principle of further access to the site being taken via the A811 Dumbarton Road to the south is acceptable, subject to relevant design standards being met, and appropriate analysis being undertaken, as and when this aspect is brought forward.
- 4.4 Sustainable Travel, Table 14: Given the sites location, a walking share of 15% seems excessive, and I would suggest this figure be revised, unless evidence to validate this figure can be provided.
- 6.0 Travel Plan Framework: We would expect the Travel Plan Framework to include mode share targets and identify measures to be implemented, the system of management, enforcement, monitoring, review and funding arrangement to sustain commitments for the duration of the Plan.
- 7.2 Committed Developments: Suggest the following additional sites be included:
    - 19/00861/FUL (18/00745/FUL): Erection and operation of a leisure-led commercial development providing swim school facilities for babies and young children https://pabs.stirling.gov.uk/online-applications/applicationDetails.do?activeTab=documents&keyVal=Q0FS01PII0500
    - 18/00505/FUL: Provision of roadside services, including erection of a petrol filling station with retail kiosk, and coffee shop with drive through facility, with associated infrastructure, vehicle access, hardstanding and landscaping https://pabs.stirling.gov.uk/online-applications/applicationDetails.do?activeTab=documents&keyVal=PCDLOHPIHNX00

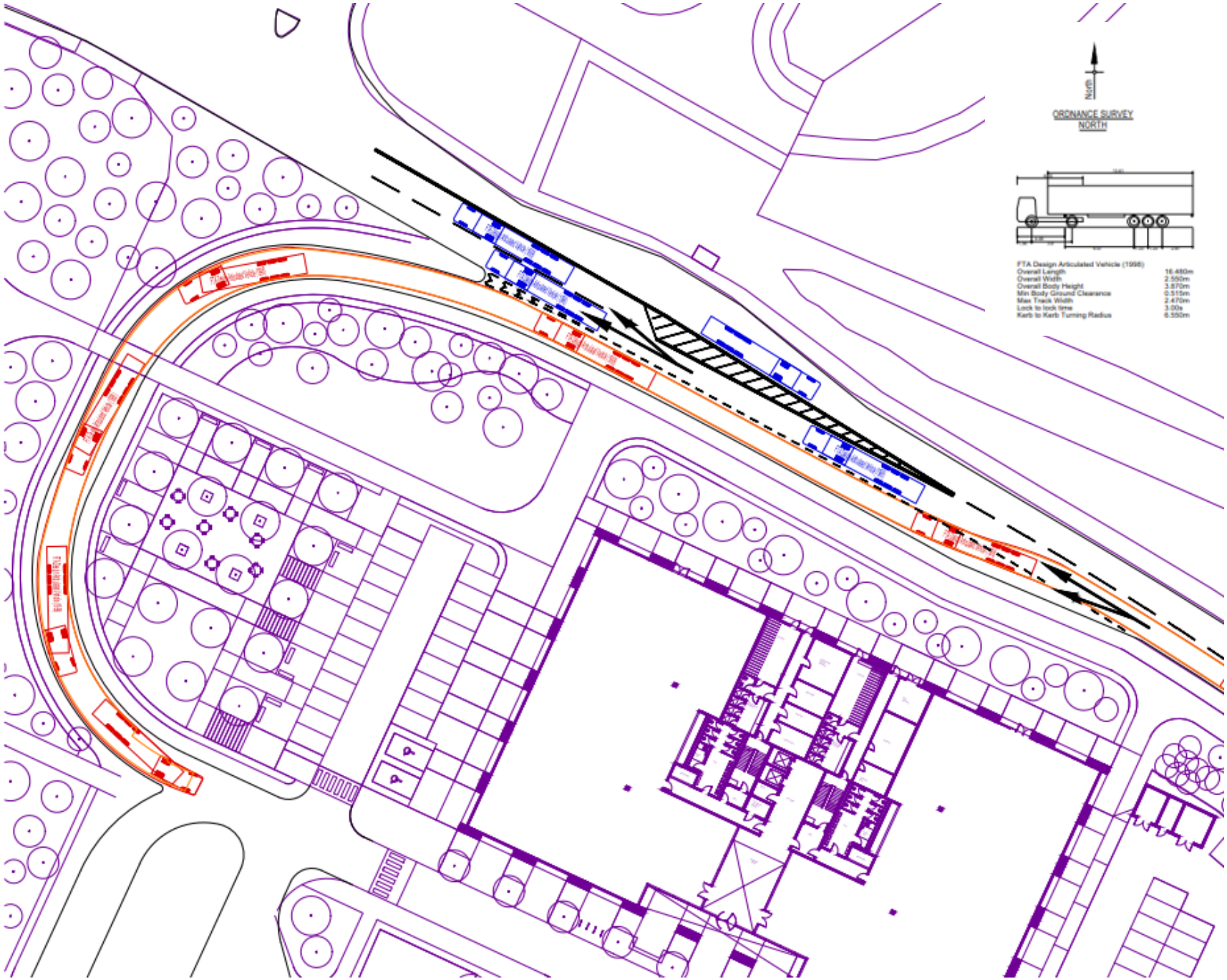
In addition to the above, a development of this scale and nature will be subject to a transport contribution, with our revised methodology set out in the following: https://www.stirling.gov.uk/media/5868/dsg-developer-contributions-18_02_2019-rfs.pdf (please note that the sector contribution rates are currently under review and may be subject to change).

Other than the above comments I can confirm that the contents of the scoping note are accepted.

Appendix B – Swept Path Analysis

Supplied by Fairhursts


North
ORDNANCE SURVEY
NORTH
'Standard' Rigid Bus
Overall Length 12.000m
Overall Width 2.550m
Overall Body Height 3.069m
Min Body Ground Clearance 0.309m
Track Width 2.350m
Lock to lock time 4.00s
Wall to Wall Turning Radius 10.771m


North
ORDNANCE SURVEY
NORTH
FTA Design Articulated Vehicle (1998)
Overall Length 16.480m
Overall Width 2.550m
Overall Body Height 3.870m
Min Body Ground Clearance 0.515m
Max Track Width 2.470m
Lock to lock time 3.00s
Kerb to Kerb Turning Radius 6.550m

Appendix C – TRICs outputs

TRIP RATE for Land Use 07 - LEISURE/K - FITNESS CLUB (PRIVATE)
VEHICLES
Calculation factor: 1 hect
BOLD print indicates peak (busiest) period

	ARRIVALS			DEPARTURES			TOTALS		
Time Range	No. Days	Ave. AREA	Trip Rate	No. Days	Ave. AREA	Trip Rate	No. Days	Ave. AREA	Trip Rate
00:00 - 01:00									
01:00 - 02:00									
02:00 - 03:00									
03:00 - 04:00									
04:00 - 05:00									
05:00 - 06:00									
06:00 - 07:00	10	0.69	30.447	10	0.69	2.309	10	0.69	32.756
07:00 - 08:00	10	0.69	23.810	10	0.69	23.088	10	0.69	46.898
08:00 - 09:00	10	0.69	31.746	10	0.69	24.387	10	0.69	56.133
09:00 - 10:00	10	0.69	42.713	10	0.69	25.108	10	0.69	67.821
10:00 - 11:00	10	0.69	32.035	10	0.69	28.139	10	0.69	60.174
11:00 - 12:00	10	0.69	19.769	10	0.69	30.592	10	0.69	50.361
12:00 - 13:00	10	0.69	19.481	10	0.69	27.994	10	0.69	47.475
13:00 - 14:00	10	0.69	21.789	10	0.69	26.118	10	0.69	47.907
14:00 - 15:00	10	0.69	24.387	10	0.69	18.903	10	0.69	43.290
15:00 - 16:00	10	0.69	31.169	10	0.69	26.118	10	0.69	57.287
16:00 - 17:00	10	0.69	40.404	10	0.69	35.065	10	0.69	75.469
17:00 - 18:00	10	0.69	58.442	10	0.69	35.642	10	0.69	94.084
18:00 - 19:00	10	0.69	54.978	10	0.69	52.525	10	0.69	107.503
19:00 - 20:00	10	0.69	32.323	10	0.69	55.844	10	0.69	88.167
20:00 - 21:00	10	0.69	16.883	10	0.69	36.508	10	0.69	53.391
21:00 - 22:00	10	0.69	3.608	10	0.69	27.273	10	0.69	30.881
22:00 - 23:00	1	0.13	0.000	1	0.13	0.000	1	0.13	0.000
23:00 - 24:00									
Total Rates:			483.984			475.613			959.597

This section displays the trip rate results based on the selected set of surveys and the selected count type (shown just above the table). It is split by three main columns, representing arrivals trips, departures trips, and total trips (arrivals plus departures). Within each of these main columns are three sub-columns. These display the number of survey days where count data is included (per time period), the average value of the selected trip rate calculation parameter (per time period), and the trip rate result (per time period). Total trip rates (the sum of the column) are also displayed at the foot of the table.

*To obtain a trip rate, the average (mean) trip rate parameter value (TRP) is first calculated for all selected survey days that have count data available for the stated time period. The average (mean) number of arrivals, departures or totals (whichever applies) is also calculated (COUNT) for all selected survey days that have count data available for the stated time period. Then, the average count is divided by the average trip rate parameter value, and multiplied by the stated calculation factor (shown just above the table and abbreviated here as FACT). So, the method is: COUNT/TRP*FACT. Trip rates are then rounded to 3 decimal places.*

TRIP RATE for Land Use 03 - RESIDENTIAL/J - HOLIDAY ACCOMMODATION
VEHICLES
Calculation factor: 1 UNITS
BOLD print indicates peak (busiest) period

	ARRIVALS			DEPARTURES			TOTALS		
Time Range	No. Days	Ave. UNITS	Trip Rate	No. Days	Ave. UNITS	Trip Rate	No. Days	Ave. UNITS	Trip Rate
00:00 - 01:00									
01:00 - 02:00									
02:00 - 03:00									
03:00 - 04:00									
04:00 - 05:00									
05:00 - 06:00									
06:00 - 07:00									
07:00 - 08:00	2	161	0.019	2	161	0.043	2	161	0.062
08:00 - 09:00	2	161	0.012	2	161	0.047	2	161	0.059
09:00 - 10:00	2	161	0.056	2	161	0.043	2	161	0.099
10:00 - 11:00	2	161	0.078	2	161	0.096	2	161	0.174
11:00 - 12:00	2	161	0.090	2	161	0.106	2	161	0.196
12:00 - 13:00	2	161	0.075	2	161	0.084	2	161	0.159
13:00 - 14:00	2	161	0.121	2	161	0.047	2	161	0.168
14:00 - 15:00	2	161	0.096	2	161	0.084	2	161	0.180
15:00 - 16:00	2	161	0.149	2	161	0.071	2	161	0.220
16:00 - 17:00	2	161	0.137	2	161	0.121	2	161	0.258
17:00 - 18:00	2	161	0.134	2	161	0.075	2	161	0.209
18:00 - 19:00	2	161	0.118	2	161	0.096	2	161	0.214
19:00 - 20:00	2	161	0.102	2	161	0.075	2	161	0.177
20:00 - 21:00	2	161	0.099	2	161	0.053	2	161	0.152
21:00 - 22:00	1	152	0.105	1	152	0.059	1	152	0.164
22:00 - 23:00									
23:00 - 24:00									
Total Rates:			1.391			1.100			2.491

This section displays the trip rate results based on the selected set of surveys and the selected count type (shown just above the table). It is split by three main columns, representing arrivals trips, departures trips, and total trips (arrivals plus departures). Within each of these main columns are three sub-columns. These display the number of survey days where count data is included (per time period), the average value of the selected trip rate calculation parameter (per time period), and the trip rate result (per time period). Total trip rates (the sum of the column) are also displayed at the foot of the table.

*To obtain a trip rate, the average (mean) trip rate parameter value (TRP) is first calculated for all selected survey days that have count data available for the stated time period. The average (mean) number of arrivals, departures or totals (whichever applies) is also calculated (COUNT) for all selected survey days that have count data available for the stated time period. Then, the average count is divided by the average trip rate parameter value, and multiplied by the stated calculation factor (shown just above the table and abbreviated here as FACT). So, the method is: COUNT/TRP*FACT. Trip rates are then rounded to 3 decimal places.*

TRIP RATE for Land Use 06 - HOTEL, FOOD & DRINK/A - HOTELS
VEHICLES
Calculation factor: 100 sqm
BOLD print indicates peak (busiest) period

	ARRIVALS			DEPARTURES			TOTALS		
Time Range	No. Days	Ave. GFA	Trip Rate	No. Days	Ave. GFA	Trip Rate	No. Days	Ave. GFA	Trip Rate
00:00 - 01:00									
01:00 - 02:00									
02:00 - 03:00									
03:00 - 04:00									
04:00 - 05:00									
05:00 - 06:00									
06:00 - 07:00									
07:00 - 08:00	13	4963	0.107	13	4963	0.226	13	4963	0.333
08:00 - 09:00	13	4963	0.288	13	4963	0.330	13	4963	0.618
09:00 - 10:00	13	4963	0.330	13	4963	0.271	13	4963	0.601
10:00 - 11:00	13	4963	0.209	13	4963	0.214	13	4963	0.423
11:00 - 12:00	13	4963	0.143	13	4963	0.186	13	4963	0.329
12:00 - 13:00	13	4963	0.271	13	4963	0.178	13	4963	0.449
13:00 - 14:00	13	4963	0.254	13	4963	0.251	13	4963	0.505
14:00 - 15:00	13	4963	0.206	13	4963	0.208	13	4963	0.414
15:00 - 16:00	13	4963	0.228	13	4963	0.246	13	4963	0.474
16:00 - 17:00	13	4963	0.217	13	4963	0.254	13	4963	0.471
17:00 - 18:00	13	4963	0.262	13	4963	0.251	13	4963	0.513
18:00 - 19:00	13	4963	0.284	13	4963	0.237	13	4963	0.521
19:00 - 20:00	13	4963	0.229	13	4963	0.186	13	4963	0.415
20:00 - 21:00	13	4963	0.157	13	4963	0.102	13	4963	0.259
21:00 - 22:00	13	4963	0.096	13	4963	0.073	13	4963	0.169
22:00 - 23:00									
23:00 - 24:00									
Total Rates:			3.281			3.213			6.494

This section displays the trip rate results based on the selected set of surveys and the selected count type (shown just above the table). It is split by three main columns, representing arrivals trips, departures trips, and total trips (arrivals plus departures). Within each of these main columns are three sub-columns. These display the number of survey days where count data is included (per time period), the average value of the selected trip rate calculation parameter (per time period), and the trip rate result (per time period). Total trip rates (the sum of the column) are also displayed at the foot of the table.

*To obtain a trip rate, the average (mean) trip rate parameter value (TRP) is first calculated for all selected survey days that have count data available for the stated time period. The average (mean) number of arrivals, departures or totals (whichever applies) is also calculated (COUNT) for all selected survey days that have count data available for the stated time period. Then, the average count is divided by the average trip rate parameter value, and multiplied by the stated calculation factor (shown just above the table and abbreviated here as FACT). So, the method is: COUNT/TRP*FACT. Trip rates are then rounded to 3 decimal places.*

TRIP RATE for Land Use 03 - RESIDENTIAL/C - FLATS PRIVATELY OWNED
VEHICLES
Calculation factor: 1 DWELLS
BOLD print indicates peak (busiest) period

	ARRIVALS			DEPARTURES			TOTALS		
Time Range	No. Days	Ave. DWELLS	Trip Rate	No. Days	Ave. DWELLS	Trip Rate	No. Days	Ave. DWELLS	Trip Rate
00:00 - 01:00									
01:00 - 02:00									
02:00 - 03:00									
03:00 - 04:00									
04:00 - 05:00									
05:00 - 06:00									
06:00 - 07:00									
07:00 - 08:00	20	51	0.055	20	51	0.134	20	51	0.189
08:00 - 09:00	20	51	0.061	20	51	0.214	20	51	0.275
09:00 - 10:00	20	51	0.087	20	51	0.115	20	51	0.202
10:00 - 11:00	20	51	0.078	20	51	0.087	20	51	0.165
11:00 - 12:00	20	51	0.087	20	51	0.094	20	51	0.181
12:00 - 13:00	20	51	0.102	20	51	0.072	20	51	0.174
13:00 - 14:00	20	51	0.071	20	51	0.103	20	51	0.174
14:00 - 15:00	20	51	0.098	20	51	0.111	20	51	0.209
15:00 - 16:00	20	51	0.115	20	51	0.077	20	51	0.192
16:00 - 17:00	20	51	0.123	20	51	0.090	20	51	0.213
17:00 - 18:00	20	51	0.204	20	51	0.104	20	51	0.308
18:00 - 19:00	20	51	0.147	20	51	0.100	20	51	0.247
19:00 - 20:00									
20:00 - 21:00									
21:00 - 22:00									
22:00 - 23:00									
23:00 - 24:00									
Total Rates:			1.228			1.301			2.529

This section displays the trip rate results based on the selected set of surveys and the selected count type (shown just above the table). It is split by three main columns, representing arrivals trips, departures trips, and total trips (arrivals plus departures). Within each of these main columns are three sub-columns. These display the number of survey days where count data is included (per time period), the average value of the selected trip rate calculation parameter (per time period), and the trip rate result (per time period). Total trip rates (the sum of the column) are also displayed at the foot of the table.

*To obtain a trip rate, the average (mean) trip rate parameter value (TRP) is first calculated for all selected survey days that have count data available for the stated time period. The average (mean) number of arrivals, departures or totals (whichever applies) is also calculated (COUNT) for all selected survey days that have count data available for the stated time period. Then, the average count is divided by the average trip rate parameter value, and multiplied by the stated calculation factor (shown just above the table and abbreviated here as FACT). So, the method is: COUNT/TRP*FACT. Trip rates are then rounded to 3 decimal places.*

TRIP RATE for Land Use 04 - EDUCATION/D - NURSERY
VEHICLES
Calculation factor: 100 sqm
BOLD print indicates peak (busiest) period

	ARRIVALS			DEPARTURES			TOTALS		
Time Range	No. Days	Ave. GFA	Trip Rate	No. Days	Ave. GFA	Trip Rate	No. Days	Ave. GFA	Trip Rate
00:00 - 01:00									
01:00 - 02:00									
02:00 - 03:00									
03:00 - 04:00									
04:00 - 05:00									
05:00 - 06:00									
06:00 - 07:00	1	400	0.000	1	400	0.000	1	400	0.000
07:00 - 08:00	16	409	1.894	16	409	0.962	16	409	2.856
08:00 - 09:00	16	409	3.345	16	409	2.734	16	409	6.079
09:00 - 10:00	16	409	1.329	16	409	1.145	16	409	2.474
10:00 - 11:00	16	409	0.550	16	409	0.351	16	409	0.901
11:00 - 12:00	16	409	0.657	16	409	0.580	16	409	1.237
12:00 - 13:00	16	409	1.008	16	409	1.206	16	409	2.214
13:00 - 14:00	16	409	0.718	16	409	1.069	16	409	1.787
14:00 - 15:00	16	409	0.550	16	409	0.626	16	409	1.176
15:00 - 16:00	16	409	0.962	16	409	1.054	16	409	2.016
16:00 - 17:00	16	409	1.542	16	409	1.695	16	409	3.237
17:00 - 18:00	16	409	2.459	16	409	2.978	16	409	5.437
18:00 - 19:00	15	427	0.188	15	427	0.688	15	427	0.876
19:00 - 20:00	1	400	0.000	1	400	0.000	1	400	0.000
20:00 - 21:00									
21:00 - 22:00									
22:00 - 23:00									
23:00 - 24:00									
Total Rates:			15.202			15.088			30.290

This section displays the trip rate results based on the selected set of surveys and the selected count type (shown just above the table). It is split by three main columns, representing arrivals trips, departures trips, and total trips (arrivals plus departures). Within each of these main columns are three sub-columns. These display the number of survey days where count data is included (per time period), the average value of the selected trip rate calculation parameter (per time period), and the trip rate result (per time period). Total trip rates (the sum of the column) are also displayed at the foot of the table.

*To obtain a trip rate, the average (mean) trip rate parameter value (TRP) is first calculated for all selected survey days that have count data available for the stated time period. The average (mean) number of arrivals, departures or totals (whichever applies) is also calculated (COUNT) for all selected survey days that have count data available for the stated time period. Then, the average count is divided by the average trip rate parameter value, and multiplied by the stated calculation factor (shown just above the table and abbreviated here as FACT). So, the method is: COUNT/TRP*FACT. Trip rates are then rounded to 3 decimal places.*

TRIP RATE for Land Use 06 - HOTEL, FOOD & DRINK/B - RESTAURANTS
VEHICLES
Calculation factor: 100 sqm
BOLD print indicates peak (busiest) period

	ARRIVALS			DEPARTURES			TOTALS		
Time Range	No. Days	Ave. GFA	Trip Rate	No. Days	Ave. GFA	Trip Rate	No. Days	Ave. GFA	Trip Rate
00:00 - 01:00									
01:00 - 02:00									
02:00 - 03:00									
03:00 - 04:00									
04:00 - 05:00									
05:00 - 06:00									
06:00 - 07:00									
07:00 - 08:00									
08:00 - 09:00									
09:00 - 10:00	1	175	0.571	1	175	0.571	1	175	1.142
10:00 - 11:00	5	292	2.125	5	292	1.097	5	292	3.222
11:00 - 12:00	6	433	1.734	6	433	1.002	6	433	2.736
12:00 - 13:00	6	433	3.584	6	433	1.272	6	433	4.856
13:00 - 14:00	6	433	3.661	6	433	3.160	6	433	6.821
14:00 - 15:00	6	433	1.850	6	433	3.314	6	433	5.164
15:00 - 16:00	7	424	0.742	7	424	1.450	7	424	2.192
16:00 - 17:00	8	446	0.813	8	446	0.673	8	446	1.486
17:00 - 18:00	8	446	2.132	8	446	0.757	8	446	2.889
18:00 - 19:00	8	446	3.282	8	446	2.300	8	446	5.582
19:00 - 20:00	8	446	3.282	8	446	3.058	8	446	6.340
20:00 - 21:00	8	446	1.992	8	446	3.226	8	446	5.218
21:00 - 22:00	8	446	1.290	8	446	1.992	8	446	3.282
22:00 - 23:00	8	446	0.673	8	446	1.711	8	446	2.384
23:00 - 24:00	8	446	0.168	8	446	1.431	8	446	1.599
Total Rates:			27.899			27.014			54.913

This section displays the trip rate results based on the selected set of surveys and the selected count type (shown just above the table). It is split by three main columns, representing arrivals trips, departures trips, and total trips (arrivals plus departures). Within each of these main columns are three sub-columns. These display the number of survey days where count data is included (per time period), the average value of the selected trip rate calculation parameter (per time period), and the trip rate result (per time period). Total trip rates (the sum of the column) are also displayed at the foot of the table.

*To obtain a trip rate, the average (mean) trip rate parameter value (TRP) is first calculated for all selected survey days that have count data available for the stated time period. The average (mean) number of arrivals, departures or totals (whichever applies) is also calculated (COUNT) for all selected survey days that have count data available for the stated time period. Then, the average count is divided by the average trip rate parameter value, and multiplied by the stated calculation factor (shown just above the table and abbreviated here as FACT). So, the method is: COUNT/TRP*FACT. Trip rates are then rounded to 3 decimal places.*

Parameter summary

Trip rate parameter range selected:	175 - 1136 (units: sqm)
Survey date date range:	01/01/11 - 12/07/18
Number of weekdays (Monday-Friday):	8
Number of Saturdays:	0
Number of Sundays:	0
Surveys automatically removed from selection:	0
Surveys manually removed from selection:	0

This section displays a quick summary of some of the data filtering selections made by the TRICS® user. The trip rate calculation parameter range of all selected surveys is displayed first, followed by the range of minimum and maximum survey dates selected by the user. Then, the total number of selected weekdays and weekend days in the selected set of surveys are show. Finally, the number of survey days that have been manually removed from the selected set outside of the standard filtering procedure are displayed.

TRIP RATE for Land Use 01 - RETAIL/O - CONVENIENCE STORE
VEHICLES
Calculation factor: 100 sqm
BOLD print indicates peak (busiest) period

	ARRIVALS			DEPARTURES			TOTALS		
Time Range	No. Days	Ave. GFA	Trip Rate	No. Days	Ave. GFA	Trip Rate	No. Days	Ave. GFA	Trip Rate
00:00 - 01:00									
01:00 - 02:00									
02:00 - 03:00									
03:00 - 04:00									
04:00 - 05:00									
05:00 - 06:00	1	400	0.500	1	400	0.000	1	400	0.500
06:00 - 07:00	7	334	4.022	7	334	3.209	7	334	7.231
07:00 - 08:00	14	337	7.482	14	337	6.825	14	337	14.307
08:00 - 09:00	14	337	8.266	14	337	8.203	14	337	16.469
09:00 - 10:00	14	337	7.291	14	337	7.079	14	337	14.370
10:00 - 11:00	14	337	6.571	14	337	6.465	14	337	13.036
11:00 - 12:00	14	337	7.312	14	337	7.270	14	337	14.582
12:00 - 13:00	14	337	9.602	14	337	9.178	14	337	18.780
13:00 - 14:00	14	337	7.270	14	337	7.206	14	337	14.476
14:00 - 15:00	14	337	8.287	14	337	8.012	14	337	16.299
15:00 - 16:00	14	337	8.796	14	337	8.860	14	337	17.656
16:00 - 17:00	14	337	9.199	14	337	8.627	14	337	17.826
17:00 - 18:00	14	337	10.513	14	337	10.153	14	337	20.666
18:00 - 19:00	14	337	10.937	14	337	11.552	14	337	22.489
19:00 - 20:00	14	337	7.927	14	337	8.754	14	337	16.681
20:00 - 21:00	12	363	3.466	12	363	4.362	12	363	7.828
21:00 - 22:00	11	376	2.490	11	376	2.926	11	376	5.416
22:00 - 23:00	3	415	0.965	3	415	1.608	3	415	2.573
23:00 - 24:00	1	400	0.000	1	400	0.250	1	400	0.250
Total Rates:			120.896			120.539			241.435

This section displays the trip rate results based on the selected set of surveys and the selected count type (shown just above the table). It is split by three main columns, representing arrivals trips, departures trips, and total trips (arrivals plus departures). Within each of these main columns are three sub-columns. These display the number of survey days where count data is included (per time period), the average value of the selected trip rate calculation parameter (per time period), and the trip rate result (per time period). Total trip rates (the sum of the column) are also displayed at the foot of the table.

*To obtain a trip rate, the average (mean) trip rate parameter value (TRP) is first calculated for all selected survey days that have count data available for the stated time period. The average (mean) number of arrivals, departures or totals (whichever applies) is also calculated (COUNT) for all selected survey days that have count data available for the stated time period. Then, the average count is divided by the average trip rate parameter value, and multiplied by the stated calculation factor (shown just above the table and abbreviated here as FACT). So, the method is: COUNT/TRP*FACT. Trip rates are then rounded to 3 decimal places.*

TRIP RATE for Land Use 02 - EMPLOYMENT/A - OFFICE
VEHICLES
Calculation factor: 100 sqm
BOLD print indicates peak (busiest) period

	ARRIVALS			DEPARTURES			TOTALS		
Time Range	No. Days	Ave. GFA	Trip Rate	No. Days	Ave. GFA	Trip Rate	No. Days	Ave. GFA	Trip Rate
00:00 - 01:00									
01:00 - 02:00									
02:00 - 03:00									
03:00 - 04:00									
04:00 - 05:00									
05:00 - 06:00									
06:00 - 07:00									
07:00 - 08:00	21	3962	0.865	21	3962	0.130	21	3962	0.995
08:00 - 09:00	22	3790	2.044	22	3790	0.290	22	3790	2.334
09:00 - 10:00	22	3790	1.297	22	3790	0.374	22	3790	1.671
10:00 - 11:00	22	3790	0.559	22	3790	0.332	22	3790	0.891
11:00 - 12:00	22	3790	0.433	22	3790	0.366	22	3790	0.799
12:00 - 13:00	22	3790	0.464	22	3790	0.534	22	3790	0.998
13:00 - 14:00	22	3790	0.530	22	3790	0.455	22	3790	0.985
14:00 - 15:00	22	3790	0.407	22	3790	0.417	22	3790	0.824
15:00 - 16:00	22	3790	0.276	22	3790	0.529	22	3790	0.805
16:00 - 17:00	22	3790	0.273	22	3790	1.180	22	3790	1.453
17:00 - 18:00	22	3790	0.214	22	3790	1.836	22	3790	2.050
18:00 - 19:00	20	4098	0.055	20	4098	0.733	20	4098	0.788
19:00 - 20:00									
20:00 - 21:00									
21:00 - 22:00									
22:00 - 23:00									
23:00 - 24:00									
Total Rates:			7.417			7.176			14.593

This section displays the trip rate results based on the selected set of surveys and the selected count type (shown just above the table). It is split by three main columns, representing arrivals trips, departures trips, and total trips (arrivals plus departures). Within each of these main columns are three sub-columns. These display the number of survey days where count data is included (per time period), the average value of the selected trip rate calculation parameter (per time period), and the trip rate result (per time period). Total trip rates (the sum of the column) are also displayed at the foot of the table.

*To obtain a trip rate, the average (mean) trip rate parameter value (TRP) is first calculated for all selected survey days that have count data available for the stated time period. The average (mean) number of arrivals, departures or totals (whichever applies) is also calculated (COUNT) for all selected survey days that have count data available for the stated time period. Then, the average count is divided by the average trip rate parameter value, and multiplied by the stated calculation factor (shown just above the table and abbreviated here as FACT). So, the method is: COUNT/TRP*FACT. Trip rates are then rounded to 3 decimal places.*

TRIP RATE for Land Use 05 - HEALTH/F - CARE HOME (ELDERLY RESIDENTIAL)
VEHICLES
Calculation factor: 1 RESIDE
BOLD print indicates peak (busiest) period

	ARRIVALS			DEPARTURES			TOTALS		
Time Range	No. Days	Ave. RESIDE	Trip Rate	No. Days	Ave. RESIDE	Trip Rate	No. Days	Ave. RESIDE	Trip Rate
00:00 - 01:00									
01:00 - 02:00									
02:00 - 03:00									
03:00 - 04:00									
04:00 - 05:00									
05:00 - 06:00									
06:00 - 07:00									
07:00 - 08:00	15	43	0.109	15	43	0.060	15	43	0.169
08:00 - 09:00	15	43	0.071	15	43	0.054	15	43	0.125
09:00 - 10:00	15	43	0.087	15	43	0.038	15	43	0.125
10:00 - 11:00	15	43	0.083	15	43	0.064	15	43	0.147
11:00 - 12:00	15	43	0.072	15	43	0.071	15	43	0.143
12:00 - 13:00	15	43	0.078	15	43	0.063	15	43	0.141
13:00 - 14:00	15	43	0.113	15	43	0.086	15	43	0.199
14:00 - 15:00	15	43	0.103	15	43	0.121	15	43	0.224
15:00 - 16:00	15	43	0.083	15	43	0.123	15	43	0.206
16:00 - 17:00	15	43	0.055	15	43	0.112	15	43	0.167
17:00 - 18:00	15	43	0.046	15	43	0.087	15	43	0.133
18:00 - 19:00	15	43	0.043	15	43	0.038	15	43	0.081
19:00 - 20:00	15	43	0.044	15	43	0.060	15	43	0.104
20:00 - 21:00	15	43	0.032	15	43	0.043	15	43	0.075
21:00 - 22:00									
22:00 - 23:00									
23:00 - 24:00									
Total Rates:			1.019			1.020			2.039

This section displays the trip rate results based on the selected set of surveys and the selected count type (shown just above the table). It is split by three main columns, representing arrivals trips, departures trips, and total trips (arrivals plus departures). Within each of these main columns are three sub-columns. These display the number of survey days where count data is included (per time period), the average value of the selected trip rate calculation parameter (per time period), and the trip rate result (per time period). Total trip rates (the sum of the column) are also displayed at the foot of the table.

*To obtain a trip rate, the average (mean) trip rate parameter value (TRP) is first calculated for all selected survey days that have count data available for the stated time period. The average (mean) number of arrivals, departures or totals (whichever applies) is also calculated (COUNT) for all selected survey days that have count data available for the stated time period. Then, the average count is divided by the average trip rate parameter value, and multiplied by the stated calculation factor (shown just above the table and abbreviated here as FACT). So, the method is: COUNT/TRP*FACT. Trip rates are then rounded to 3 decimal places.*

Parameter summary

Trip rate parameter range selected:	17 - 78 (units:)
Survey date date range:	01/01/12 - 02/05/19
Number of weekdays (Monday-Friday):	15
Number of Saturdays:	0
Number of Sundays:	0
Surveys automatically removed from selection:	0
Surveys manually removed from selection:	0

This section displays a quick summary of some of the data filtering selections made by the TRICS® user. The trip rate calculation parameter range of all selected surveys is displayed first, followed by the range of minimum and maximum survey dates selected by the user. Then, the total number of selected weekdays and weekend days in the selected set of surveys are show. Finally, the number of survey days that have been manually removed from the selected set outside of the standard filtering procedure are displayed.

TRIP RATE for Land Use 03 - RESIDENTIAL/M - MIXED PRIVATE/AFFORDABLE HOUSING
VEHICLES
Calculation factor: 1 DWELLS
BOLD print indicates peak (busiest) period

	ARRIVALS			DEPARTURES			TOTALS		
Time Range	No. Days	Ave. DWELLS	Trip Rate	No. Days	Ave. DWELLS	Trip Rate	No. Days	Ave. DWELLS	Trip Rate
00:00 - 01:00									
01:00 - 02:00									
02:00 - 03:00									
03:00 - 04:00									
04:00 - 05:00									
05:00 - 06:00									
06:00 - 07:00									
07:00 - 08:00	26	167	0.091	26	167	0.290	26	167	0.381
08:00 - 09:00	26	167	0.112	26	167	0.337	26	167	0.449
09:00 - 10:00	26	167	0.124	26	167	0.169	26	167	0.293
10:00 - 11:00	26	167	0.118	26	167	0.131	26	167	0.249
11:00 - 12:00	26	167	0.128	26	167	0.135	26	167	0.263
12:00 - 13:00	26	167	0.138	26	167	0.129	26	167	0.267
13:00 - 14:00	26	167	0.139	26	167	0.136	26	167	0.275
14:00 - 15:00	26	167	0.142	26	167	0.161	26	167	0.303
15:00 - 16:00	26	167	0.233	26	167	0.156	26	167	0.389
16:00 - 17:00	26	167	0.258	26	167	0.157	26	167	0.415
17:00 - 18:00	26	167	0.315	26	167	0.163	26	167	0.478
18:00 - 19:00	26	167	0.283	26	167	0.161	26	167	0.444
19:00 - 20:00									
20:00 - 21:00									
21:00 - 22:00									
22:00 - 23:00									
23:00 - 24:00									
Total Rates:			2.081			2.125			4.206

This section displays the trip rate results based on the selected set of surveys and the selected count type (shown just above the table). It is split by three main columns, representing arrivals trips, departures trips, and total trips (arrivals plus departures). Within each of these main columns are three sub-columns. These display the number of survey days where count data is included (per time period), the average value of the selected trip rate calculation parameter (per time period), and the trip rate result (per time period). Total trip rates (the sum of the column) are also displayed at the foot of the table.

*To obtain a trip rate, the average (mean) trip rate parameter value (TRP) is first calculated for all selected survey days that have count data available for the stated time period. The average (mean) number of arrivals, departures or totals (whichever applies) is also calculated (COUNT) for all selected survey days that have count data available for the stated time period. Then, the average count is divided by the average trip rate parameter value, and multiplied by the stated calculation factor (shown just above the table and abbreviated here as FACT). So, the method is: COUNT/TRP*FACT. Trip rates are then rounded to 3 decimal places.*

Parameter summary

Trip rate parameter range selected:	16 - 762 (units:)
Survey date date range:	01/01/12 - 29/09/19
Number of weekdays (Monday-Friday):	58
Number of Saturdays:	0
Number of Sundays:	0
Surveys automatically removed from selection:	0
Surveys manually removed from selection:	0

This section displays a quick summary of some of the data filtering selections made by the TRICS® user. The trip rate calculation parameter range of all selected surveys is displayed first, followed by the range of minimum and maximum survey dates selected by the user. Then, the total number of selected weekdays and weekend days in the selected set of surveys are show. Finally, the number of survey days that have been manually removed from the selected set outside of the standard filtering procedure are displayed.

TRIP RATE for Land Use 01 - RETAIL/O - CONVENIENCE STORE
VEHICLES
Calculation factor: 100 sqm
BOLD print indicates peak (busiest) period

	ARRIVALS			DEPARTURES			TOTALS		
Time Range	No. Days	Ave. GFA	Trip Rate	No. Days	Ave. GFA	Trip Rate	No. Days	Ave. GFA	Trip Rate
00:00 - 01:00									
01:00 - 02:00									
02:00 - 03:00									
03:00 - 04:00									
04:00 - 05:00									
05:00 - 06:00	1	400	0.500	1	400	0.000	1	400	0.500
06:00 - 07:00	7	334	4.022	7	334	3.209	7	334	7.231
07:00 - 08:00	14	337	7.482	14	337	6.825	14	337	14.307
08:00 - 09:00	14	337	8.266	14	337	8.203	14	337	16.469
09:00 - 10:00	14	337	7.291	14	337	7.079	14	337	14.370
10:00 - 11:00	14	337	6.571	14	337	6.465	14	337	13.036
11:00 - 12:00	14	337	7.312	14	337	7.270	14	337	14.582
12:00 - 13:00	14	337	9.602	14	337	9.178	14	337	18.780
13:00 - 14:00	14	337	7.270	14	337	7.206	14	337	14.476
14:00 - 15:00	14	337	8.287	14	337	8.012	14	337	16.299
15:00 - 16:00	14	337	8.796	14	337	8.860	14	337	17.656
16:00 - 17:00	14	337	9.199	14	337	8.627	14	337	17.826
17:00 - 18:00	14	337	10.513	14	337	10.153	14	337	20.666
18:00 - 19:00	14	337	10.937	14	337	11.552	14	337	22.489
19:00 - 20:00	14	337	7.927	14	337	8.754	14	337	16.681
20:00 - 21:00	12	363	3.466	12	363	4.362	12	363	7.828
21:00 - 22:00	11	376	2.490	11	376	2.926	11	376	5.416
22:00 - 23:00	3	415	0.965	3	415	1.608	3	415	2.573
23:00 - 24:00	1	400	0.000	1	400	0.250	1	400	0.250
Total Rates:			120.896			120.539			241.435

This section displays the trip rate results based on the selected set of surveys and the selected count type (shown just above the table). It is split by three main columns, representing arrivals trips, departures trips, and total trips (arrivals plus departures). Within each of these main columns are three sub-columns. These display the number of survey days where count data is included (per time period), the average value of the selected trip rate calculation parameter (per time period), and the trip rate result (per time period). Total trip rates (the sum of the column) are also displayed at the foot of the table.

*To obtain a trip rate, the average (mean) trip rate parameter value (TRP) is first calculated for all selected survey days that have count data available for the stated time period. The average (mean) number of arrivals, departures or totals (whichever applies) is also calculated (COUNT) for all selected survey days that have count data available for the stated time period. Then, the average count is divided by the average trip rate parameter value, and multiplied by the stated calculation factor (shown just above the table and abbreviated here as FACT). So, the method is: COUNT/TRP*FACT. Trip rates are then rounded to 3 decimal places.*

TRIP RATE for Land Use 03 - RESIDENTIAL/F - SHELTERED ACCOMMODATION
VEHICLES
Calculation factor: 1 DWELLS
BOLD print indicates peak (busiest) period

	ARRIVALS			DEPARTURES			TOTALS		
Time Range	No. Days	Ave. DWELLS	Trip Rate	No. Days	Ave. DWELLS	Trip Rate	No. Days	Ave. DWELLS	Trip Rate
00:00 - 01:00									
01:00 - 02:00									
02:00 - 03:00									
03:00 - 04:00									
04:00 - 05:00									
05:00 - 06:00									
06:00 - 07:00									
07:00 - 08:00	12	45	0.046	12	45	0.048	12	45	0.094
08:00 - 09:00	12	45	0.072	12	45	0.072	12	45	0.144
09:00 - 10:00	12	45	0.111	12	45	0.124	12	45	0.235
10:00 - 11:00	12	45	0.142	12	45	0.135	12	45	0.277
11:00 - 12:00	12	45	0.149	12	45	0.146	12	45	0.295
12:00 - 13:00	12	45	0.127	12	45	0.122	12	45	0.249
13:00 - 14:00	12	45	0.116	12	45	0.148	12	45	0.264
14:00 - 15:00	12	45	0.116	12	45	0.111	12	45	0.227
15:00 - 16:00	12	45	0.103	12	45	0.096	12	45	0.199
16:00 - 17:00	12	45	0.135	12	45	0.098	12	45	0.233
17:00 - 18:00	12	45	0.077	12	45	0.096	12	45	0.173
18:00 - 19:00	12	45	0.074	12	45	0.068	12	45	0.142
19:00 - 20:00									
20:00 - 21:00									
21:00 - 22:00									
22:00 - 23:00									
23:00 - 24:00									
Total Rates:			1.268			1.264			2.532

This section displays the trip rate results based on the selected set of surveys and the selected count type (shown just above the table). It is split by three main columns, representing arrivals trips, departures trips, and total trips (arrivals plus departures). Within each of these main columns are three sub-columns. These display the number of survey days where count data is included (per time period), the average value of the selected trip rate calculation parameter (per time period), and the trip rate result (per time period). Total trip rates (the sum of the column) are also displayed at the foot of the table.

*To obtain a trip rate, the average (mean) trip rate parameter value (TRP) is first calculated for all selected survey days that have count data available for the stated time period. The average (mean) number of arrivals, departures or totals (whichever applies) is also calculated (COUNT) for all selected survey days that have count data available for the stated time period. Then, the average count is divided by the average trip rate parameter value, and multiplied by the stated calculation factor (shown just above the table and abbreviated here as FACT). So, the method is: COUNT/TRP*FACT. Trip rates are then rounded to 3 decimal places.*

Parameter summary

Trip rate parameter range selected:	14 - 87 (units:)
Survey date date range:	01/01/12 - 25/09/19
Number of weekdays (Monday-Friday):	12
Number of Saturdays:	0
Number of Sundays:	0
Surveys automatically removed from selection:	0
Surveys manually removed from selection:	0

This section displays a quick summary of some of the data filtering selections made by the TRICS® user. The trip rate calculation parameter range of all selected surveys is displayed first, followed by the range of minimum and maximum survey dates selected by the user. Then, the total number of selected weekdays and weekend days in the selected set of surveys are show. Finally, the number of survey days that have been manually removed from the selected set outside of the standard filtering procedure are displayed.

TRIP RATE for Land Use 03 - RESIDENTIAL/N - RETIREMENT FLATS
VEHICLES
Calculation factor: 1 DWELLS
BOLD print indicates peak (busiest) period

	ARRIVALS			DEPARTURES			TOTALS		
Time Range	No. Days	Ave. DWELLS	Trip Rate	No. Days	Ave. DWELLS	Trip Rate	No. Days	Ave. DWELLS	Trip Rate
00:00 - 01:00									
01:00 - 02:00									
02:00 - 03:00									
03:00 - 04:00									
04:00 - 05:00									
05:00 - 06:00									
06:00 - 07:00									
07:00 - 08:00	17	41	0.012	17	41	0.019	17	41	0.031
08:00 - 09:00	17	41	0.055	17	41	0.062	17	41	0.117
09:00 - 10:00	17	41	0.081	17	41	0.091	17	41	0.172
10:00 - 11:00	17	41	0.096	17	41	0.113	17	41	0.209
11:00 - 12:00	17	41	0.098	17	41	0.085	17	41	0.183
12:00 - 13:00	17	41	0.090	17	41	0.084	17	41	0.174
13:00 - 14:00	17	41	0.085	17	41	0.084	17	41	0.169
14:00 - 15:00	17	41	0.100	17	41	0.107	17	41	0.207
15:00 - 16:00	17	41	0.067	17	41	0.059	17	41	0.126
16:00 - 17:00	17	41	0.075	17	41	0.051	17	41	0.126
17:00 - 18:00	17	41	0.058	17	41	0.056	17	41	0.114
18:00 - 19:00	17	41	0.052	17	41	0.049	17	41	0.101
19:00 - 20:00									
20:00 - 21:00									
21:00 - 22:00									
22:00 - 23:00									
23:00 - 24:00									
Total Rates:			0.869			0.860			1.729

This section displays the trip rate results based on the selected set of surveys and the selected count type (shown just above the table). It is split by three main columns, representing arrivals trips, departures trips, and total trips (arrivals plus departures). Within each of these main columns are three sub-columns. These display the number of survey days where count data is included (per time period), the average value of the selected trip rate calculation parameter (per time period), and the trip rate result (per time period). Total trip rates (the sum of the column) are also displayed at the foot of the table.

*To obtain a trip rate, the average (mean) trip rate parameter value (TRP) is first calculated for all selected survey days that have count data available for the stated time period. The average (mean) number of arrivals, departures or totals (whichever applies) is also calculated (COUNT) for all selected survey days that have count data available for the stated time period. Then, the average count is divided by the average trip rate parameter value, and multiplied by the stated calculation factor (shown just above the table and abbreviated here as FACT). So, the method is: COUNT/TRP*FACT. Trip rates are then rounded to 3 decimal places.*

Parameter summary

Trip rate parameter range selected:	17 - 88 (units:)
Survey date date range:	01/01/12 - 27/09/19
Number of weekdays (Monday-Friday):	17
Number of Saturdays:	0
Number of Sundays:	0
Surveys automatically removed from selection:	0
Surveys manually removed from selection:	0

This section displays a quick summary of some of the data filtering selections made by the TRICS® user. The trip rate calculation parameter range of all selected surveys is displayed first, followed by the range of minimum and maximum survey dates selected by the user. Then, the total number of selected weekdays and weekend days in the selected set of surveys are show. Finally, the number of survey days that have been manually removed from the selected set outside of the standard filtering procedure are displayed.

Appendix D – Traffic Flow Diagrams

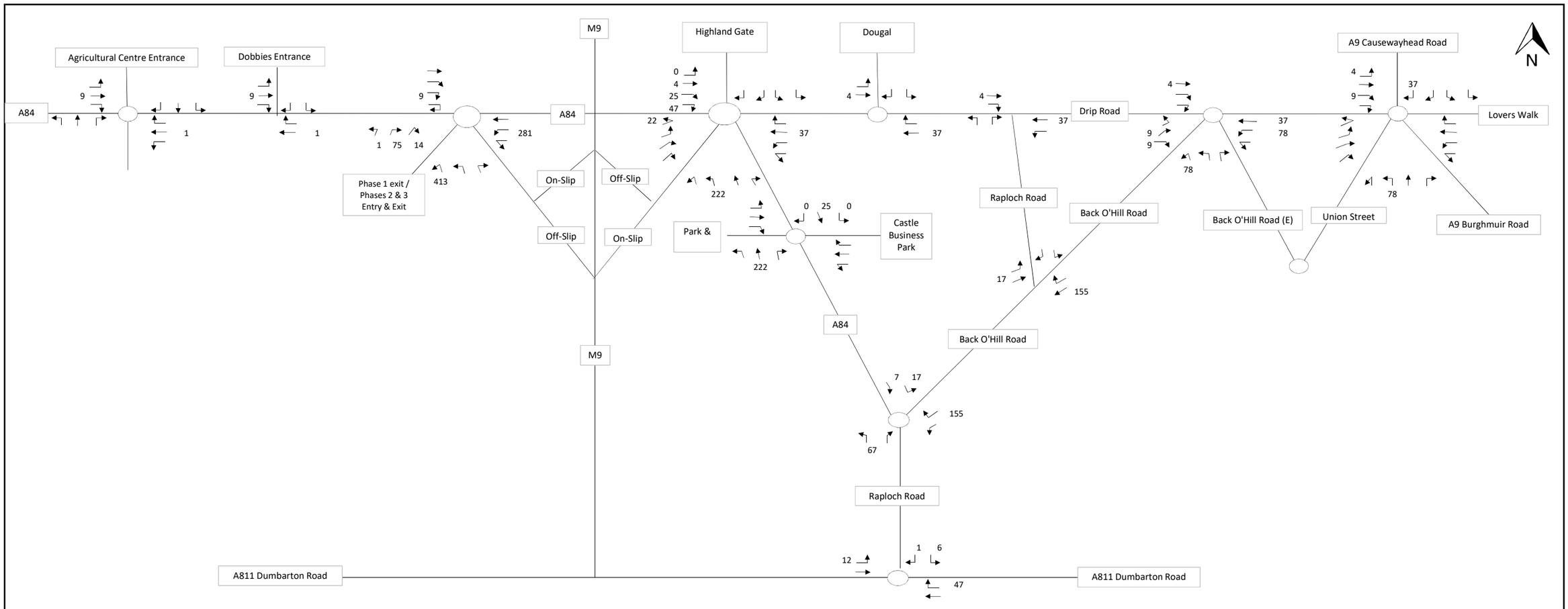


Figure D.1 - Existing Site 2019 AM Traffic	Project:	Craigforth		SWECO
	Client:	Ambassador LB holdings LLP	Date:	03.07.2020

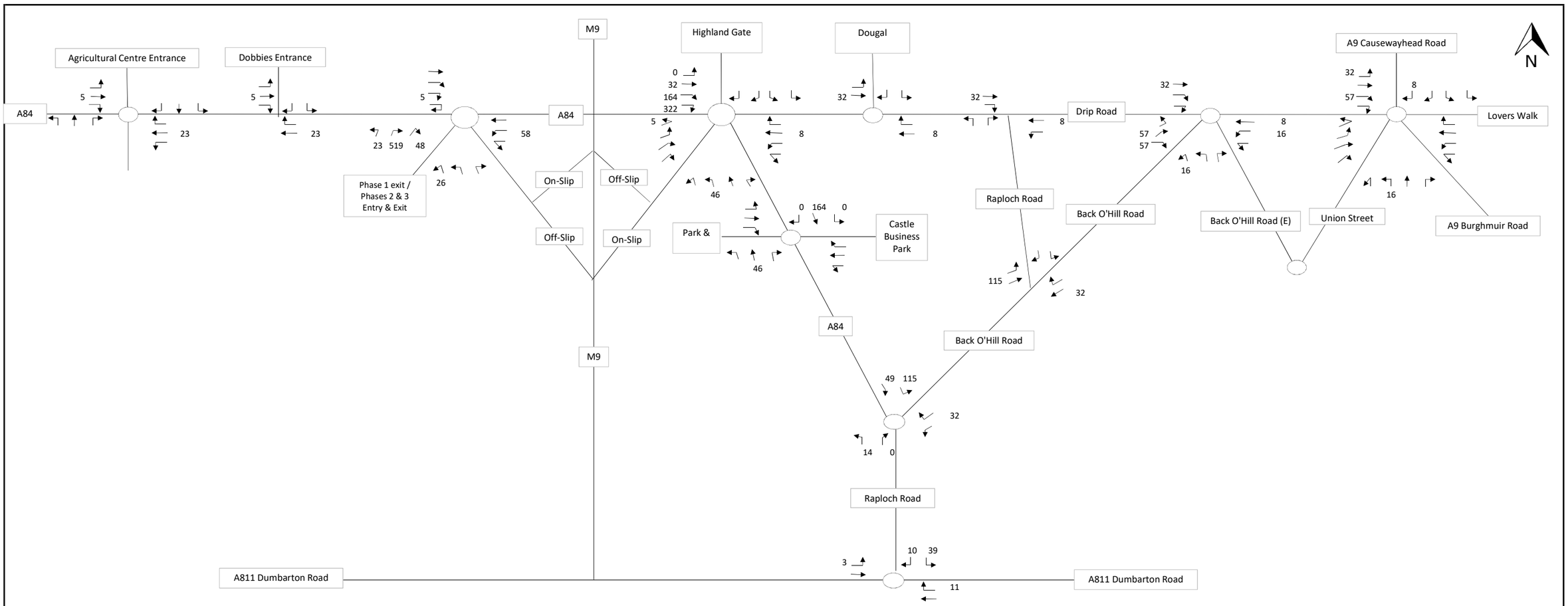


Figure D.2 - Existing Site 2019 PM Traffic	Project:	Craigforth		SWECO
	Client:	Ambassador LB holdings LLP	Date:	03.07.2020

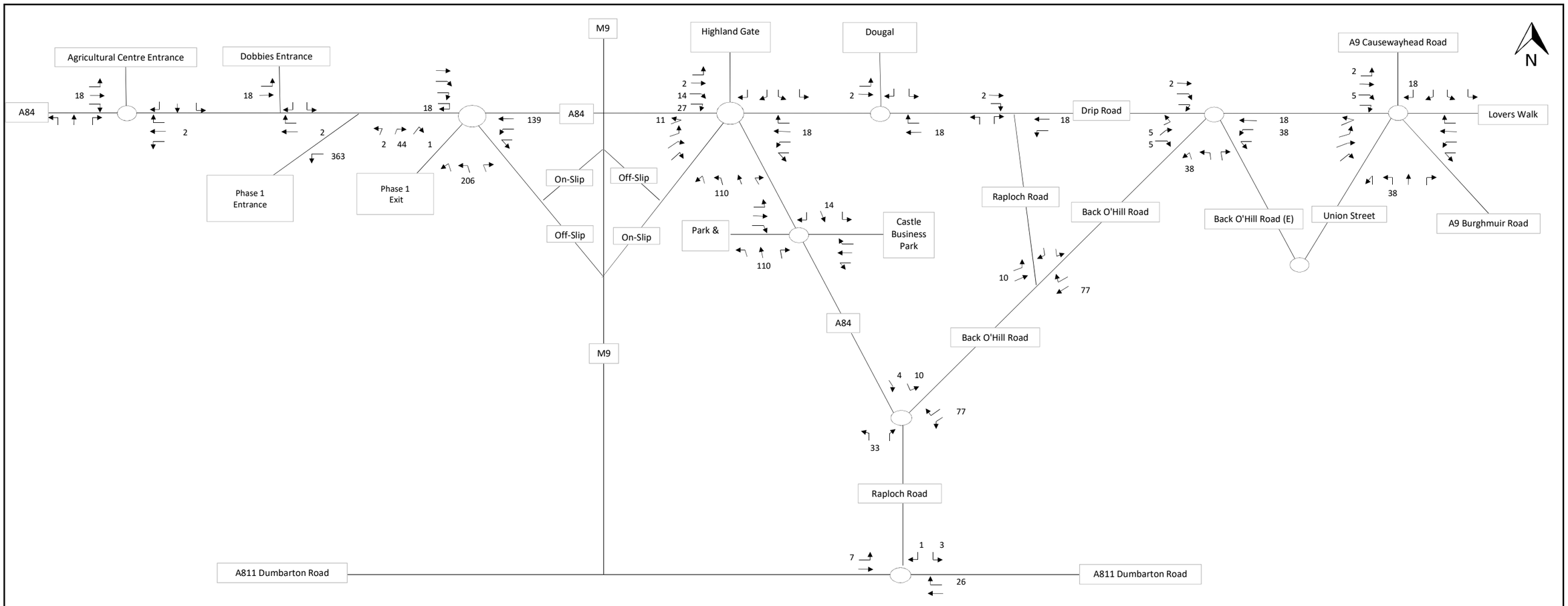


Figure D.3 - Phase One AM	Project:	Craigforth		SWECO
	Client:	Ambassador LB holdings LLP	Date:	03.07.2020

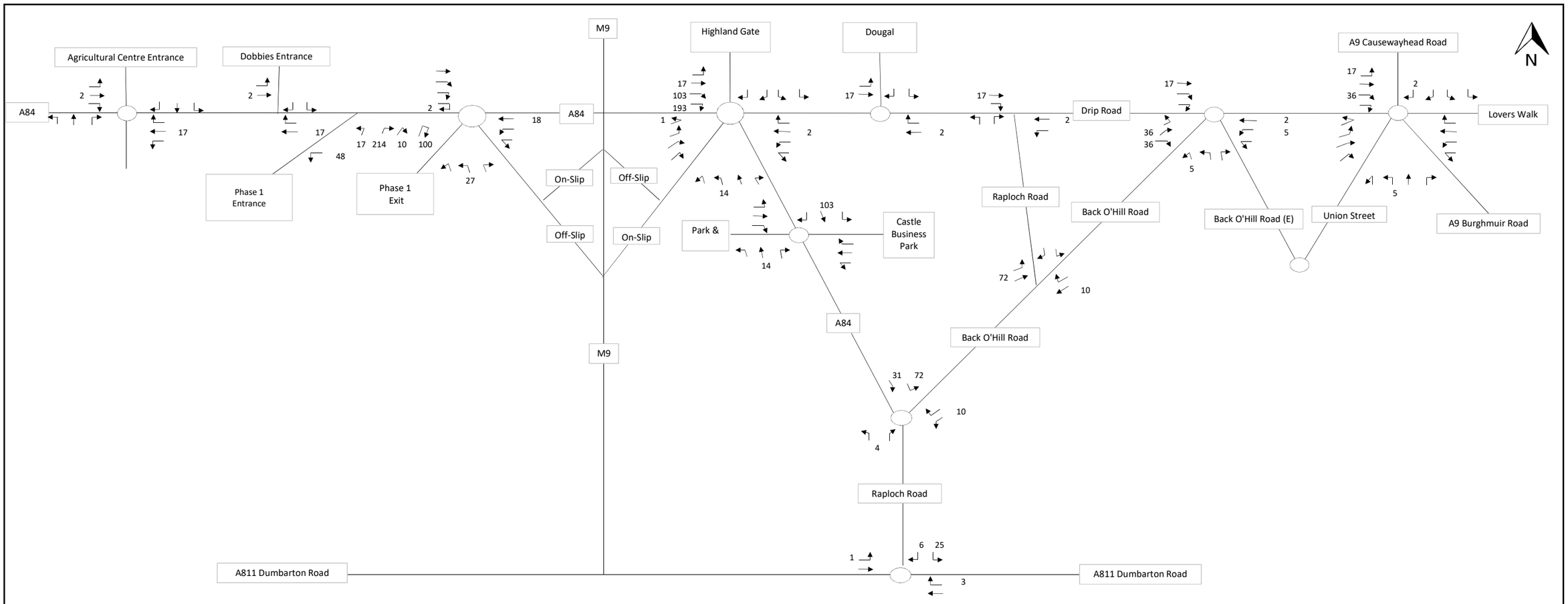


Figure D.4 - Phase One PM	Project:	Craigforth		SWECO
	Client:	Ambassador LB holdings LLP	Date:	03.07.2020

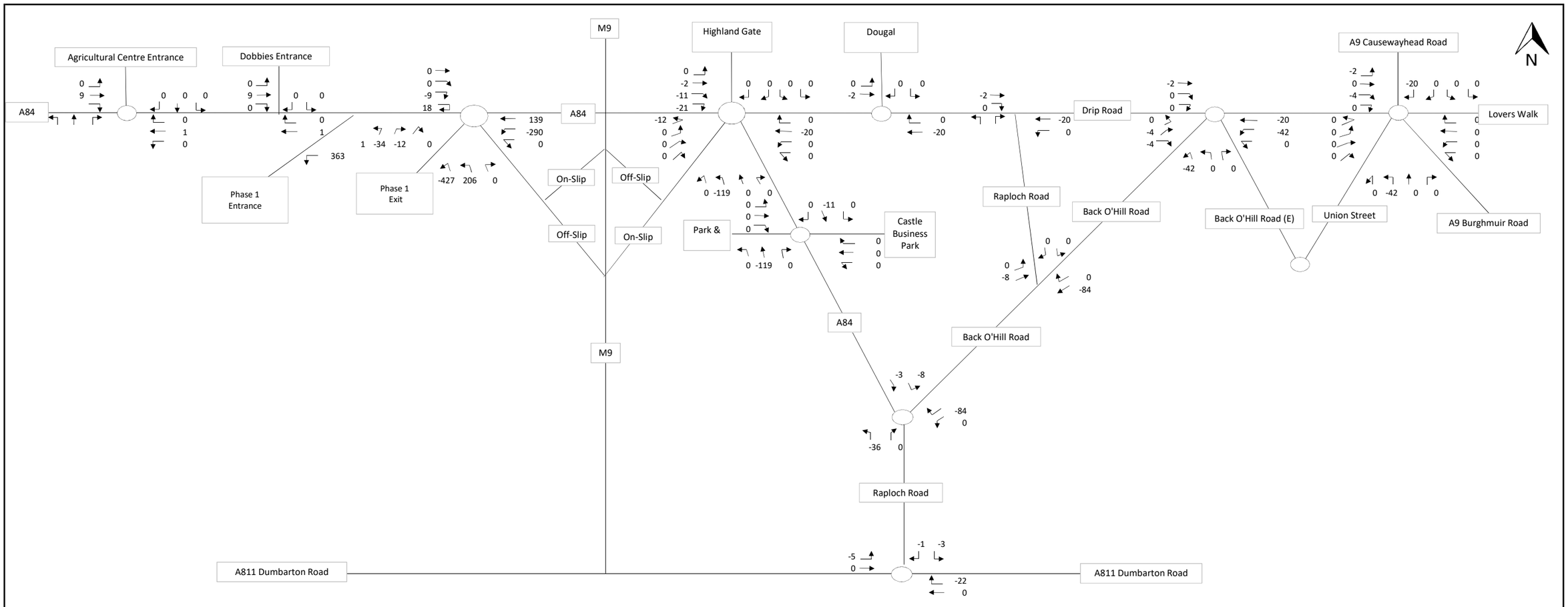


Figure D.5 - Phase One Net Change AM	Project:	Craigforth		SWECO
	Client:	Ambassador LB holdings LLP	Date:	03.07.2020

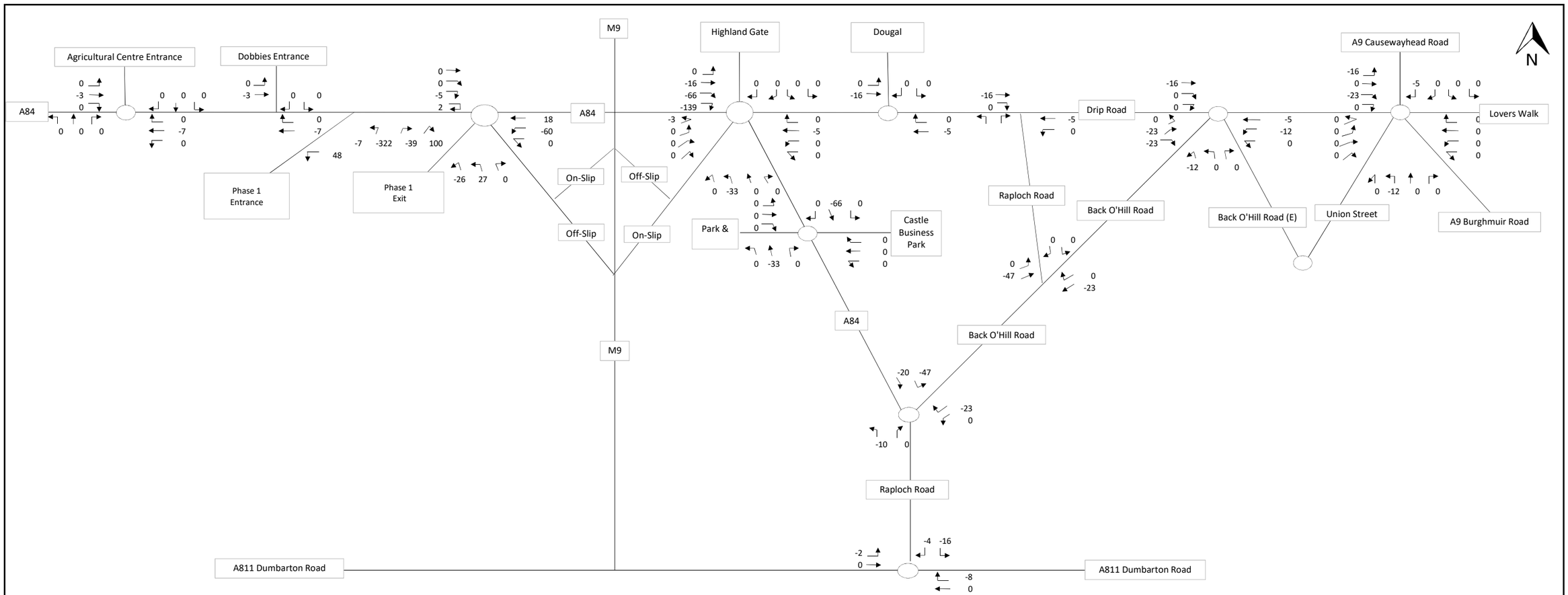


Figure D.6 - Phase One Net Change PM	Project:	Craigforth		SWECO
	Client:	Ambassador LB holdings LLP	Date:	03.07.2020

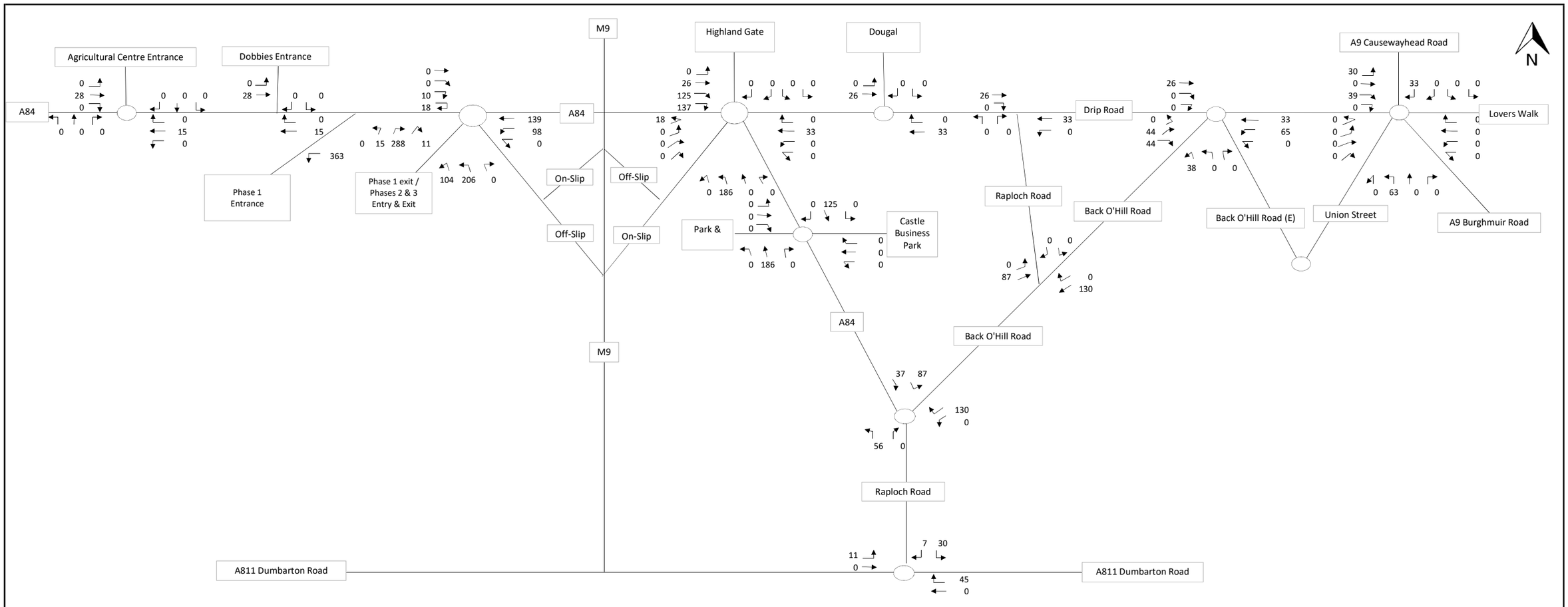


Figure D.7 - Craigforth Full Development AM	Project:	Craigforth		SWECO
	Client:	Ambassador LB holdings LLP	Date:	03.07.2020

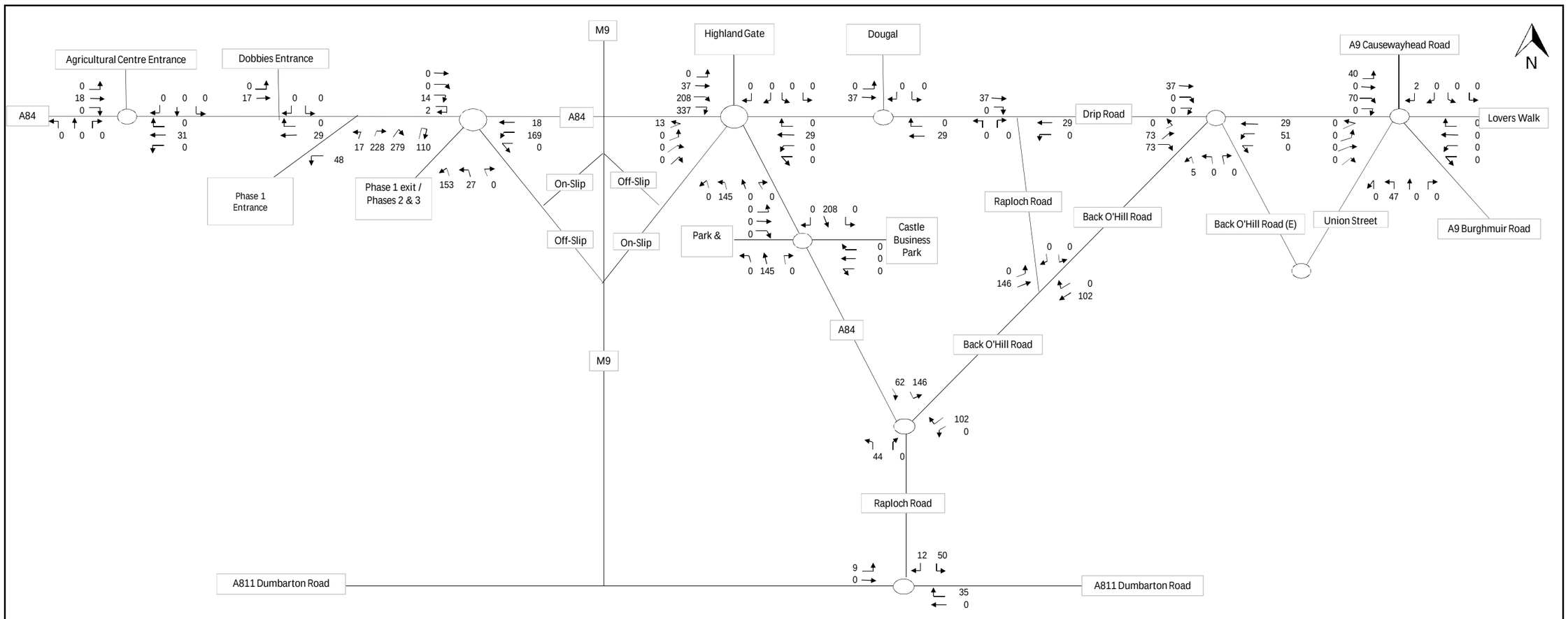


Figure D.8 - Craigforth Full Development PM	Project:	Craigforth		SWECO
	Client:	Ambassador LB holdings LLP	Date:	03.07.2020

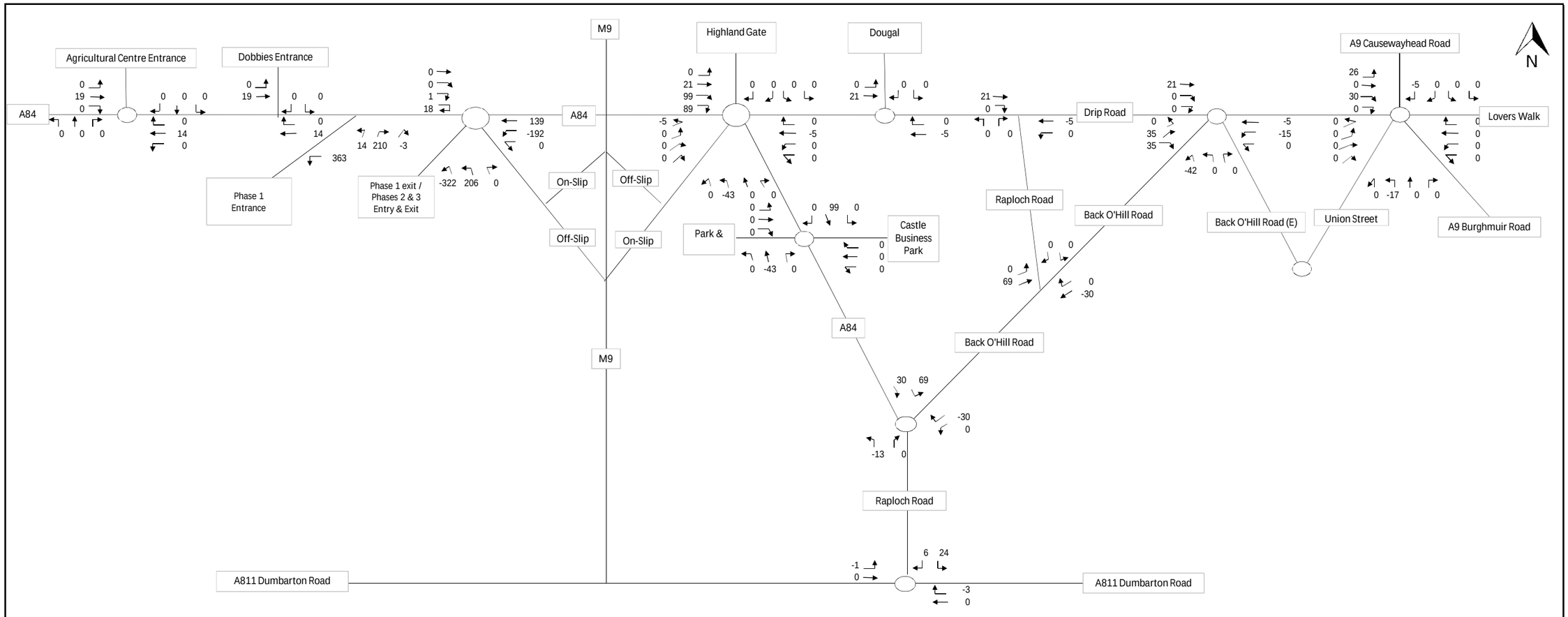


Figure D.9 - Total Development Net Change AM	Project:	Craigforth		SWECO
	Client:	Ambassador LB holdings LLP	Date:	03.07.2020

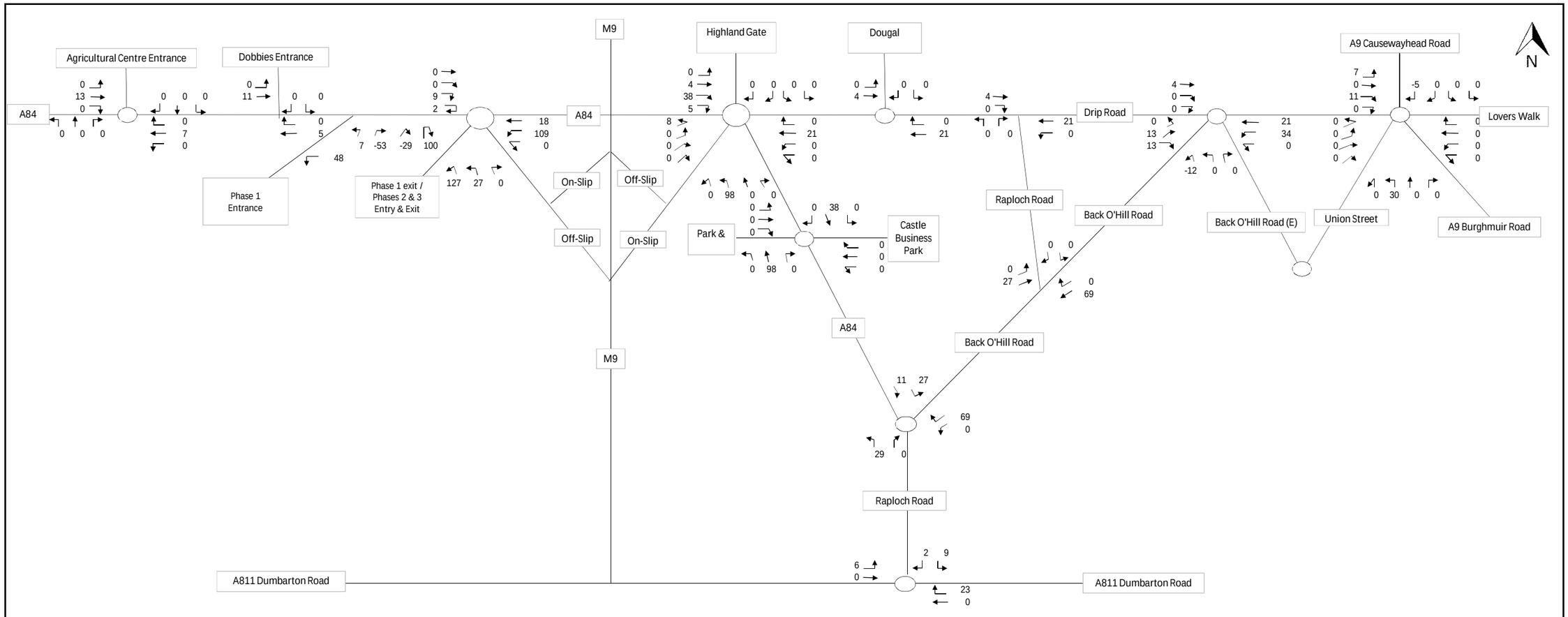


Figure D.10 - Total Development Net Change PM	Project:	Craigforth		SWECO
	Client:	Ambassador LB holdings LLP	Date:	03.07.2020

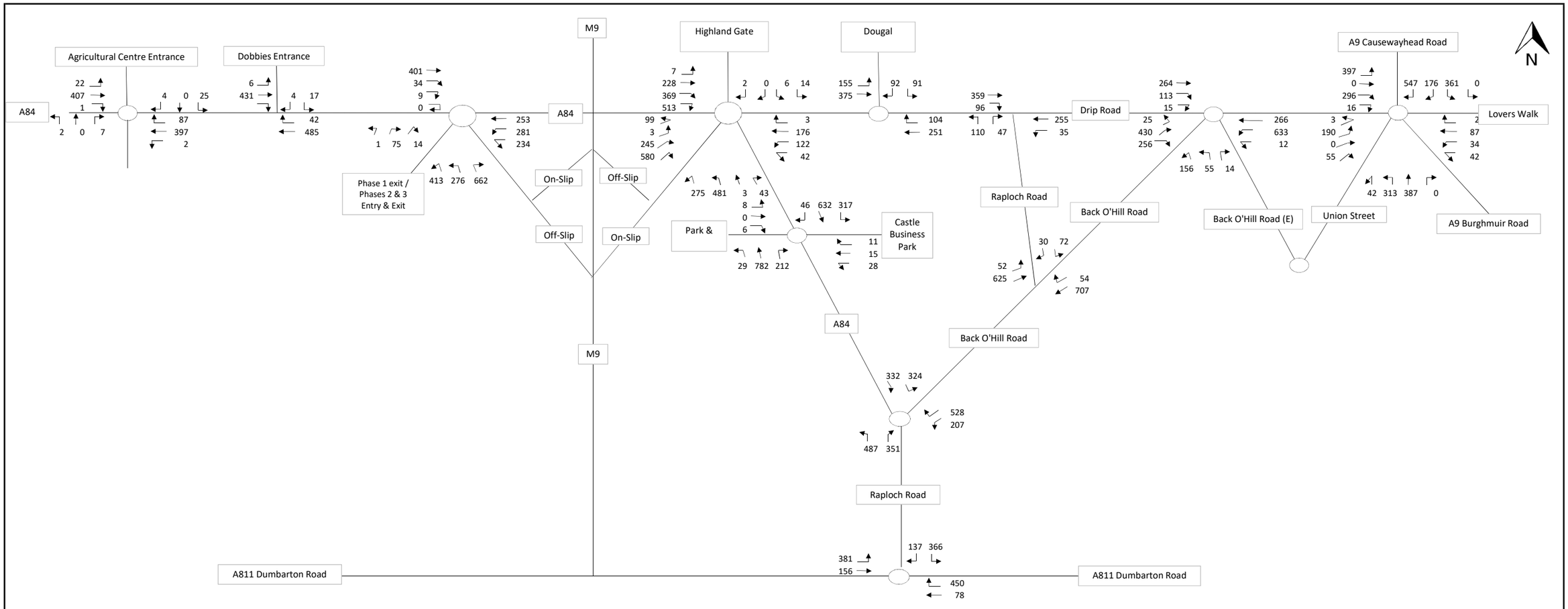


Figure D.11 - Base 2019 AM	Project:	Craigforth		SWECO
	Client:	Ambassador LB holdings LLP	Date:	03.07.2020

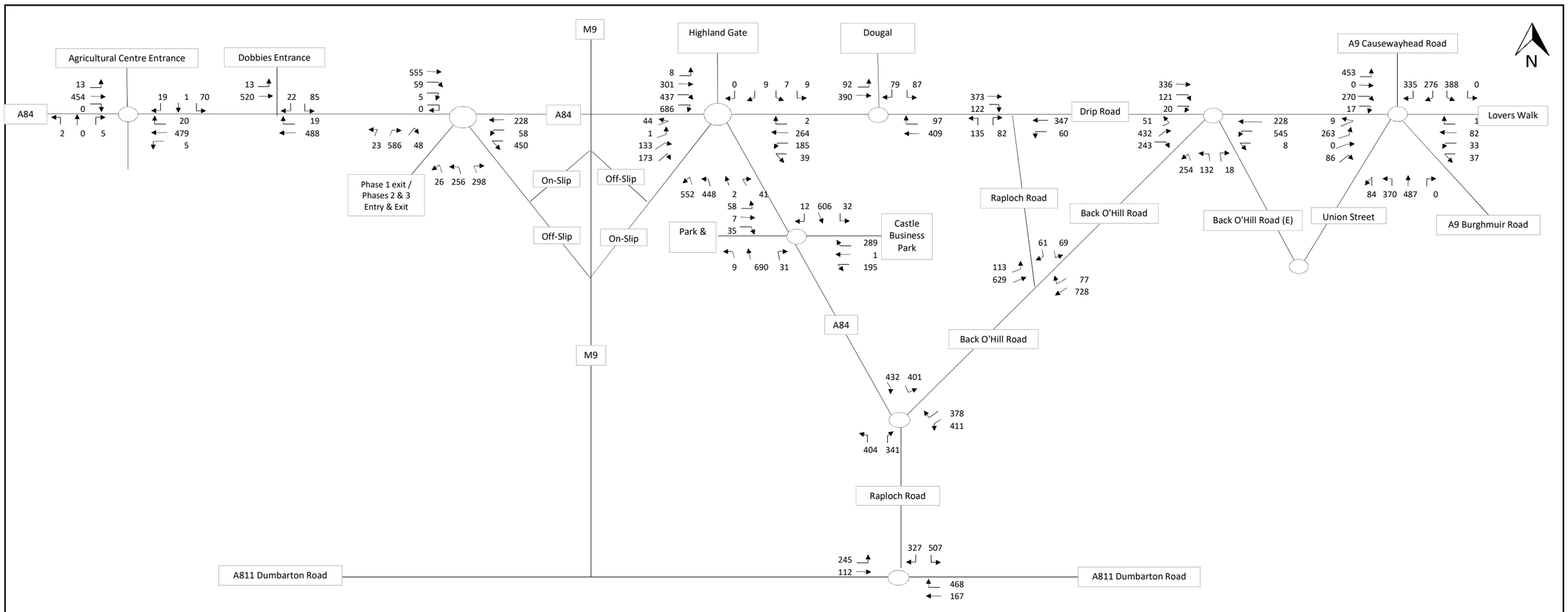


Figure D.12 - Base 2019 PM	Project:	Craigforth		SWECO
	Client:	Ambassador LB holdings LLP	Date:	03.07.2020

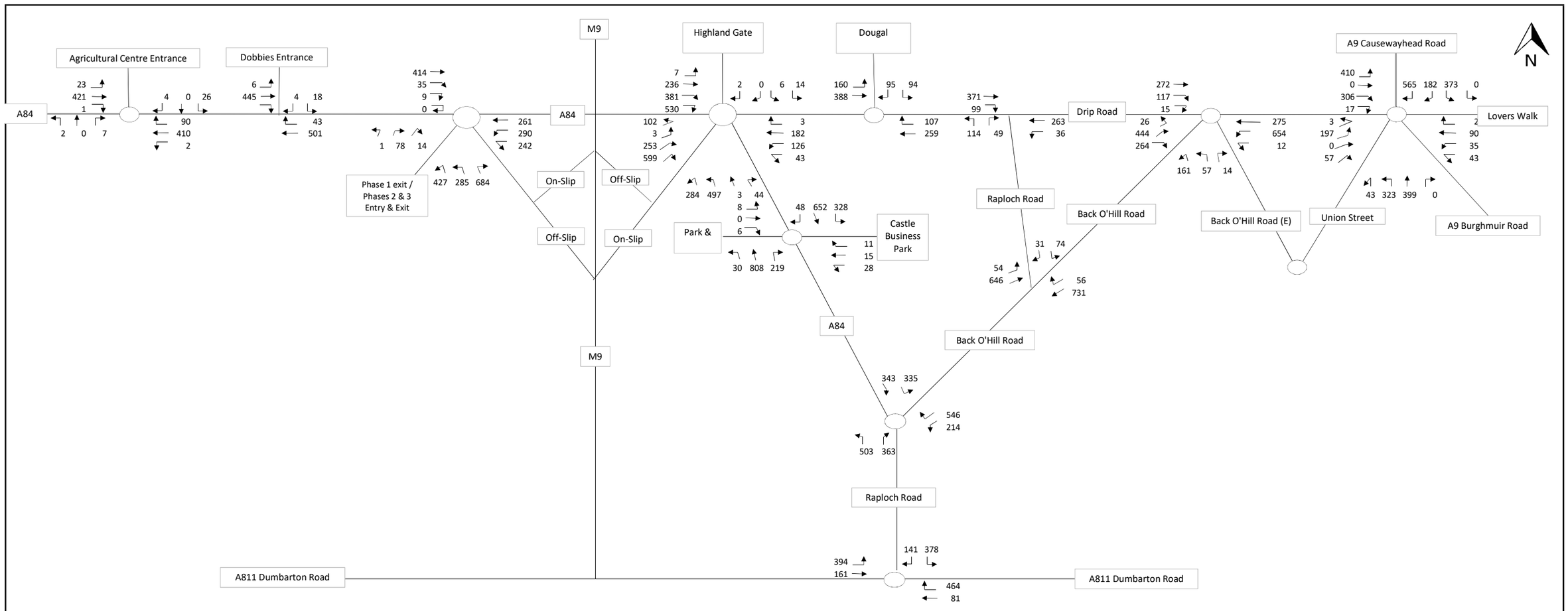


Figure D.13 - Base 2022 AM	Project:	Craigforth		SWECO
	Client:	Ambassador LB holdings LLP	Date:	03.07.2020

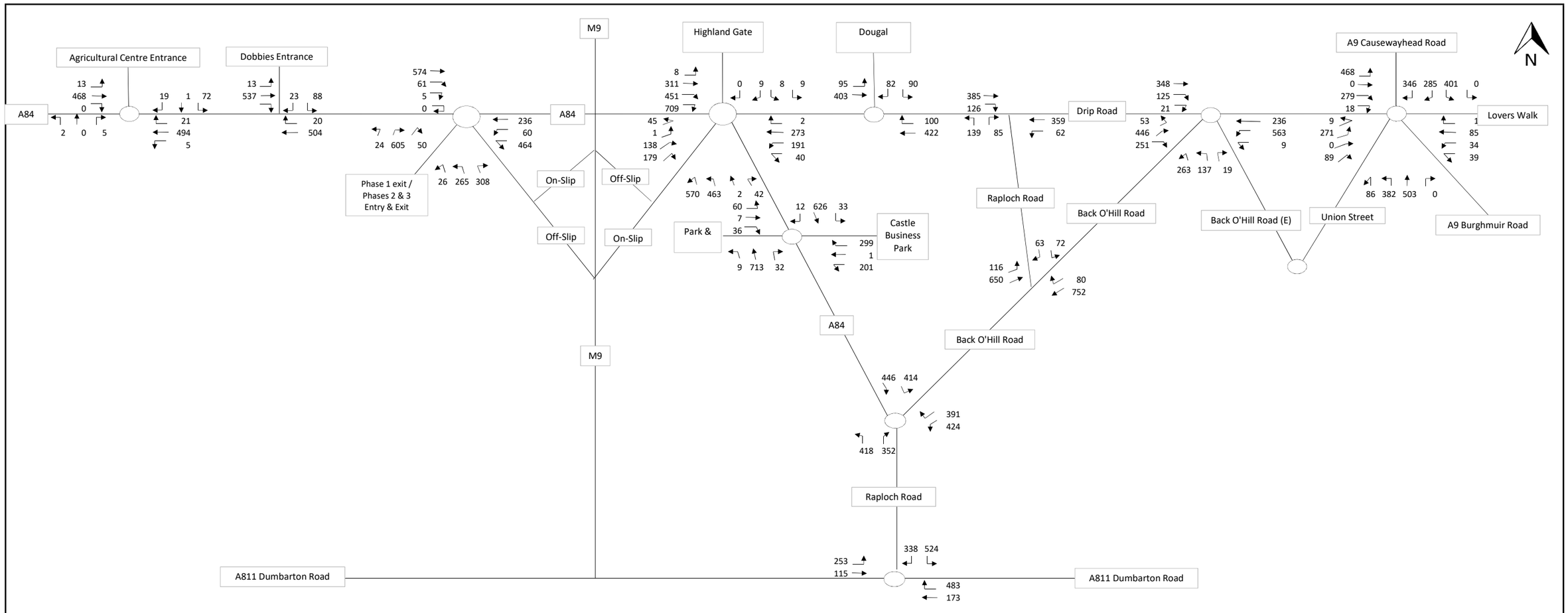


Figure D.14 - Base 2022 PM	Project:	Craigforth		SWECO
	Client:	Ambassador LB holdings LLP	Date:	03.07.2020

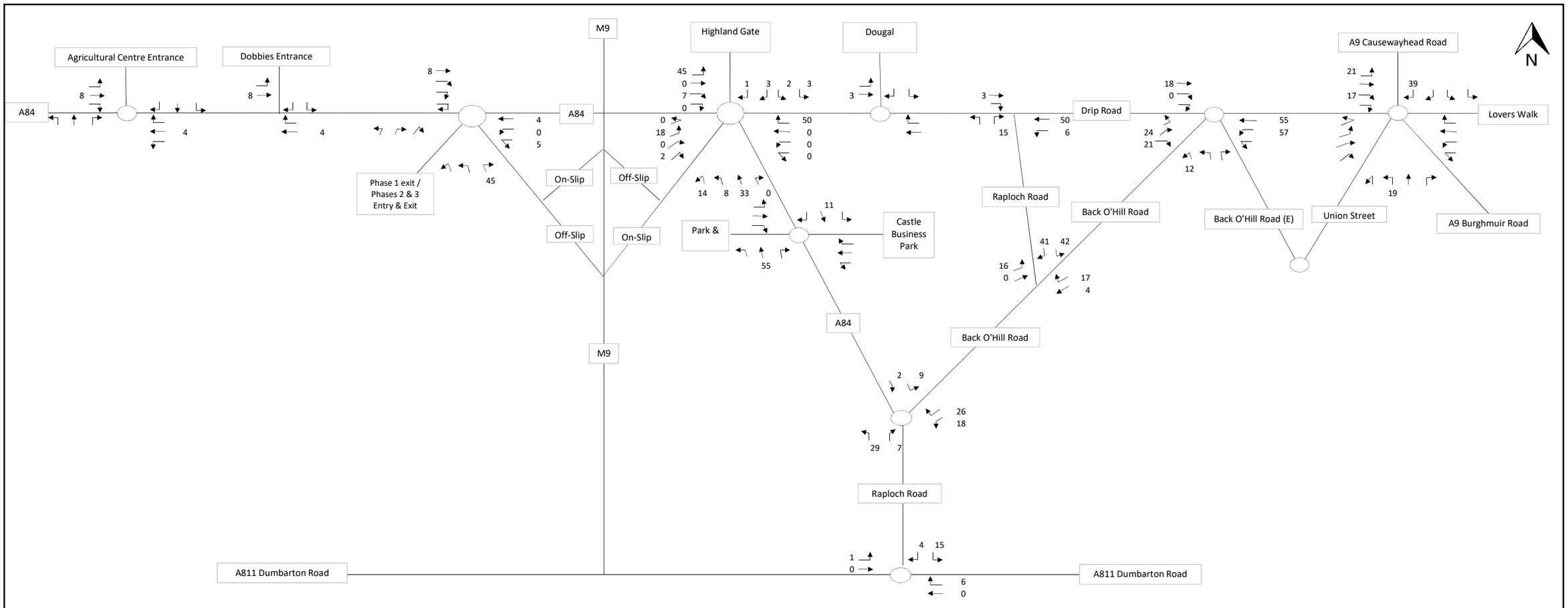


Figure D.15 - Committed Development Total AM	Project:	Craigforth		SWECO
	Client:	Ambassador LB holdings LLP	Date:	03.07.2020

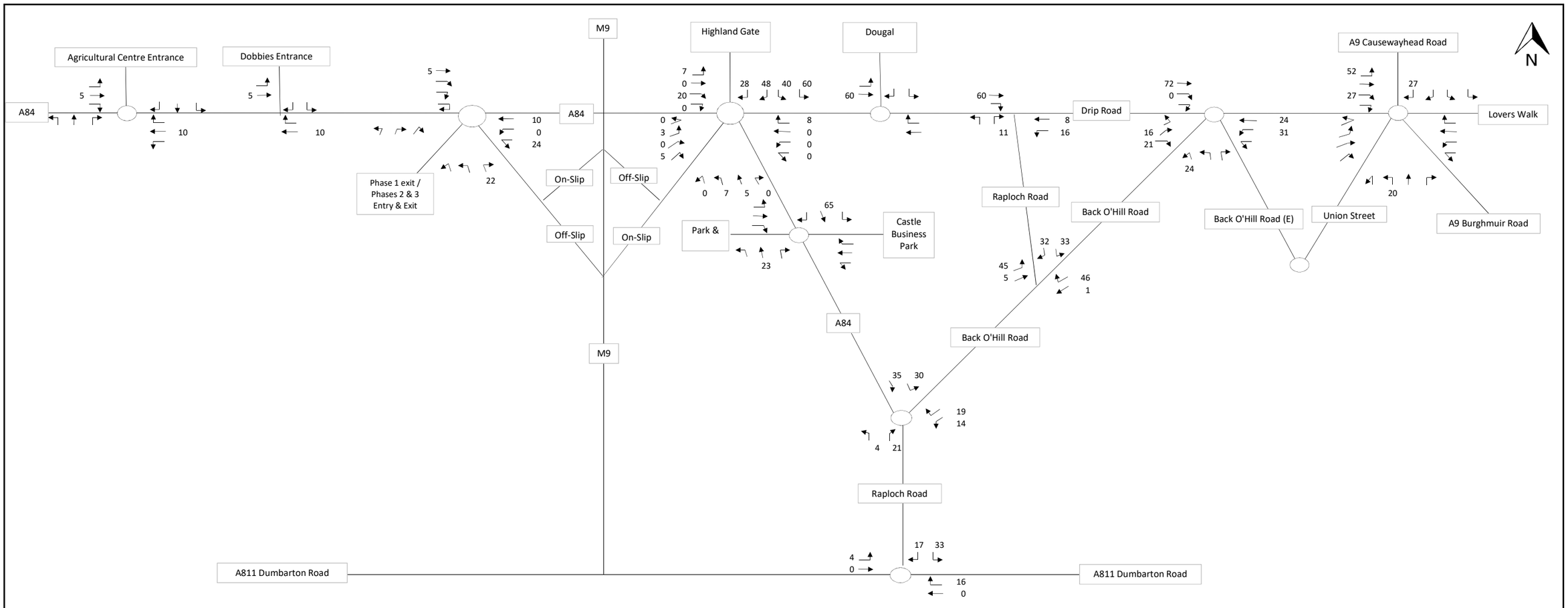


Figure D.16 - Committed Development Total PM	Project:	Craigforth		SWECO
	Client:	Ambassador LB holdings LLP	Date:	03.07.2020

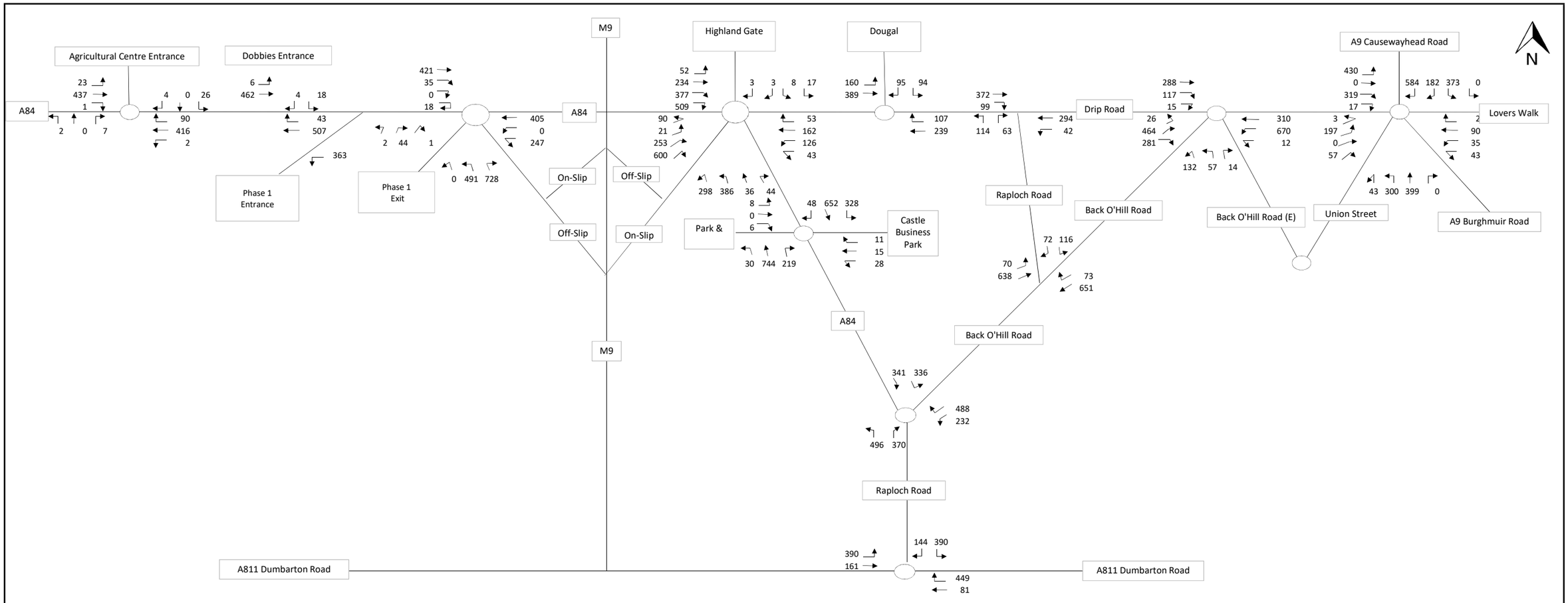


Figure D.17 - Base + Committed + Phase One Development AM	Project:	Craigforth		SWECO
	Client:	Ambassador LB holdings LLP	Date:	03.07.2020

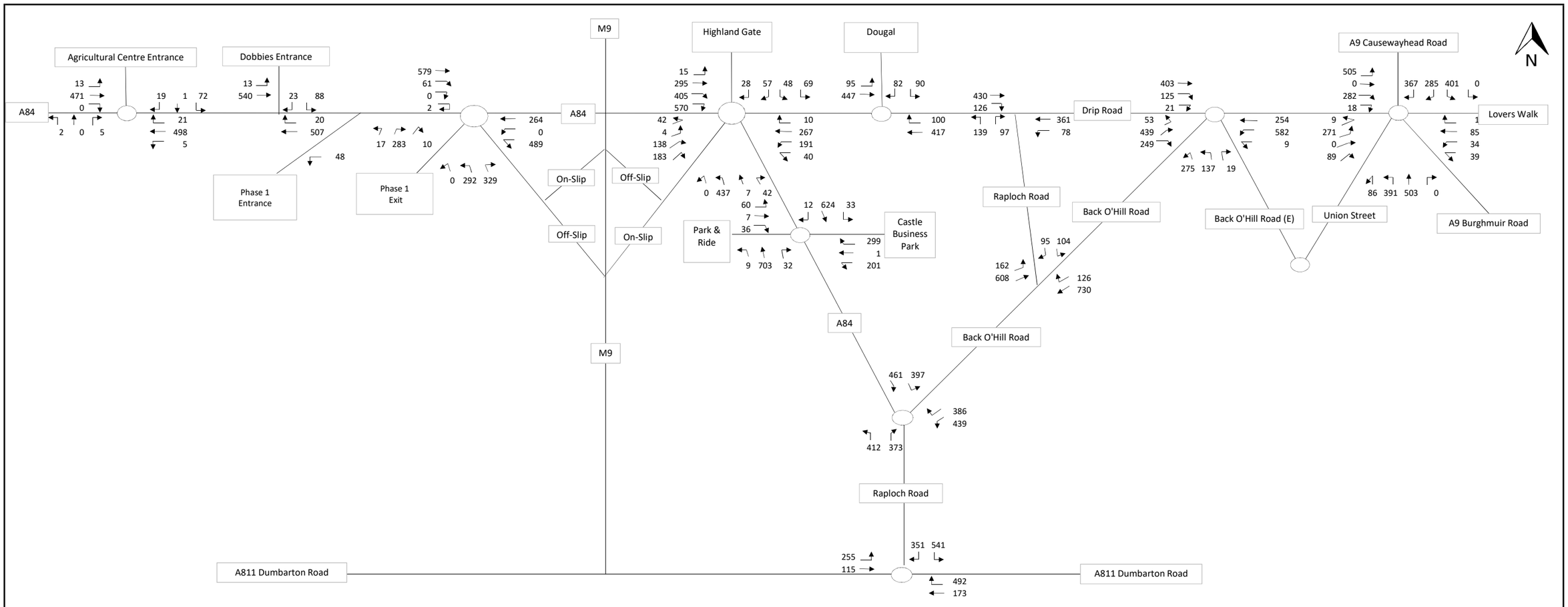


Figure D.18 - Base + Committed + Phase One Development PM	Project:	Craigforth		SWECO
	Client:	Ambassador LB holdings LLP	Date:	03.07.2020

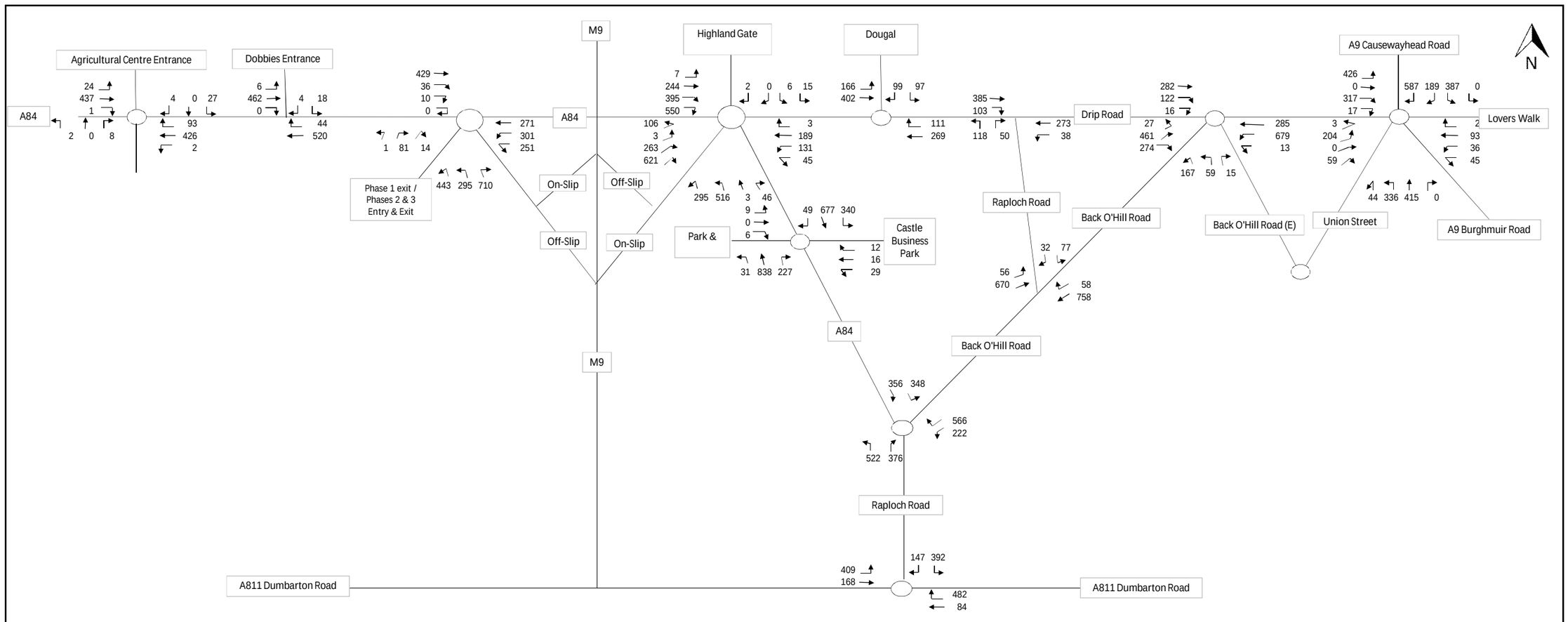


Figure D.19 - 2026 Base AM	Project:	Craigforth	SWECO
	Client:	Ambassador LB holdings LLP	Date: 03.07.2020

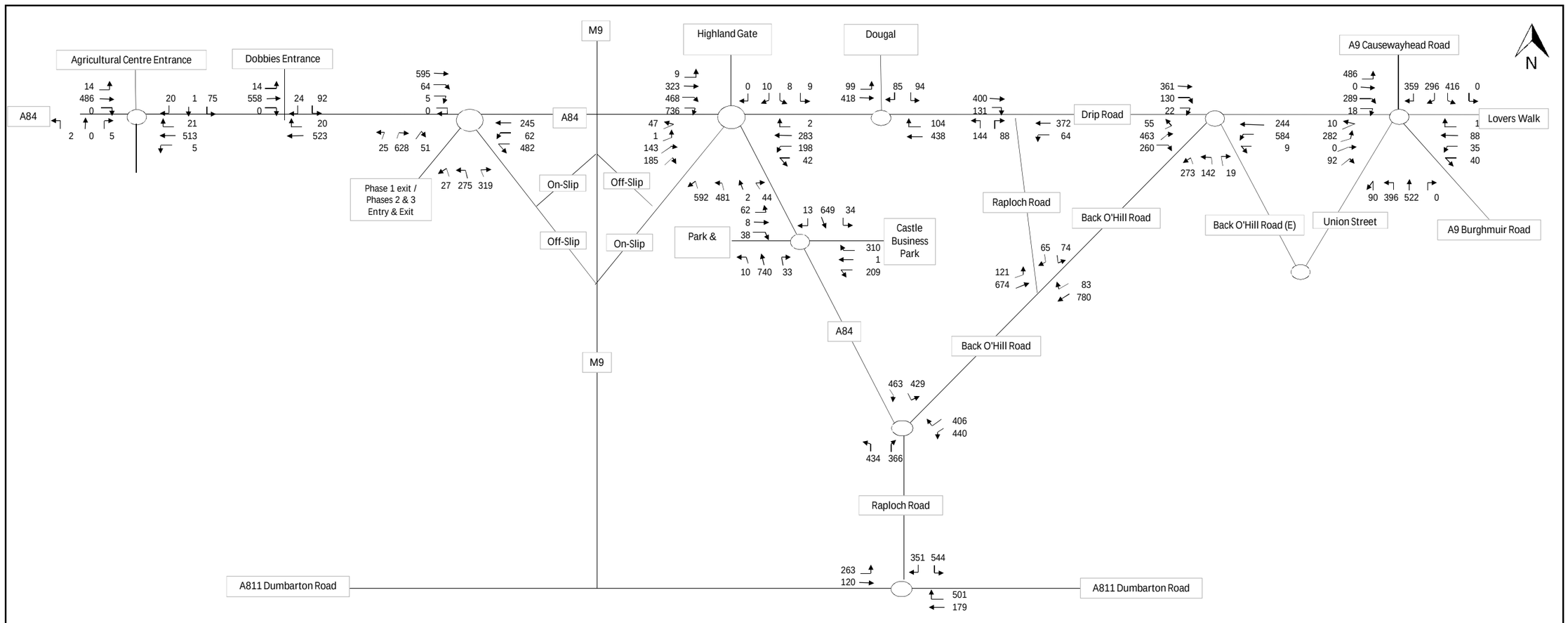


Figure D.20 - 2026 Base PM	Project:	Craigforth		SWECO
	Client:	Ambassador LB holdings LLP	Date:	03.07.2020

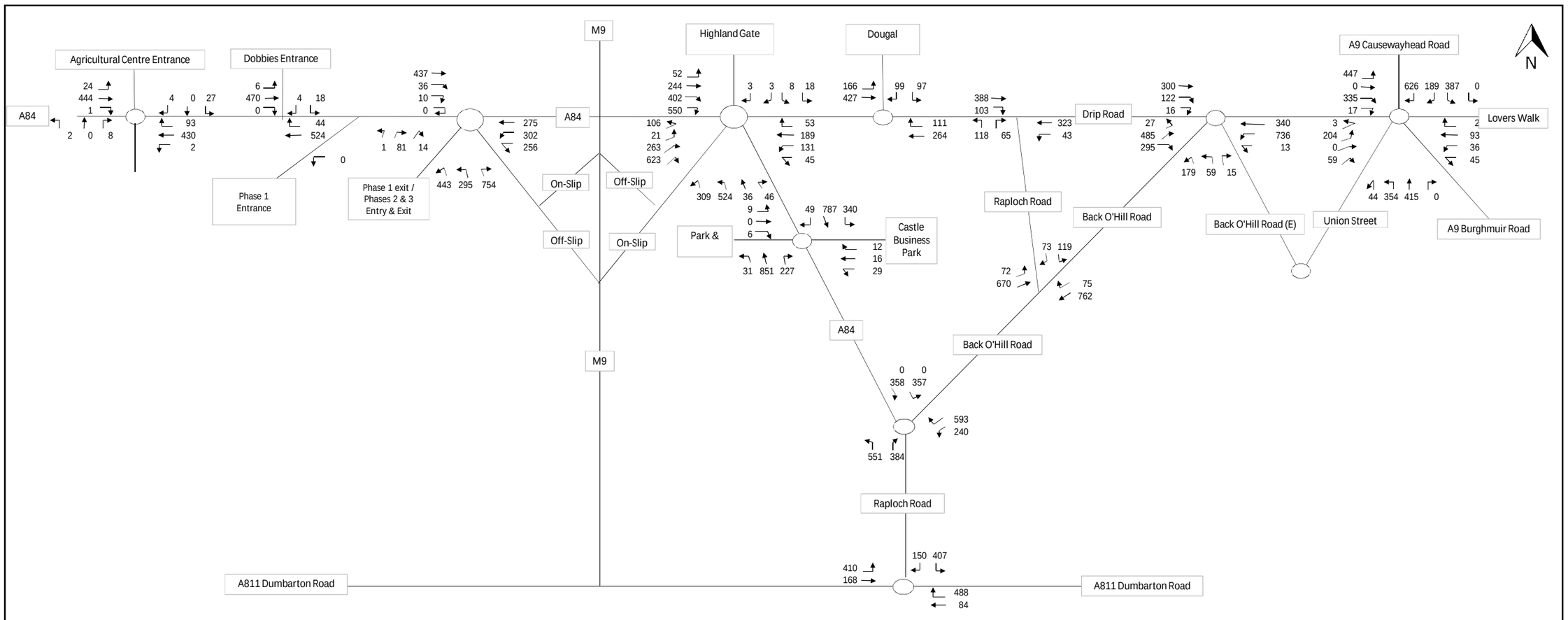


Figure D.21 - 2026 Base + Committed AM	Project:	Craigforth		SWECO
	Client:	Ambassador LB holdings LLP	Date:	03.07.2020

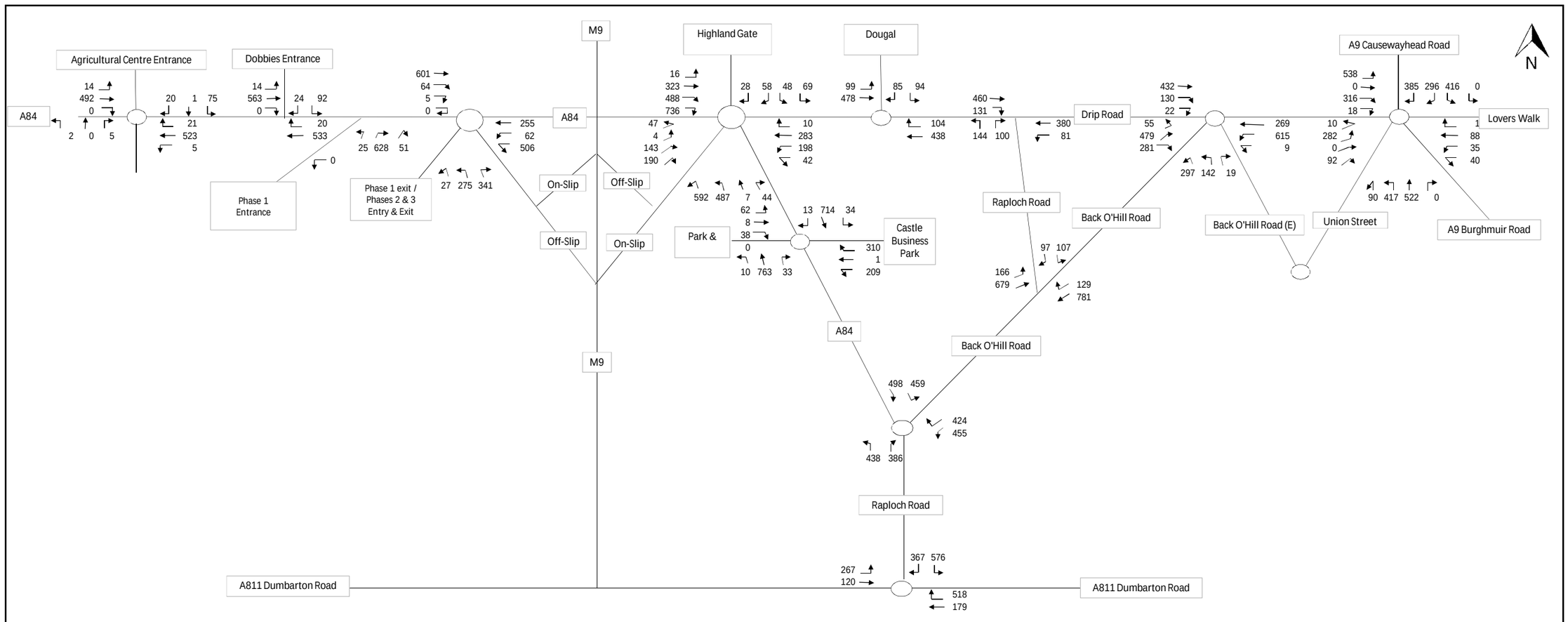


Figure D.22- 2026 Base + Committed PM	Project:	Craigforth		SWECO
	Client:	Ambassador LB holdings LLP	Date:	03.07.2020

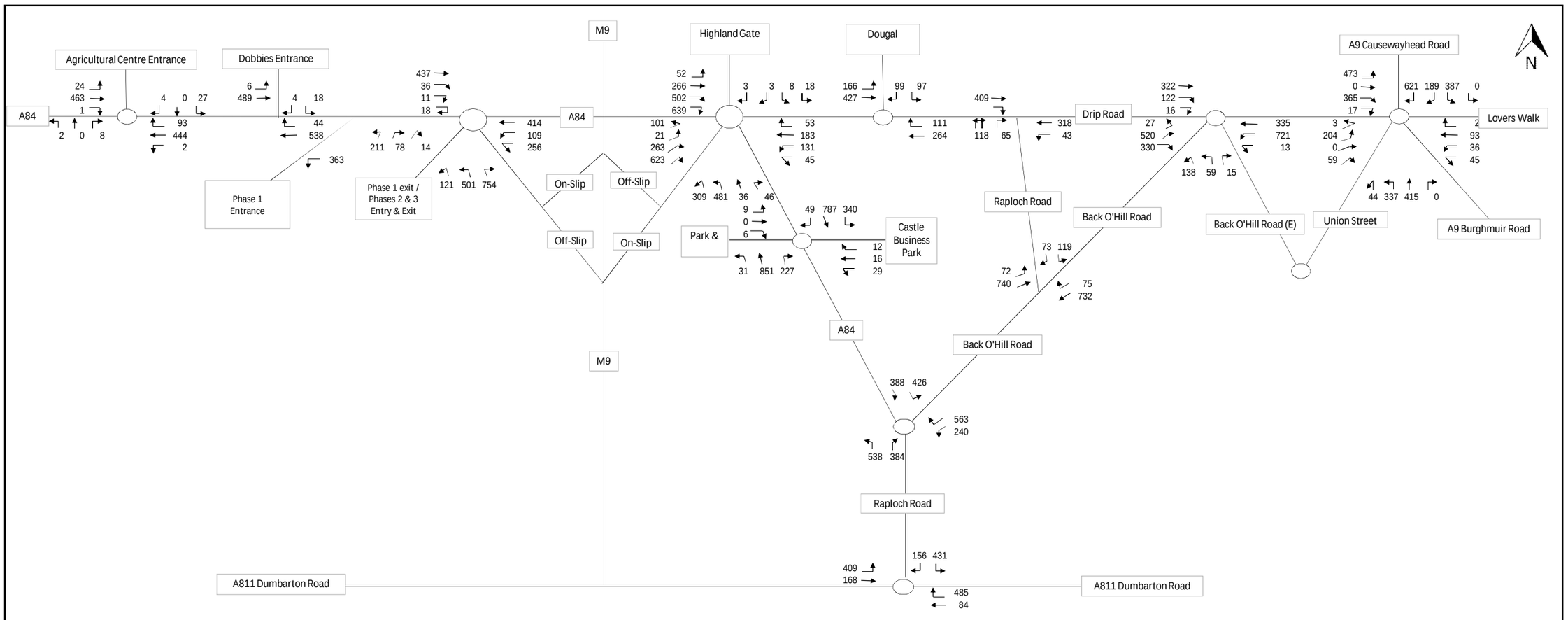


Figure D.23 - 2026 Base + Committed + Full Development AM	Project:	Craigforth		SWECO
	Client:	Ambassador LB holdings LLP	Date:	03.07.2020

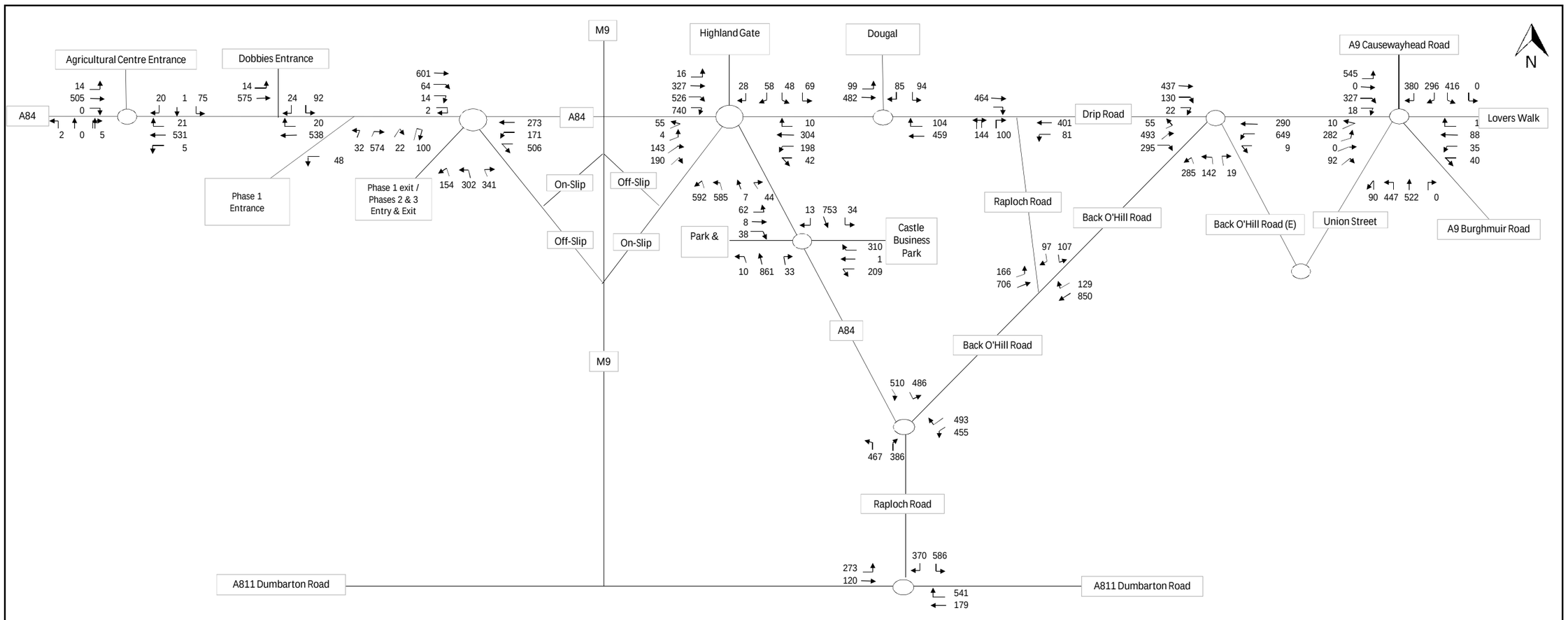


Figure D.26 - 2026 Base + Committed + Full Development PM	Project:	Craigforth		SWECO
	Client:	Ambassador LB holdings LLP	Date:	03.07.2020

Appendix E – Junction modelling output files

Junctions 9

ARCADY 9 - Roundabout Module

Version: 9.0.2.5947

For sales and distribution information, program advice and maintenance, contact TRL:
+44 (0)1344 770558 software@trl.co.uk www.trlsoftware.co.uk

Filename: Kildean Roundabout Rev 1.j9
Path: P:\6524\65201031_Craigforth\000_Craigforth_Sub_Folders\04 Deliverables Management\Calculations\Working\Modelling
Report generation date: 09/07/2020 16:26:59

Summary of junction performance

	AM				PM			
	Queue (PCU)	Delay (s)	RFC	LOS	Queue (PCU)	Delay (s)	RFC	LOS
	Base 2019							
Arm 1	0.0	4.94	0.03	A	0.0	4.36	0.03	A
Arm 2	3.1	31.52	0.77	D	11.4	79.50	0.96	F
Arm 3	1.7	7.21	0.64	A	12.5	41.51	0.95	E
Arm 4	1.7	5.95	0.63	A	0.3	2.96	0.24	A
Arm 5	4.4	13.34	0.82	B	7.2	17.23	0.89	C
	Base 2022							
Arm 1	0.0	5.15	0.03	A	0.0	4.51	0.03	A
Arm 2	4.4	43.13	0.83	E	19.9	125.70	1.03	F
Arm 3	2.0	7.88	0.67	A	20.3	62.47	0.99	F
Arm 4	1.9	6.44	0.65	A	0.3	3.01	0.25	A
Arm 5	5.6	16.67	0.86	C	9.8	22.99	0.92	C
	Base 2022 + Committed							
Arm 1	0.0	5.24	0.05	A	0.4	6.06	0.27	A
Arm 2	10.5	88.33	0.96	F	47.8	281.06	1.18	F
Arm 3	2.6	9.64	0.72	A	28.3	82.85	1.01	F
Arm 4	2.2	7.40	0.69	A	0.3	3.05	0.26	A
Arm 5	10.7	30.92	0.93	D	12.5	29.00	0.94	D
	Base 2026 + Committed + Dev							
Arm 1	0.1	5.74	0.05	A	0.4	6.50	0.29	A
Arm 2	27.9	213.12	1.10	F	84.9	529.01	1.36	F
Arm 3	2.5	9.49	0.72	A	92.4	250.70	1.14	F
Arm 4	2.3	7.59	0.70	A	0.4	3.19	0.28	A
Arm 5	106.3	213.46	1.14	F	32.8	65.36	1.01	F
	Base 2022 + Committed + Ph1							
Arm 1	0.0	5.13	0.05	A	0.3	5.17	0.24	A
Arm 2	6.1	56.23	0.89	F	13.8	91.29	0.98	F
Arm 3	1.6	6.90	0.62	A	0.8	5.22	0.44	A
Arm 4	1.8	6.21	0.65	A	0.3	3.06	0.26	A
Arm 5	8.3	24.45	0.90	C	4.0	10.32	0.80	B

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	(untitled)
Location	
Site number	
Date	19/03/2020
Version	
Status	(new file)
Identifier	
Client	
Jobnumber	
Enumerator	SWECO\GBCADL
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	Base 2019	AM	ONE HOUR	07:45	09:15	15	✓
D2	Base 2019	PM	ONE HOUR	16:15	17:45	15	✓
D3	Base 2022	AM	ONE HOUR	07:45	09:15	15	✓
D4	Base 2022	PM	ONE HOUR	16:15	17:45	15	✓
D5	Base 2022 + Committed	AM	ONE HOUR	07:45	09:15	15	✓
D6	Base 2022 + Committed	PM	ONE HOUR	16:15	17:45	15	✓
D7	Base 2026 + Committed + Dev	AM	ONE HOUR	07:45	09:15	15	✓
D8	Base 2026 + Committed + Dev	PM	ONE HOUR	16:15	17:45	15	✓
D9	Base 2022 + Committed + Ph1	AM	ONE HOUR	07:45	09:15	15	✓
D10	Base 2022 + Committed + Ph1	PM	ONE HOUR	16:15	17:45	15	✓

Analysis Set Details

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

Base 2019, AM

Data Errors and Warnings

No errors or warnings

Junction Network

Junctions

Junction	Name	Junction Type	Arm order	Junction Delay (s)	Junction LOS
1	untitled	Standard Roundabout	1, 2, 3, 4, 5	11.56	B

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

Arms

Arms

Arm	Name	Description
1	Highland Park	
2	Drip Road	
3	A84 South	
4	M90 On Slip	
5	A84 West	

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	3.50	7.30	22.0	20.0	110.0	46.0	
2	3.60	7.30	8.0	36.0	110.0	45.0	
3	7.30	7.30	0.0	40.0	110.0	56.0	
4	7.30	7.30	0.0	30.0	110.0	24.0	
5	4.00	7.40	26.0	50.0	110.0	34.0	

Slope / Intercept / Capacity

Roundabout Slope and Intercept used in model

Arm	Final slope	Final intercept (PCU/hr)
1	0.436	1702
2	0.412	1496
3	0.484	2066
4	0.538	2294
5	0.488	1968

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

Arm Capacity Adjustments

Arm	Type	Reason	Direct capacity adjustment (PCU/hr)
2	Direct		-340
3	Direct		-250
4	Direct		-250

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	Base 2019	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		ONE HOUR	✓	22	100.000
2		ONE HOUR	✓	343	100.000
3		ONE HOUR	✓	802	100.000
4		ONE HOUR	✓	927	100.000
5		ONE HOUR	✓	1117	100.000

Origin-Destination Data

Demand (PCU/hr)

		To				
		1	2	3	4	5
From	1	0	14	6	0	2
	2	3	0	42	122	176
	3	3	43	0	275	481
	4	3	245	580	0	99
	5	7	228	369	513	0

Vehicle Mix

Heavy Vehicle Percentages

		To				
		1	2	3	4	5
From	1	0	0	0	0	0
	2	1	0	0	0	0
	3	0	0	0	0	0
	4	0	0	0	0	0
	5	0	0	0	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	0.03	4.94	0.0	A	20	30
2	0.77	31.52	3.1	D	315	472
3	0.64	7.21	1.7	A	736	1104
4	0.63	5.95	1.7	A	851	1276
5	0.82	13.34	4.4	B	1025	1537

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)	LOS
1	17	4	1483	1056	0.016	16	12	0.0	0.0	3.462	A
2	258	65	1102	702	0.368	256	397	0.0	0.6	8.036	A
3	604	151	610	1521	0.397	601	747	0.0	0.7	3.903	A
4	698	174	530	1759	0.397	695	681	0.0	0.7	3.375	A
5	841	210	658	1647	0.510	837	568	0.0	1.0	4.419	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)	LOS
1	20	5	1774	929	0.021	20	14	0.0	0.0	3.959	A
2	308	77	1319	612	0.504	307	476	0.6	1.0	11.717	B
3	721	180	731	1463	0.493	720	894	0.7	1.0	4.839	A
4	833	208	635	1703	0.489	832	816	0.7	1.0	4.129	A
5	1004	251	787	1584	0.634	1001	680	1.0	1.7	6.148	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)	LOS
1	24	6	2165	759	0.032	24	17	0.0	0.0	4.901	A
2	378	94	1609	493	0.767	370	581	1.0	2.9	27.792	D
3	883	221	887	1387	0.637	880	1092	1.0	1.7	7.060	A
4	1021	255	774	1628	0.627	1018	993	1.0	1.7	5.871	A
5	1230	307	963	1499	0.821	1220	829	1.7	4.3	12.467	B

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)	LOS
1	24	6	2177	753	0.032	24	18	0.0	0.0	4.936	A
2	378	94	1618	489	0.773	377	583	2.9	3.1	31.515	D
3	883	221	897	1382	0.639	883	1097	1.7	1.7	7.209	A
4	1021	255	779	1625	0.628	1021	1001	1.7	1.7	5.951	A
5	1230	307	966	1497	0.821	1229	834	4.3	4.4	13.337	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)	LOS
1	20	5	1791	921	0.021	20	15	0.0	0.0	3.994	A
2	308	77	1332	607	0.508	317	480	3.1	1.1	12.737	B
3	721	180	746	1455	0.495	724	903	1.7	1.0	4.944	A
4	833	208	643	1698	0.491	836	827	1.7	1.0	4.188	A
5	1004	251	791	1582	0.635	1015	688	4.4	1.8	6.455	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)	LOS
1	17	4	1493	1051	0.016	17	12	0.0	0.0	3.478	A
2	258	65	1110	698	0.370	260	400	1.1	0.6	8.247	A
3	604	151	617	1518	0.398	605	753	1.0	0.7	3.952	A
4	698	174	535	1756	0.397	699	688	1.0	0.7	3.410	A
5	841	210	661	1646	0.511	844	573	1.8	1.1	4.506	A

Base 2019, PM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Vehicle Mix		HV% is zero for all movements / time segments. Vehicle Mix matrix should be completed whether working in PCUs or Vehs.

Junction Network

Junctions

Junction	Name	Junction Type	Arm order	Junction Delay (s)	Junction LOS
1	untitled	Standard Roundabout	1, 2, 3, 4, 5	32.35	D

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	Base 2019	PM	ONE HOUR	16:15	17:45	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		ONE HOUR	✓	25	100.000
2		ONE HOUR	✓	490	100.000
3		ONE HOUR	✓	1043	100.000
4		ONE HOUR	✓	351	100.000
5		ONE HOUR	✓	1432	100.000

Origin-Destination Data

Demand (PCU/hr)

		To				
		1	2	3	4	5
From	1	0	9	7	9	0
	2	2	0	39	185	264
	3	2	41	0	552	448
	4	1	133	173	0	44
	5	8	301	437	686	0

Vehicle Mix

Heavy Vehicle Percentages

		To				
		1	2	3	4	5
From	1	0	0	0	0	0
	2	0	0	0	0	0
	3	0	0	0	0	0
	4	0	0	0	0	0
	5	0	0	0	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	0.03	4.36	0.0	A	23	34
2	0.96	79.50	11.4	F	450	674
3	0.95	41.51	12.5	E	957	1436
4	0.24	2.96	0.3	A	322	483
5	0.89	17.23	7.2	C	1314	1971

Main Results for each time segment

16:15 - 16:30

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)	LOS
1	19	5	1327	1124	0.017	19	10	0.0	0.0	3.257	A
2	369	92	983	751	0.491	365	363	0.0	0.9	9.249	A
3	785	196	857	1402	0.560	780	491	0.0	1.3	5.748	A
4	264	66	565	1740	0.152	264	1071	0.0	0.2	2.437	A
5	1078	270	264	1839	0.586	1072	565	0.0	1.4	4.661	A

16:30 - 16:45

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)	LOS
1	22	6	1588	1010	0.022	22	12	0.0	0.0	3.643	A
2	440	110	1176	671	0.656	437	434	0.9	1.8	15.156	C
3	938	234	1025	1320	0.710	933	588	1.3	2.4	9.200	A
4	316	79	677	1680	0.188	315	1282	0.2	0.2	2.637	A
5	1287	322	316	1814	0.710	1283	676	1.4	2.4	6.731	A

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)	LOS
1	28	7	1931	861	0.032	27	14	0.0	0.0	4.320	A
2	540	135	1431	566	0.953	513	528	1.8	8.5	51.927	F
3	1148	287	1229	1221	0.940	1118	715	2.4	9.9	28.899	D
4	386	97	805	1611	0.240	386	1542	0.2	0.3	2.938	A
5	1577	394	386	1780	0.886	1559	805	2.4	6.8	15.221	C

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)	LOS
1	28	7	1948	853	0.032	28	14	0.0	0.0	4.359	A
2	540	135	1443	561	0.962	528	532	8.5	11.4	79.504	F
3	1148	287	1250	1211	0.948	1138	721	9.9	12.5	41.513	E
4	386	97	823	1602	0.241	386	1566	0.3	0.3	2.961	A
5	1577	394	387	1779	0.886	1575	822	6.8	7.2	17.232	C

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)	LOS
1	22	6	1613	999	0.022	23	12	0.0	0.0	3.684	A
2	440	110	1194	664	0.664	478	441	11.4	2.1	22.845	C
3	938	234	1073	1297	0.723	977	599	12.5	2.7	12.532	B
4	316	79	719	1657	0.190	316	1331	0.3	0.2	2.683	A
5	1287	322	318	1813	0.710	1306	716	7.2	2.5	7.351	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)	LOS
1	19	5	1338	1119	0.017	19	10	0.0	0.0	3.274	A
2	369	92	991	747	0.494	373	366	2.1	1.0	9.735	A
3	785	196	869	1396	0.563	791	496	2.7	1.3	6.006	A
4	264	66	575	1735	0.152	264	1085	0.2	0.2	2.448	A
5	1078	270	265	1839	0.586	1082	574	2.5	1.4	4.785	A

Base 2022, AM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Vehicle Mix		HV% is zero for all movements / time segments. Vehicle Mix matrix should be completed whether working in PCUs or Vehs.

Junction Network

Junctions

Junction	Name	Junction Type	Arm order	Junction Delay (s)	Junction LOS
1	untitled	Standard Roundabout	1, 2, 3, 4, 5	14.27	B

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
D3	Base 2022	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		ONE HOUR	✓	22	100.000
2		ONE HOUR	✓	354	100.000
3		ONE HOUR	✓	828	100.000
4		ONE HOUR	✓	957	100.000
5		ONE HOUR	✓	1154	100.000

Origin-Destination Data

Demand (PCU/hr)

		To				
		1	2	3	4	5
From	1	0	14	6	0	2
	2	3	0	43	126	182
	3	3	44	0	284	497
	4	3	253	599	0	102
	5	7	236	381	530	0

Vehicle Mix

Heavy Vehicle Percentages

		To				
		1	2	3	4	5
From	1	0	0	0	0	0
	2	0	0	0	0	0
	3	0	0	0	0	0
	4	0	0	0	0	0
	5	0	0	0	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	0.03	5.15	0.0	A	20	30
2	0.83	43.13	4.4	E	325	487
3	0.67	7.88	2.0	A	760	1140
4	0.65	6.44	1.9	A	878	1317
5	0.86	16.67	5.6	C	1059	1588

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)	LOS
1	17	4	1531	1035	0.016	16	12	0.0	0.0	3.534	A
2	267	67	1138	687	0.388	264	410	0.0	0.6	8.462	A
3	623	156	630	1511	0.413	621	771	0.0	0.7	4.030	A
4	720	180	547	1750	0.412	718	704	0.0	0.7	3.480	A
5	869	217	679	1637	0.531	864	586	0.0	1.1	4.631	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)	LOS
1	20	5	1832	904	0.022	20	14	0.0	0.0	4.072	A
2	318	80	1361	595	0.535	316	491	0.6	1.1	12.838	B
3	744	186	755	1451	0.513	743	923	0.7	1.0	5.074	A
4	860	215	655	1692	0.509	859	842	0.7	1.0	4.315	A
5	1037	259	812	1572	0.660	1034	702	1.1	1.9	6.656	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)	LOS
1	24	6	2233	729	0.033	24	17	0.0	0.0	5.106	A
2	390	97	1658	472	0.825	379	598	1.1	3.9	35.171	E
3	912	228	912	1375	0.663	908	1125	1.0	1.9	7.659	A
4	1054	263	797	1616	0.652	1050	1024	1.0	1.8	6.332	A
5	1271	318	993	1484	0.856	1257	854	1.9	5.3	15.025	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)	LOS
1	24	6	2248	722	0.034	24	18	0.0	0.0	5.155	A
2	390	97	1670	467	0.834	388	602	3.9	4.4	43.131	E
3	912	228	926	1368	0.666	911	1132	1.9	2.0	7.877	A
4	1054	263	804	1612	0.654	1054	1034	1.8	1.9	6.444	A
5	1271	318	996	1482	0.857	1269	861	5.3	5.6	16.668	C

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)	LOS
1	20	5	1854	894	0.022	20	15	0.0	0.0	4.117	A
2	318	80	1378	588	0.541	331	496	4.4	1.2	14.651	B
3	744	186	776	1441	0.517	748	933	2.0	1.1	5.222	A
4	860	215	666	1686	0.510	864	857	1.9	1.1	4.394	A
5	1037	259	817	1570	0.661	1052	713	5.6	2.0	7.141	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)	LOS
1	17	4	1543	1030	0.016	17	12	0.0	0.0	3.552	A
2	267	67	1146	683	0.390	269	413	1.2	0.6	8.730	A
3	623	156	638	1507	0.414	625	777	1.1	0.7	4.087	A
4	720	180	553	1747	0.412	722	711	1.1	0.7	3.515	A
5	869	217	683	1635	0.531	872	592	2.0	1.1	4.739	A

Base 2022, PM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Vehicle Mix		HV% is zero for all movements / time segments. Vehicle Mix matrix should be completed whether working in PCUs or Vehs.

Junction Network

Junctions

Junction	Name	Junction Type	Arm order	Junction Delay (s)	Junction LOS
1	untitled	Standard Roundabout	1, 2, 3, 4, 5	48.13	E

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
D4	Base 2022	PM	ONE HOUR	16:15	17:45	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		ONE HOUR	✓	26	100.000
2		ONE HOUR	✓	506	100.000
3		ONE HOUR	✓	1077	100.000
4		ONE HOUR	✓	363	100.000
5		ONE HOUR	✓	1479	100.000

Origin-Destination Data

Demand (PCU/hr)

		To				
		1	2	3	4	5
From	1	0	9	8	9	0
	2	2	0	40	191	273
	3	2	42	0	570	463
	4	1	138	179	0	45
	5	8	311	451	709	0

Vehicle Mix

Heavy Vehicle Percentages

		To				
		1	2	3	4	5
From	1	0	0	0	0	0
	2	0	0	0	0	0
	3	0	0	0	0	0
	4	0	0	0	0	0
	5	0	0	0	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	0.03	4.51	0.0	A	24	36
2	1.03	125.70	19.9	F	464	696
3	0.99	62.47	20.3	F	988	1482
4	0.25	3.01	0.3	A	333	500
5	0.92	22.99	9.8	C	1357	2036

Main Results for each time segment

16:15 - 16:30

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)	LOS
1	20	5	1371	1105	0.018	20	10	0.0	0.0	3.316	A
2	381	95	1016	737	0.517	377	375	0.0	1.0	9.878	A
3	811	203	885	1388	0.584	805	508	0.0	1.4	6.121	A
4	273	68	584	1730	0.158	273	1106	0.0	0.2	2.468	A
5	1113	278	273	1835	0.607	1107	583	0.0	1.5	4.908	A

16:30 - 16:45

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)	LOS
1	23	6	1640	987	0.024	23	12	0.0	0.0	3.733	A
2	455	114	1215	655	0.695	450	448	1.0	2.1	17.242	C
3	968	242	1058	1304	0.742	963	608	1.4	2.8	10.379	B
4	326	82	698	1669	0.196	326	1323	0.2	0.2	2.681	A
5	1330	332	327	1809	0.735	1325	697	1.5	2.7	7.366	A

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)	LOS
1	29	7	1988	836	0.034	29	14	0.0	0.0	4.460	A
2	557	139	1473	548	1.016	515	543	2.1	12.7	70.016	F
3	1186	296	1253	1210	0.980	1140	735	2.8	14.3	37.749	E
4	400	100	816	1605	0.249	399	1576	0.2	0.3	2.985	A
5	1628	407	398	1774	0.918	1604	817	2.7	8.9	18.899	C

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)	LOS
1	29	7	2010	826	0.035	29	14	0.0	0.0	4.513	A
2	557	139	1490	542	1.029	528	549	12.7	19.9	125.701	F
3	1186	296	1275	1199	0.989	1162	743	14.3	20.3	62.470	F
4	400	100	834	1596	0.250	400	1603	0.3	0.3	3.009	A
5	1628	407	400	1773	0.918	1625	834	8.9	9.8	22.987	C

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)	LOS
1	23	6	1676	972	0.024	23	12	0.0	0.0	3.794	A
2	455	114	1241	644	0.706	524	458	19.9	2.6	43.040	E
3	968	242	1141	1264	0.766	1035	624	20.3	3.5	19.878	C
4	326	82	772	1629	0.200	327	1405	0.3	0.3	2.766	A
5	1330	332	331	1807	0.736	1357	768	9.8	2.9	8.467	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)	LOS
1	20	5	1383	1099	0.018	20	10	0.0	0.0	3.336	A
2	381	95	1025	733	0.519	387	378	2.6	1.1	10.572	B
3	811	203	900	1381	0.587	819	513	3.5	1.4	6.500	A
4	273	68	596	1724	0.159	274	1123	0.3	0.2	2.484	A
5	1113	278	275	1834	0.607	1119	595	2.9	1.6	5.066	A

Base 2022 + Committed, AM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Vehicle Mix		HV% is zero for all movements / time segments. Vehicle Mix matrix should be completed whether working in PCUs or Vehs.

Junction Network

Junctions

Junction	Name	Junction Type	Arm order	Junction Delay (s)	Junction LOS
1	untitled	Standard Roundabout	1, 2, 3, 4, 5	25.39	D

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
D5	Base 2022 + Committed	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		ONE HOUR	✓	31	100.000
2		ONE HOUR	✓	404	100.000
3		ONE HOUR	✓	883	100.000
4		ONE HOUR	✓	976	100.000
5		ONE HOUR	✓	1206	100.000

Origin-Destination Data

Demand (PCU/hr)

		To				
		1	2	3	4	5
From	1	0	17	8	3	3
	2	53	0	43	126	182
	3	36	44	0	298	505
	4	21	253	600	0	102
	5	52	236	388	530	0

Vehicle Mix

Heavy Vehicle Percentages

		To				
		1	2	3	4	5
From	1	0	0	0	0	0
	2	0	0	0	0	0
	3	0	0	0	0	0
	4	0	0	0	0	0
	5	0	0	0	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	0.05	5.24	0.0	A	28	43
2	0.96	88.33	10.5	F	371	556
3	0.72	9.64	2.6	A	810	1215
4	0.69	7.40	2.2	A	896	1343
5	0.93	30.92	10.7	D	1107	1660

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)	LOS
1	23	6	1536	1033	0.023	23	121	0.0	0.0	3.566	A
2	304	76	1148	683	0.445	301	412	0.0	0.8	9.353	A
3	665	166	670	1492	0.446	662	778	0.0	0.8	4.319	A
4	735	184	616	1713	0.429	732	716	0.0	0.7	3.658	A
5	908	227	755	1600	0.567	903	593	0.0	1.3	5.125	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)	LOS
1	28	7	1838	901	0.031	28	145	0.0	0.0	4.122	A
2	363	91	1373	590	0.616	360	493	0.8	1.5	15.472	C
3	794	198	802	1428	0.556	792	931	0.8	1.2	5.643	A
4	877	219	737	1648	0.532	876	857	0.7	1.1	4.654	A
5	1084	271	903	1528	0.710	1080	709	1.3	2.4	7.961	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)	LOS
1	34	9	2228	731	0.047	34	174	0.0	0.0	5.163	A
2	445	111	1663	470	0.946	421	599	1.5	7.6	56.318	F
3	972	243	954	1355	0.718	967	1130	1.2	2.5	9.181	A
4	1075	269	889	1566	0.686	1071	1032	1.1	2.1	7.204	A
5	1328	332	1101	1431	0.928	1300	858	2.4	9.3	23.731	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)	LOS
1	34	9	2253	720	0.047	34	177	0.0	0.0	5.244	A
2	445	111	1682	462	0.962	433	604	7.6	10.5	88.330	F
3	972	243	975	1344	0.723	972	1141	2.5	2.6	9.644	A
4	1075	269	899	1561	0.689	1074	1047	2.1	2.2	7.397	A
5	1328	332	1107	1428	0.930	1322	867	9.3	10.7	30.916	D

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)	LOS
1	28	7	1879	883	0.032	28	152	0.0	0.0	4.209	A
2	363	91	1404	577	0.630	398	502	10.5	1.8	23.653	C
3	794	198	852	1404	0.565	799	951	2.6	1.3	5.994	A
4	877	219	763	1634	0.537	881	887	2.2	1.2	4.812	A
5	1084	271	914	1523	0.712	1117	731	10.7	2.6	9.545	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)	LOS
1	23	6	1550	1026	0.023	23	123	0.0	0.0	3.588	A
2	304	76	1158	678	0.448	308	416	1.8	0.8	9.816	A
3	665	166	681	1487	0.447	667	785	1.3	0.8	4.402	A
4	735	184	623	1709	0.430	736	725	1.2	0.8	3.709	A
5	908	227	760	1597	0.568	913	599	2.6	1.3	5.296	A

Base 2022 + Committed, PM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Vehicle Mix		HV% is zero for all movements / time segments. Vehicle Mix matrix should be completed whether working in PCUs or Vehs.

Junction Network

Junctions

Junction	Name	Junction Type	Arm order	Junction Delay (s)	Junction LOS
1	untitled	Standard Roundabout	1, 2, 3, 4, 5	76.26	F

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
D6	Base 2022 + Committed	PM	ONE HOUR	16:15	17:45	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		ONE HOUR	✓	202	100.000
2		ONE HOUR	✓	514	100.000
3		ONE HOUR	✓	1089	100.000
4		ONE HOUR	✓	370	100.000
5		ONE HOUR	✓	1506	100.000

Origin-Destination Data

Demand (PCU/hr)

		To				
		1	2	3	4	5
From	1	0	69	48	57	28
	2	10	0	40	191	273
	3	7	42	0	570	470
	4	4	138	183	0	45
	5	15	311	471	709	0

Vehicle Mix

Heavy Vehicle Percentages

		To				
		1	2	3	4	5
From	1	0	0	0	0	0
	2	0	0	0	0	0
	3	0	0	0	0	0
	4	0	0	0	0	0
	5	0	0	0	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	0.27	6.06	0.4	A	185	278
2	1.18	281.06	47.8	F	472	707
3	1.01	82.85	28.3	F	999	1499
4	0.26	3.05	0.3	A	340	509
5	0.94	29.00	12.5	D	1382	2073

Main Results for each time segment

16:15 - 16:30

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)	LOS
1	152	38	1389	1097	0.139	151	27	0.0	0.2	3.805	A
2	387	97	1120	694	0.558	382	420	0.0	1.2	11.370	B
3	820	205	947	1358	0.604	814	556	0.0	1.5	6.548	A
4	279	70	619	1711	0.163	278	1141	0.0	0.2	2.510	A
5	1134	283	288	1828	0.620	1127	609	0.0	1.6	5.095	A

16:30 - 16:45

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)	LOS
1	182	45	1661	978	0.186	181	32	0.2	0.2	4.516	A
2	462	116	1340	603	0.766	455	502	1.2	3.0	23.280	C
3	979	245	1131	1269	0.772	972	665	1.5	3.2	11.871	B
4	333	83	739	1647	0.202	332	1364	0.2	0.3	2.738	A
5	1354	338	345	1800	0.752	1349	727	1.6	2.9	7.877	A

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)	LOS
1	222	56	2007	827	0.269	222	37	0.2	0.4	5.939	A
2	566	141	1622	487	1.161	475	607	3.0	25.6	128.129	F
3	1199	300	1297	1188	1.009	1137	800	3.2	18.6	46.270	E
4	407	102	834	1595	0.255	407	1600	0.3	0.3	3.029	A
5	1658	415	418	1764	0.940	1626	824	2.9	10.9	22.227	C

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)	LOS
1	222	56	2033	816	0.273	222	38	0.4	0.4	6.063	A
2	566	141	1642	479	1.182	477	614	25.6	47.8	281.058	F
3	1199	300	1311	1182	1.015	1160	808	18.6	28.3	82.846	F
4	407	102	846	1589	0.256	407	1625	0.3	0.3	3.046	A
5	1658	415	419	1764	0.940	1652	835	10.9	12.5	28.999	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)	LOS
1	182	45	1708	958	0.190	182	36	0.4	0.2	4.644	A
2	462	116	1375	589	0.784	577	515	47.8	19.1	212.596	F
3	979	245	1264	1204	0.813	1073	688	28.3	4.9	38.379	E
4	333	83	854	1585	0.210	333	1482	0.3	0.3	2.875	A
5	1354	338	352	1797	0.754	1391	835	12.5	3.2	9.650	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)	LOS
1	152	38	1403	1091	0.139	152	29	0.2	0.2	3.835	A
2	387	97	1131	690	0.561	458	424	19.1	1.3	20.727	C
3	820	205	1023	1321	0.621	833	566	4.9	1.7	7.559	A
4	279	70	670	1684	0.165	279	1186	0.3	0.2	2.564	A
5	1134	283	291	1826	0.621	1140	658	3.2	1.7	5.289	A

Base 2026 + Committed + Dev, AM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Vehicle Mix		HV% is zero for all movements / time segments. Vehicle Mix matrix should be completed whether working in PCUs or Vehs.

Junction Network

Junctions

Junction	Name	Junction Type	Arm order	Junction Delay (s)	Junction LOS
1	untitled	Standard Roundabout	1, 2, 3, 4, 5	109.79	F

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
D7	Base 2026 + Committed + Dev	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		ONE HOUR	✓	32	100.000
2		ONE HOUR	✓	412	100.000
3		ONE HOUR	✓	872	100.000
4		ONE HOUR	✓	1008	100.000
5		ONE HOUR	✓	1459	100.000

Origin-Destination Data

Demand (PCU/hr)

		To				
		1	2	3	4	5
From	1	0	18	8	3	3
	2	53	0	45	131	183
	3	36	46	0	309	481
	4	21	263	623	0	101
	5	52	266	502	639	0

Vehicle Mix

Heavy Vehicle Percentages

		To				
		1	2	3	4	5
From	1	0	0	0	0	0
	2	0	0	0	0	0
	3	0	0	0	0	0
	4	0	0	0	0	0
	5	0	0	0	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	0.05	5.74	0.1	A	29	44
2	1.10	213.12	27.9	F	378	567
3	0.72	9.49	2.5	A	800	1200
4	0.70	7.59	2.3	A	925	1387
5	1.14	213.46	106.3	F	1339	2008

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)	LOS
1	24	6	1750	940	0.026	24	121	0.0	0.0	3.931	A
2	310	78	1330	608	0.510	306	444	0.0	1.0	11.786	B
3	656	164	754	1451	0.452	653	881	0.0	0.8	4.494	A
4	759	190	599	1722	0.441	756	808	0.0	0.8	3.714	A
5	1098	275	781	1587	0.692	1090	574	0.0	2.2	7.113	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)	LOS
1	29	7	2087	793	0.036	29	144	0.0	0.0	4.713	A
2	370	93	1586	502	0.738	364	530	1.0	2.5	25.093	D
3	784	196	898	1382	0.567	782	1052	0.8	1.3	5.985	A
4	906	227	716	1659	0.546	905	964	0.8	1.2	4.761	A
5	1312	328	934	1513	0.867	1297	686	2.2	5.8	15.760	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)	LOS
1	35	9	2373	668	0.053	35	164	0.0	0.1	5.687	A
2	454	113	1794	416	1.090	398	614	2.5	16.4	107.466	F
3	960	240	975	1344	0.714	956	1218	1.3	2.4	9.154	A
4	1110	277	848	1588	0.699	1106	1082	1.2	2.3	7.397	A
5	1606	402	1136	1414	1.136	1401	818	5.8	57.2	90.981	F

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)	LOS
1	35	9	2386	662	0.053	35	165	0.1	0.1	5.739	A
2	454	113	1804	412	1.101	407	617	16.4	27.9	213.121	F
3	960	240	987	1338	0.717	960	1224	2.4	2.5	9.492	A
4	1110	277	856	1584	0.701	1110	1091	2.3	2.3	7.587	A
5	1606	402	1141	1412	1.138	1410	825	57.2	106.3	213.457	F

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)	LOS
1	29	7	2281	708	0.041	29	159	0.1	0.0	5.298	A
2	370	93	1742	438	0.846	423	567	27.9	14.9	186.446	F
3	784	196	1035	1315	0.596	788	1129	2.5	1.5	6.876	A
4	906	227	753	1639	0.553	910	1070	2.3	1.3	4.968	A
5	1312	328	948	1506	0.871	1492	716	106.3	61.2	202.929	F

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)	LOS
1	24	6	1989	835	0.029	24	137	0.0	0.0	4.438	A
2	310	78	1524	528	0.588	364	490	14.9	1.5	28.917	D
3	656	164	913	1375	0.478	659	975	1.5	0.9	5.047	A
4	759	190	636	1702	0.446	761	935	1.3	0.8	3.829	A
5	1098	275	793	1581	0.695	1334	603	61.2	2.4	34.107	D

Base 2026 + Committed + Dev, PM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Vehicle Mix		HV% is zero for all movements / time segments. Vehicle Mix matrix should be completed whether working in PCUs or Vehs.

Junction Network

Junctions

Junction	Name	Junction Type	Arm order	Junction Delay (s)	Junction LOS
1	untitled	Standard Roundabout	1, 2, 3, 4, 5	177.79	F

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
D8	Base 2026 + Committed + Dev	PM	ONE HOUR	16:15	17:45	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		ONE HOUR	✓	203	100.000
2		ONE HOUR	✓	554	100.000
3		ONE HOUR	✓	1228	100.000
4		ONE HOUR	✓	392	100.000
5		ONE HOUR	✓	1609	100.000

Origin-Destination Data

Demand (PCU/hr)

		To				
		1	2	3	4	5
From	1	0	69	48	58	28
	2	10	0	42	198	304
	3	7	44	0	592	585
	4	4	143	190	0	55
	5	16	327	526	740	0

Vehicle Mix

Heavy Vehicle Percentages

		To				
		1	2	3	4	5
From	1	0	0	0	0	0
	2	0	0	0	0	0
	3	0	0	0	0	0
	4	0	0	0	0	0
	5	0	0	0	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	0.29	6.50	0.4	A	186	279
2	1.36	529.01	84.9	F	508	763
3	1.14	250.70	92.4	F	1127	1690
4	0.28	3.19	0.4	A	360	540
5	1.01	65.36	32.8	F	1476	2215

Main Results for each time segment

16:15 - 16:30

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)	LOS
1	153	38	1474	1060	0.144	152	28	0.0	0.2	3.965	A
2	417	104	1190	665	0.627	411	436	0.0	1.6	13.813	B
3	925	231	997	1333	0.693	916	603	0.0	2.2	8.453	A
4	295	74	728	1653	0.179	294	1185	0.0	0.2	2.649	A
5	1211	303	298	1823	0.665	1204	724	0.0	1.9	5.745	A

16:30 - 16:45

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)	LOS
1	182	46	1762	934	0.195	182	33	0.2	0.2	4.784	A
2	498	125	1423	569	0.875	484	522	1.6	5.2	37.017	E
3	1104	276	1186	1242	0.889	1086	721	2.2	6.6	21.062	C
4	352	88	862	1581	0.223	352	1410	0.2	0.3	2.930	A
5	1446	362	357	1794	0.806	1438	857	1.9	3.9	9.896	A

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)	LOS
1	224	56	2089	792	0.282	223	36	0.2	0.4	6.320	A
2	610	152	1691	459	1.330	454	620	5.2	44.1	215.359	F
3	1352	338	1295	1189	1.137	1177	851	6.6	50.3	98.376	F
4	432	108	898	1561	0.276	431	1574	0.3	0.4	3.185	A
5	1772	443	428	1760	1.007	1697	901	3.9	22.6	37.629	E

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)	LOS
1	224	56	2123	777	0.288	223	36	0.4	0.4	6.501	A
2	610	152	1718	447	1.363	447	628	44.1	84.9	502.906	F
3	1352	338	1304	1185	1.141	1183	862	50.3	92.4	224.838	F
4	432	108	897	1562	0.276	432	1590	0.4	0.4	3.184	A
5	1772	443	428	1759	1.007	1731	900	22.6	32.8	65.363	F

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)	LOS
1	182	46	1886	880	0.207	183	35	0.4	0.3	5.167	A
2	498	125	1519	530	0.940	524	550	84.9	78.5	529.010	F
3	1104	276	1279	1197	0.922	1184	764	92.4	72.3	250.696	F
4	352	88	935	1541	0.229	353	1528	0.4	0.3	3.031	A
5	1446	362	362	1792	0.807	1559	926	32.8	4.5	22.081	C

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)	LOS
1	153	38	1503	1047	0.146	153	34	0.3	0.2	4.029	A
2	417	104	1205	659	0.633	651	451	78.5	20.1	277.881	F
3	925	231	1228	1222	0.757	1196	628	72.3	4.4	117.791	F
4	295	74	1010	1501	0.197	295	1415	0.3	0.2	2.985	A
5	1211	303	315	1814	0.668	1221	990	4.5	2.0	6.167	A

Base 2022 + Committed + Ph1, AM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Vehicle Mix		HV% is zero for all movements / time segments. Vehicle Mix matrix should be completed whether working in PCUs or Vehs.

Junction Network

Junctions

Junction	Name	Junction Type	Arm order	Junction Delay (s)	Junction LOS
1	untitled	Standard Roundabout	1, 2, 3, 4, 5	18.60	C

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
D9	Base 2022 + Committed + Ph1	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		ONE HOUR	✓	31	100.000
2		ONE HOUR	✓	384	100.000
3		ONE HOUR	✓	764	100.000
4		ONE HOUR	✓	964	100.000
5		ONE HOUR	✓	1172	100.000

Origin-Destination Data

Demand (PCU/hr)

		To				
		1	2	3	4	5
From	1	0	17	8	3	3
	2	53	0	43	126	162
	3	36	44	0	298	386
	4	21	253	600	0	90
	5	52	234	377	509	0

Vehicle Mix

Heavy Vehicle Percentages

		To				
		1	2	3	4	5
From	1	0	0	0	0	0
	2	0	0	0	0	0
	3	0	0	0	0	0
	4	0	0	0	0	0
	5	0	0	0	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	0.05	5.13	0.0	A	28	43
2	0.89	56.23	6.1	F	352	529
3	0.62	6.90	1.6	A	701	1052
4	0.65	6.21	1.8	A	885	1327
5	0.90	24.45	8.3	C	1075	1613

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)	LOS
1	23	6	1511	1044	0.022	23	121	0.0	0.0	3.527	A
2	289	72	1124	693	0.417	286	411	0.0	0.7	8.800	A
3	575	144	640	1507	0.382	573	770	0.0	0.6	3.845	A
4	726	181	512	1769	0.410	723	701	0.0	0.7	3.434	A
5	882	221	755	1600	0.551	877	480	0.0	1.2	4.950	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)	LOS
1	28	7	1808	914	0.030	28	145	0.0	0.0	4.062	A
2	345	86	1345	602	0.574	343	491	0.7	1.3	13.785	B
3	687	172	766	1446	0.475	686	922	0.6	0.9	4.730	A
4	867	217	613	1715	0.505	865	839	0.7	1.0	4.233	A
5	1054	263	904	1528	0.690	1050	575	1.2	2.2	7.476	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)	LOS
1	34	9	2198	744	0.046	34	175	0.0	0.0	5.067	A
2	423	106	1634	482	0.876	408	598	1.3	5.1	41.826	E
3	841	210	920	1371	0.614	839	1121	0.9	1.6	6.727	A
4	1061	265	743	1645	0.645	1058	1015	1.0	1.8	6.106	A
5	1290	323	1104	1430	0.902	1269	698	2.2	7.5	20.177	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)	LOS
1	34	9	2218	736	0.046	34	178	0.0	0.0	5.130	A
2	423	106	1649	476	0.888	419	603	5.1	6.1	56.229	F
3	841	210	937	1362	0.617	841	1130	1.6	1.6	6.899	A
4	1061	265	751	1640	0.647	1061	1028	1.8	1.8	6.213	A
5	1290	323	1108	1428	0.904	1287	704	7.5	8.3	24.449	C

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)	LOS
1	28	7	1839	901	0.031	28	149	0.0	0.0	4.126	A
2	345	86	1368	592	0.583	364	498	6.1	1.5	16.994	C
3	687	172	796	1431	0.480	689	936	1.6	0.9	4.875	A
4	867	217	627	1707	0.508	870	859	1.8	1.0	4.316	A
5	1054	263	911	1524	0.691	1077	586	8.3	2.3	8.471	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)	LOS
1	23	6	1524	1038	0.022	23	123	0.0	0.0	3.549	A
2	289	72	1133	689	0.420	292	414	1.5	0.7	9.137	A
3	575	144	649	1502	0.383	576	776	0.9	0.6	3.893	A
4	726	181	517	1766	0.411	727	708	1.0	0.7	3.469	A
5	882	221	760	1598	0.552	887	485	2.3	1.2	5.093	A

Base 2022 + Committed + Ph1, PM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Vehicle Mix		HV% is zero for all movements / time segments. Vehicle Mix matrix should be completed whether working in PCUs or Vehs.

Junction Network

Junctions

Junction	Name	Junction Type	Arm order	Junction Delay (s)	Junction LOS
1	untitled	Standard Roundabout	1, 2, 3, 4, 5	22.59	C

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
D10	Base 2022 + Committed + Ph1	PM	ONE HOUR	16:15	17:45	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		ONE HOUR	✓	202	100.000
2		ONE HOUR	✓	508	100.000
3		ONE HOUR	✓	486	100.000
4		ONE HOUR	✓	367	100.000
5		ONE HOUR	✓	1285	100.000

Origin-Destination Data

Demand (PCU/hr)

		To				
		1	2	3	4	5
From	1	0	69	48	57	28
	2	10	0	40	191	267
	3	7	42	0	0	437
	4	4	138	183	0	42
	5	15	295	405	570	0

Vehicle Mix

Heavy Vehicle Percentages

		To				
		1	2	3	4	5
From	1	0	0	0	0	0
	2	0	0	0	0	0
	3	0	0	0	0	0
	4	0	0	0	0	0
	5	0	0	0	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	0.24	5.17	0.3	A	185	278
2	0.98	91.29	13.8	F	466	699
3	0.44	5.22	0.8	A	446	669
4	0.26	3.06	0.3	A	337	505
5	0.80	10.32	4.0	B	1179	1769

Main Results for each time segment

16:15 - 16:30

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)	LOS
1	152	38	1224	1169	0.130	151	27	0.0	0.1	3.537	A
2	382	96	968	757	0.505	378	408	0.0	1.0	9.416	A
3	366	91	840	1410	0.260	364	507	0.0	0.3	3.439	A
4	276	69	592	1726	0.160	276	612	0.0	0.2	2.481	A
5	967	242	288	1828	0.529	963	579	0.0	1.1	4.144	A

16:30 - 16:45

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)	LOS
1	182	45	1465	1064	0.171	181	32	0.1	0.2	4.079	A
2	457	114	1158	678	0.673	453	488	1.0	2.0	15.695	C
3	437	109	1005	1330	0.329	436	606	0.3	0.5	4.026	A
4	330	82	708	1663	0.198	330	733	0.2	0.2	2.699	A
5	1155	289	345	1800	0.642	1153	693	1.1	1.8	5.538	A

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)	LOS
1	222	56	1789	922	0.241	222	39	0.2	0.3	5.136	A
2	559	140	1415	573	0.977	527	597	2.0	10.0	57.376	F
3	535	134	1203	1234	0.434	534	739	0.5	0.8	5.127	A
4	404	101	852	1586	0.255	404	885	0.2	0.3	3.045	A
5	1415	354	422	1763	0.803	1406	834	1.8	3.9	9.880	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)	LOS
1	222	56	1798	919	0.242	222	39	0.3	0.3	5.169	A
2	559	140	1421	570	0.981	544	599	10.0	13.8	91.294	F
3	535	134	1222	1224	0.437	535	743	0.8	0.8	5.221	A
4	404	101	863	1580	0.256	404	895	0.3	0.3	3.060	A
5	1415	354	422	1762	0.803	1414	844	3.9	4.0	10.317	B

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)	LOS
1	182	45	1477	1058	0.172	182	33	0.3	0.2	4.109	A
2	457	114	1168	675	0.677	503	491	13.8	2.2	25.980	D
3	437	109	1056	1305	0.335	438	614	0.8	0.5	4.158	A
4	330	82	737	1648	0.200	330	757	0.3	0.3	2.733	A
5	1155	289	347	1799	0.642	1164	721	4.0	1.8	5.738	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)	LOS
1	152	38	1232	1165	0.131	152	27	0.2	0.2	3.554	A
2	382	96	974	754	0.507	387	410	2.2	1.1	9.929	A
3	366	91	851	1404	0.261	366	510	0.5	0.4	3.472	A
4	276	69	599	1722	0.160	277	619	0.3	0.2	2.490	A
5	967	242	289	1827	0.529	970	586	1.8	1.1	4.214	A

Junctions 9

ARCADY 9 - Roundabout Module

Version: 9.0.2.5947

For sales and distribution information, program advice and maintenance, contact TRL:
+44 (0)1344 770558 software@trl.co.uk www.trlsoftware.co.uk

Filename: Craigforth Roundabout Rev1.j9
Path: C:\Users\GBDEPS\AppData\Local\Microsoft\Windows\INetCache\Content.Outlook\N4ENF6SA
Report generation date: 09/07/2020 16:33:04

Summary of junction performance

	AM				PM			
	Queue (PCU)	Delay (s)	RFC	LOS	Queue (PCU)	Delay (s)	RFC	LOS
	Base 2019							
Arm 1	0.7	2.90	0.40	A	0.6	2.89	0.39	A
Arm 2	13.9	35.72	0.95	E	0.6	3.41	0.38	A
Arm 3	0.2	5.59	0.13	A	3.3	17.22	0.78	C
Arm 4	1.1	8.48	0.54	A	4.6	25.74	0.83	D
	Base 2022							
Arm 1	0.7	2.96	0.42	A	0.7	2.96	0.41	A
Arm 2	23.0	55.03	0.99	F	0.6	3.49	0.39	A
Arm 3	0.2	5.74	0.14	A	4.1	20.76	0.81	C
Arm 4	1.2	9.01	0.56	A	6.3	34.40	0.88	D
	Base 2022 + Committed							
Arm 1	0.7	2.99	0.42	A	0.7	3.05	0.43	A
Arm 2	36.9	80.22	1.02	F	0.7	3.59	0.41	A
Arm 3	0.2	5.87	0.14	A	4.5	22.56	0.83	C
Arm 4	1.3	9.58	0.58	A	7.3	39.61	0.90	E
	Base 2026 + Committed + Dev							
Arm 1	0.7	2.96	0.41	A	1.1	3.75	0.52	A
Arm 2	18.1	45.15	0.97	E	1.3	5.29	0.56	A
Arm 3	1.8	19.59	0.65	C	9.3	44.65	0.92	E
Arm 4	1.7	11.48	0.64	B	15.3	75.31	0.98	F
	Base 2022 + Com + Dev Ph 1							
Arm 1	0.5	2.62	0.34	A	0.7	2.88	0.40	A
Arm 2	4.5	12.54	0.82	B	0.7	3.52	0.40	A
Arm 3	0.1	7.51	0.10	A	0.6	6.66	0.39	A
Arm 4	1.4	9.51	0.58	A	2.5	13.20	0.72	B

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.

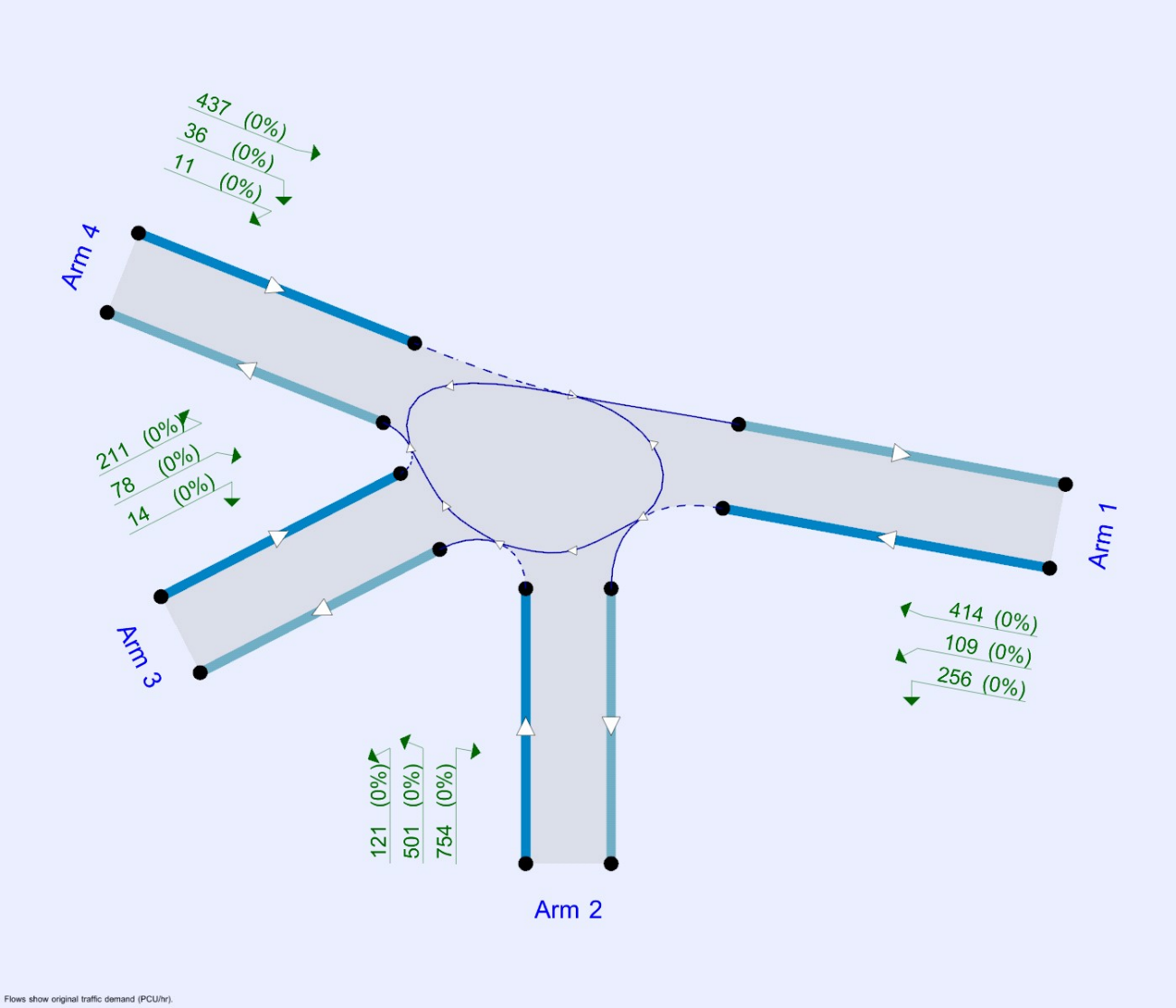
File summary

File Description

Title	(untitled)
Location	
Site number	
Date	18/03/2020
Version	
Status	(new file)
Identifier	
Client	
Jobnumber	
Enumerator	SWECO\GBCADL
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



The junction diagram reflects the last run of Junctions.

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	Base 2019	AM	ONE HOUR	07:45	09:15	15	✓
D2	Base 2019	PM	ONE HOUR	17:15	18:45	15	✓
D3	Base 2022	AM	ONE HOUR	07:45	09:15	15	✓
D4	Base 2022	PM	ONE HOUR	17:15	18:45	15	✓
D5	Base 2022 + Committed	AM	ONE HOUR	07:45	09:15	15	✓
D6	Base 2022 + Committed	PM	ONE HOUR	17:15	18:45	15	✓
D7	Base 2026 + Committed + Dev	AM	ONE HOUR	07:45	09:15	15	✓
D8	Base 2026 + Committed + Dev	PM	ONE HOUR	17:15	18:45	15	✓
D10	Base 2022 + Com + Dev Ph 1	AM	ONE HOUR	07:45	09:15	15	✓
D11	Base 2022 + Com + Dev Ph 1	PM	ONE HOUR	17:15	18:45	15	✓

Analysis Set Details

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

Base 2019, AM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Geometry	Arm 1 - Roundabout Geometry	Effective flare length is over 30m, which is outside the normal range. Treat capacities with increasing caution.
Warning	Vehicle Mix		HV% is zero for all movements / time segments. Vehicle Mix matrix should be completed whether working in PCUs or Vehs.

Junction Network

Junctions

Junction	Name	Junction Type	Arm order	Junction Delay (s)	Junction LOS
1	untitled	Standard Roundabout	1, 2, 3, 4	20.64	C

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

Arms

Arms

Arm	Name	Description
1	A84 (East)	
2	M9	
3	untitled	
4	A84 (West)	

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	3.70	7.30	38.0	40.0	90.0	13.0	
2	7.30	7.30	0.0	20.0	90.0	65.0	
3	3.50	7.00	8.0	25.0	82.0	44.0	
4	3.40	7.00	30.0	30.0	82.0	41.0	

Slope / Intercept / Capacity

Roundabout Slope and Intercept used in model

Arm	Final slope	Final intercept (PCU/hr)
1	0.534	2122
2	0.465	1943
3	0.422	1444
4	0.474	1779

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

Arm Capacity Adjustments

Arm	Type	Reason	Direct capacity adjustment (PCU/hr)
2	Direct		-100
3	Direct		-150
4	Direct		-475

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	Base 2019	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		ONE HOUR	✓	768	100.000
2		ONE HOUR	✓	1351	100.000
3		ONE HOUR	✓	90	100.000
4		ONE HOUR	✓	444	100.000

Origin-Destination Data

Demand (PCU/hr)

		To			
		1	2	3	4
From	1	0	234	281	253
	2	662	0	413	276
	3	75	14	0	1
	4	401	34	9	0

Vehicle Mix

Heavy Vehicle Percentages

		To			
		1	2	3	4
From	1	0	0	0	0
	2	0	0	0	0
	3	0	0	0	0
	4	0	0	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	0.40	2.90	0.7	A	705	1057
2	0.95	35.72	13.9	E	1240	1860
3	0.13	5.59	0.2	A	83	124
4	0.54	8.48	1.1	A	407	611

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)	LOS
1	578	145	43	2099	0.275	577	852	0.0	0.4	2.363	A
2	1017	254	408	1654	0.615	1011	212	0.0	1.6	5.547	A
3	68	17	892	918	0.074	67	527	0.0	0.1	4.233	A
4	334	84	562	1037	0.322	332	397	0.0	0.5	5.096	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)	LOS
1	690	173	51	2094	0.330	690	1020	0.4	0.5	2.563	A
2	1215	304	488	1617	0.751	1209	253	1.6	2.9	8.720	A
3	81	20	1067	844	0.096	81	630	0.1	0.1	4.718	A
4	399	100	672	985	0.405	398	475	0.5	0.7	6.132	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)	LOS
1	846	211	63	2088	0.405	845	1234	0.5	0.7	2.894	A
2	1487	372	597	1566	0.950	1452	310	2.9	11.7	26.116	D
3	99	25	1287	751	0.132	99	763	0.1	0.2	5.519	A
4	489	122	809	920	0.532	487	576	0.7	1.1	8.292	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)	LOS
1	846	211	63	2088	0.405	846	1249	0.7	0.7	2.896	A
2	1487	372	598	1565	0.950	1479	310	11.7	13.9	35.723	E
3	99	25	1305	743	0.133	99	771	0.2	0.2	5.588	A
4	489	122	823	913	0.535	489	582	1.1	1.1	8.476	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)	LOS
1	690	173	51	2094	0.330	691	1046	0.7	0.5	2.568	A
2	1215	304	489	1616	0.751	1257	254	13.9	3.1	11.153	B
3	81	20	1101	830	0.098	81	645	0.2	0.1	4.812	A
4	399	100	696	973	0.410	401	485	1.1	0.7	6.310	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)	LOS
1	578	145	43	2099	0.276	579	861	0.5	0.4	2.368	A
2	1017	254	409	1653	0.615	1023	213	3.1	1.6	5.767	A
3	68	17	901	914	0.074	68	531	0.1	0.1	4.257	A
4	334	84	568	1034	0.323	335	400	0.7	0.5	5.160	A

Base 2019, PM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Geometry	Arm 1 - Roundabout Geometry	Effective flare length is over 30m, which is outside the normal range. Treat capacities with increasing caution.
Warning	Vehicle Mix		HV% is zero for all movements / time segments. Vehicle Mix matrix should be completed whether working in PCUs or Vehs.

Junction Network

Junctions

Junction	Name	Junction Type	Arm order	Junction Delay (s)	Junction LOS
1	untitled	Standard Roundabout	1, 2, 3, 4	12.09	B

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	Base 2019	PM	ONE HOUR	17:15	18:45	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		ONE HOUR	✓	736	100.000
2		ONE HOUR	✓	580	100.000
3		ONE HOUR	✓	657	100.000
4		ONE HOUR	✓	619	100.000

Origin-Destination Data

Demand (PCU/hr)

		To			
		1	2	3	4
From	1	0	450	58	228
	2	298	0	26	256
	3	586	48	0	23
	4	555	59	5	0

Vehicle Mix

Heavy Vehicle Percentages

		To			
		1	2	3	4
From	1	0	0	0	0
	2	0	0	0	0
	3	0	0	0	0
	4	0	0	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	0.39	2.89	0.6	A	675	1013
2	0.38	3.41	0.6	A	532	798
3	0.78	17.22	3.3	C	603	904
4	0.83	25.74	4.6	D	568	852

Main Results for each time segment

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)	LOS
1	554	139	84	2077	0.267	553	1076	0.0	0.4	2.360	A
2	437	109	218	1742	0.251	435	418	0.0	0.3	2.753	A
3	495	124	587	1046	0.473	491	67	0.0	0.9	6.485	A
4	466	117	698	973	0.479	462	381	0.0	0.9	7.008	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)	LOS
1	662	165	100	2068	0.320	661	1289	0.4	0.5	2.559	A
2	521	130	261	1722	0.303	521	500	0.3	0.4	2.998	A
3	591	148	702	998	0.592	588	80	0.9	1.4	8.754	A
4	556	139	836	907	0.613	554	455	0.9	1.5	10.117	B

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)	LOS
1	810	203	122	2057	0.394	810	1568	0.5	0.6	2.885	A
2	639	160	320	1695	0.377	638	611	0.4	0.6	3.405	A
3	723	181	860	931	0.777	716	98	1.4	3.2	16.223	C
4	682	170	1019	820	0.831	671	557	1.5	4.3	22.577	C

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)	LOS
1	810	203	123	2056	0.394	810	1583	0.6	0.6	2.889	A
2	639	160	320	1694	0.377	639	613	0.6	0.6	3.408	A
3	723	181	861	931	0.777	723	98	3.2	3.3	17.217	C
4	682	170	1026	817	0.834	680	558	4.3	4.6	25.743	D

18:15 - 18:30

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)	LOS
1	662	165	102	2067	0.320	662	1311	0.6	0.5	2.566	A
2	521	130	262	1722	0.303	522	503	0.6	0.4	3.002	A
3	591	148	704	997	0.592	598	80	3.3	1.5	9.186	A
4	556	139	845	902	0.617	568	457	4.6	1.7	11.134	B

18:30 - 18:45

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)	LOS
1	554	139	85	2076	0.267	555	1088	0.5	0.4	2.365	A
2	437	109	219	1741	0.251	437	420	0.4	0.3	2.762	A
3	495	124	589	1045	0.473	497	67	1.5	0.9	6.593	A
4	466	117	704	970	0.481	469	382	1.7	0.9	7.230	A

Base 2022, AM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Geometry	Arm 1 - Roundabout Geometry	Effective flare length is over 30m, which is outside the normal range. Treat capacities with increasing caution.
Warning	Vehicle Mix		HV% is zero for all movements / time segments. Vehicle Mix matrix should be completed whether working in PCUs or Vehs.

Junction Network

Junctions

Junction	Name	Junction Type	Arm order	Junction Delay (s)	Junction LOS
1	untitled	Standard Roundabout	1, 2, 3, 4	30.59	D

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
D3	Base 2022	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		ONE HOUR	✓	793	100.000
2		ONE HOUR	✓	1396	100.000
3		ONE HOUR	✓	93	100.000
4		ONE HOUR	✓	458	100.000

Origin-Destination Data

Demand (PCU/hr)

		To			
		1	2	3	4
From	1	0	242	290	261
	2	684	0	427	285
	3	78	14	0	1
	4	414	35	9	0

Vehicle Mix

Heavy Vehicle Percentages

		To			
		1	2	3	4
From	1	0	0	0	0
	2	0	0	0	0
	3	0	0	0	0
	4	0	0	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	0.42	2.96	0.7	A	728	1092
2	0.99	55.03	23.0	F	1281	1921
3	0.14	5.74	0.2	A	85	128
4	0.56	9.01	1.2	A	420	630

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)	LOS
1	597	149	43	2098	0.285	595	880	0.0	0.4	2.393	A
2	1051	263	420	1648	0.638	1044	218	0.0	1.7	5.898	A
3	70	18	921	905	0.077	70	544	0.0	0.1	4.304	A
4	345	86	580	1028	0.335	343	410	0.0	0.5	5.238	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)	LOS
1	713	178	52	2094	0.340	712	1053	0.4	0.5	2.606	A
2	1255	314	503	1610	0.780	1248	261	1.7	3.4	9.790	A
3	84	21	1101	829	0.101	83	650	0.1	0.1	4.826	A
4	412	103	694	974	0.423	411	490	0.5	0.7	6.379	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)	LOS
1	873	218	64	2088	0.418	872	1266	0.5	0.7	2.961	A
2	1537	384	616	1557	0.987	1482	320	3.4	17.1	34.492	D
3	102	26	1316	739	0.139	102	782	0.1	0.2	5.654	A
4	504	126	827	911	0.553	502	591	0.7	1.2	8.764	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)	LOS
1	873	218	64	2087	0.418	873	1283	0.7	0.7	2.963	A
2	1537	384	617	1557	0.987	1514	320	17.1	23.0	55.027	F
3	102	26	1338	729	0.140	102	792	0.2	0.2	5.741	A
4	504	126	843	904	0.558	504	597	1.2	1.2	9.006	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)	LOS
1	713	178	52	2094	0.341	714	1097	0.7	0.5	2.611	A
2	1255	314	504	1609	0.780	1332	262	23.0	3.8	16.317	C
3	84	21	1159	805	0.104	84	677	0.2	0.1	4.994	A
4	412	103	735	955	0.431	414	508	1.2	0.8	6.679	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)	LOS
1	597	149	44	2098	0.285	597	890	0.5	0.4	2.401	A
2	1051	263	422	1647	0.638	1059	219	3.8	1.8	6.199	A
3	70	18	932	901	0.078	70	549	0.1	0.1	4.335	A
4	345	86	588	1025	0.337	346	414	0.8	0.5	5.314	A

Base 2022, PM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Geometry	Arm 1 - Roundabout Geometry	Effective flare length is over 30m, which is outside the normal range. Treat capacities with increasing caution.
Warning	Vehicle Mix		HV% is zero for all movements / time segments. Vehicle Mix matrix should be completed whether working in PCUs or Vehs.

Junction Network

Junctions

Junction	Name	Junction Type	Arm order	Junction Delay (s)	Junction LOS
1	untitled	Standard Roundabout	1, 2, 3, 4	15.11	C

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
D4	Base 2022	PM	ONE HOUR	17:15	18:45	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		ONE HOUR	✓	760	100.000
2		ONE HOUR	✓	599	100.000
3		ONE HOUR	✓	679	100.000
4		ONE HOUR	✓	640	100.000

Origin-Destination Data

Demand (PCU/hr)

		To			
		1	2	3	4
From	1	0	464	60	236
	2	308	0	26	265
	3	605	50	0	24
	4	574	61	5	0

Vehicle Mix

Heavy Vehicle Percentages

		To			
		1	2	3	4
From	1	0	0	0	0
	2	0	0	0	0
	3	0	0	0	0
	4	0	0	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	0.41	2.96	0.7	A	697	1046
2	0.39	3.49	0.6	A	550	824
3	0.81	20.76	4.1	C	623	935
4	0.88	34.40	6.3	D	587	881

Main Results for each time segment

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)	LOS
1	572	143	87	2075	0.276	571	1112	0.0	0.4	2.390	A
2	451	113	226	1738	0.259	450	431	0.0	0.3	2.791	A
3	511	128	607	1038	0.493	507	68	0.0	1.0	6.739	A
4	482	120	721	962	0.501	478	394	0.0	1.0	7.384	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)	LOS
1	683	171	104	2066	0.331	683	1332	0.4	0.5	2.602	A
2	538	135	270	1718	0.314	538	516	0.3	0.5	3.052	A
3	610	153	727	987	0.618	608	82	1.0	1.6	9.425	A
4	575	144	863	894	0.644	572	472	1.0	1.7	11.083	B

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)	LOS
1	837	209	125	2055	0.407	836	1615	0.5	0.7	2.953	A
2	660	165	331	1689	0.390	659	630	0.5	0.6	3.491	A
3	748	187	890	919	0.814	738	100	1.6	3.9	19.032	C
4	705	176	1051	805	0.875	689	577	1.7	5.6	28.019	D

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)	LOS
1	837	209	127	2054	0.407	837	1634	0.7	0.7	2.958	A
2	660	165	331	1689	0.390	660	633	0.6	0.6	3.495	A
3	748	187	891	918	0.814	747	100	3.9	4.1	20.756	C
4	705	176	1059	801	0.880	702	578	5.6	6.3	34.403	D

18:15 - 18:30

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)	LOS
1	683	171	107	2064	0.331	684	1362	0.7	0.5	2.608	A
2	538	135	271	1717	0.314	539	520	0.6	0.5	3.056	A
3	610	153	728	987	0.619	620	82	4.1	1.7	10.076	B
4	575	144	876	888	0.648	593	473	6.3	1.9	12.872	B

18:30 - 18:45

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)	LOS
1	572	143	88	2075	0.276	573	1125	0.5	0.4	2.397	A
2	451	113	227	1738	0.259	451	434	0.5	0.4	2.800	A
3	511	128	610	1037	0.493	514	69	1.7	1.0	6.922	A
4	482	120	728	958	0.503	485	396	1.9	1.0	7.669	A

Base 2022 + Committed, AM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Geometry	Arm 1 - Roundabout Geometry	Effective flare length is over 30m, which is outside the normal range. Treat capacities with increasing caution.
Warning	Vehicle Mix		HV% is zero for all movements / time segments. Vehicle Mix matrix should be completed whether working in PCUs or Vehs.

Junction Network

Junctions

Junction	Name	Junction Type	Arm order	Junction Delay (s)	Junction LOS
1	untitled	Standard Roundabout	1, 2, 3, 4	43.88	E

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
D5	Base 2022 + Committed	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		ONE HOUR	✓	803	100.000
2		ONE HOUR	✓	1440	100.000
3		ONE HOUR	✓	93	100.000
4		ONE HOUR	✓	465	100.000

Origin-Destination Data

Demand (PCU/hr)

		To			
		1	2	3	4
From	1	0	247	291	265
	2	728	0	427	285
	3	78	14	0	1
	4	421	35	9	0

Vehicle Mix

Heavy Vehicle Percentages

		To			
		1	2	3	4
From	1	0	0	0	0
	2	0	0	0	0
	3	0	0	0	0
	4	0	0	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	0.42	2.99	0.7	A	737	1105
2	1.02	80.22	36.9	F	1321	1982
3	0.14	5.87	0.2	A	85	128
4	0.58	9.58	1.3	A	427	640

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)	LOS
1	605	151	43	2098	0.288	603	918	0.0	0.4	2.405	A
2	1084	271	424	1646	0.659	1077	222	0.0	1.9	6.241	A
3	70	18	956	890	0.079	70	544	0.0	0.1	4.384	A
4	350	88	613	1013	0.346	348	413	0.0	0.5	5.401	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)	LOS
1	722	180	52	2094	0.345	721	1098	0.4	0.5	2.623	A
2	1295	324	508	1607	0.805	1286	266	1.9	3.9	10.947	B
3	84	21	1143	812	0.103	83	651	0.1	0.1	4.944	A
4	418	105	733	956	0.437	417	494	0.5	0.8	6.669	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)	LOS
1	884	221	64	2088	0.424	883	1308	0.5	0.7	2.988	A
2	1585	396	621	1555	1.020	1504	325	3.9	24.2	43.996	E
3	102	26	1350	724	0.141	102	776	0.1	0.2	5.784	A
4	512	128	862	895	0.572	510	590	0.8	1.3	9.299	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)	LOS
1	884	221	64	2087	0.424	884	1325	0.7	0.7	2.991	A
2	1585	396	622	1554	1.020	1535	326	24.2	36.9	80.217	F
3	102	26	1371	715	0.143	102	785	0.2	0.2	5.873	A
4	512	128	877	887	0.577	512	597	1.3	1.3	9.579	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)	LOS
1	722	180	52	2094	0.345	723	1170	0.7	0.5	2.629	A
2	1295	324	509	1607	0.806	1424	267	36.9	4.5	30.464	D
3	84	21	1240	771	0.108	84	692	0.2	0.1	5.242	A
4	418	105	803	923	0.453	420	521	1.3	0.8	7.189	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)	LOS
1	605	151	44	2098	0.288	605	930	0.5	0.4	2.413	A
2	1084	271	426	1645	0.659	1094	223	4.5	2.0	6.651	A
3	70	18	970	885	0.079	70	551	0.1	0.1	4.420	A
4	350	88	623	1008	0.347	351	417	0.8	0.5	5.490	A

Base 2022 + Committed, PM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Geometry	Arm 1 - Roundabout Geometry	Effective flare length is over 30m, which is outside the normal range. Treat capacities with increasing caution.
Warning	Vehicle Mix		HV% is zero for all movements / time segments. Vehicle Mix matrix should be completed whether working in PCUs or Vehs.

Junction Network

Junctions

Junction	Name	Junction Type	Arm order	Junction Delay (s)	Junction LOS
1	untitled	Standard Roundabout	1, 2, 3, 4	16.62	C

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
D6	Base 2022 + Committed	PM	ONE HOUR	17:15	18:45	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		ONE HOUR	✓	795	100.000
2		ONE HOUR	✓	620	100.000
3		ONE HOUR	✓	679	100.000
4		ONE HOUR	✓	645	100.000

Origin-Destination Data

Demand (PCU/hr)

		To			
		1	2	3	4
From	1	0	489	60	246
	2	329	0	26	265
	3	605	50	0	24
	4	579	61	5	0

Vehicle Mix

Heavy Vehicle Percentages

		To			
		1	2	3	4
From	1	0	0	0	0
	2	0	0	0	0
	3	0	0	0	0
	4	0	0	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	0.43	3.05	0.7	A	730	1094
2	0.41	3.59	0.7	A	569	853
3	0.83	22.56	4.5	C	623	935
4	0.90	39.61	7.3	E	592	888

Main Results for each time segment

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)	LOS
1	599	150	87	2075	0.288	597	1131	0.0	0.4	2.433	A
2	467	117	233	1735	0.269	465	450	0.0	0.4	2.834	A
3	511	128	630	1028	0.497	507	68	0.0	1.0	6.864	A
4	486	121	736	954	0.509	482	402	0.0	1.0	7.552	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)	LOS
1	715	179	104	2066	0.346	714	1355	0.4	0.5	2.663	A
2	557	139	279	1713	0.325	557	539	0.4	0.5	3.110	A
3	610	153	755	976	0.626	608	82	1.0	1.6	9.718	A
4	580	145	882	885	0.655	577	481	1.0	1.8	11.543	B

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)	LOS
1	875	219	125	2055	0.426	874	1640	0.5	0.7	3.049	A
2	683	171	342	1684	0.405	682	658	0.5	0.7	3.587	A
3	748	187	924	904	0.827	737	100	1.6	4.2	20.392	C
4	710	178	1073	794	0.894	692	588	1.8	6.3	30.951	D

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)	LOS
1	875	219	127	2054	0.426	875	1661	0.7	0.7	3.054	A
2	683	171	342	1684	0.405	683	660	0.7	0.7	3.593	A
3	748	187	925	904	0.827	747	100	4.2	4.5	22.555	C
4	710	178	1082	790	0.899	706	589	6.3	7.3	39.614	E

18:15 - 18:30

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)	LOS
1	715	179	107	2064	0.346	716	1389	0.7	0.5	2.672	A
2	557	139	280	1713	0.325	558	543	0.7	0.5	3.120	A
3	610	153	756	975	0.626	621	82	4.5	1.7	10.481	B
4	580	145	896	879	0.660	601	482	7.3	2.0	13.871	B

18:30 - 18:45

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)	LOS
1	599	150	88	2075	0.289	599	1145	0.5	0.4	2.440	A
2	467	117	234	1734	0.269	467	453	0.5	0.4	2.843	A
3	511	128	633	1027	0.498	514	69	1.7	1.0	7.057	A
4	486	121	744	951	0.511	489	403	2.0	1.1	7.867	A

Base 2026 + Committed + Dev, AM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Geometry	Arm 1 - Roundabout Geometry	Effective flare length is over 30m, which is outside the normal range. Treat capacities with increasing caution.
Warning	Vehicle Mix		HV% is zero for all movements / time segments. Vehicle Mix matrix should be completed whether working in PCUs or Vehs.

Junction Network

Junctions

Junction	Name	Junction Type	Arm order	Junction Delay (s)	Junction LOS
1	untitled	Standard Roundabout	1, 2, 3, 4	25.72	D

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
D7	Base 2026 + Committed + Dev	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		ONE HOUR	✓	779	100.000
2		ONE HOUR	✓	1376	100.000
3		ONE HOUR	✓	303	100.000
4		ONE HOUR	✓	502	100.000

Origin-Destination Data

Demand (PCU/hr)

		To			
		1	2	3	4
From	1	0	256	109	414
	2	754	0	121	501
	3	78	14	0	211
	4	437	36	11	18

Vehicle Mix

Heavy Vehicle Percentages

		To			
		1	2	3	4
From	1	0	0	0	0
	2	0	0	0	0
	3	0	0	0	0
	4	0	0	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	0.41	2.96	0.7	A	715	1072
2	0.97	45.15	18.1	E	1263	1894
3	0.65	19.59	1.8	C	278	417
4	0.64	11.48	1.7	B	461	691

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)	LOS
1	586	147	59	2090	0.281	585	949	0.0	0.4	2.390	A
2	1036	259	414	1651	0.628	1029	230	0.0	1.7	5.733	A
3	228	57	1263	761	0.300	226	181	0.0	0.4	6.693	A
4	378	94	633	1003	0.377	376	857	0.0	0.6	5.712	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)	LOS
1	700	175	71	2084	0.336	700	1136	0.4	0.5	2.601	A
2	1237	309	496	1613	0.767	1231	275	1.7	3.2	9.281	A
3	272	68	1511	656	0.415	271	216	0.4	0.7	9.321	A
4	451	113	757	944	0.478	450	1025	0.6	0.9	7.264	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)	LOS
1	858	214	86	2075	0.413	857	1369	0.5	0.7	2.953	A
2	1515	379	607	1561	0.970	1470	336	3.2	14.4	30.397	D
3	334	83	1816	528	0.632	330	261	0.7	1.6	17.876	C
4	553	138	906	874	0.633	550	1240	0.9	1.7	11.000	B

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)	LOS
1	858	214	87	2075	0.413	858	1389	0.7	0.7	2.956	A
2	1515	379	608	1561	0.971	1500	337	14.4	18.1	45.153	E
3	334	83	1844	516	0.647	333	264	1.6	1.8	19.595	C
4	553	138	923	866	0.639	552	1254	1.7	1.7	11.477	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)	LOS
1	700	175	72	2083	0.336	701	1177	0.7	0.5	2.607	A
2	1237	309	497	1612	0.767	1296	276	18.1	3.5	13.331	B
3	272	68	1571	631	0.432	276	222	1.8	0.8	10.253	B
4	451	113	794	927	0.487	454	1053	1.7	1.0	7.668	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)	LOS
1	586	147	60	2090	0.281	587	961	0.5	0.4	2.397	A
2	1036	259	416	1650	0.628	1043	231	3.5	1.7	5.995	A
3	228	57	1277	755	0.302	229	182	0.8	0.4	6.863	A
4	378	94	641	999	0.378	379	865	1.0	0.6	5.818	A

Base 2026 + Committed + Dev, PM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Geometry	Arm 1 - Roundabout Geometry	Effective flare length is over 30m, which is outside the normal range. Treat capacities with increasing caution.
Warning	Vehicle Mix		HV% is zero for all movements / time segments. Vehicle Mix matrix should be completed whether working in PCUs or Vehs.

Junction Network

Junctions

Junction	Name	Junction Type	Arm order	Junction Delay (s)	Junction LOS
1	untitled	Standard Roundabout	1, 2, 3, 4	29.02	D

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
D8	Base 2026 + Committed + Dev	PM	ONE HOUR	17:15	18:45	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		ONE HOUR	✓	950	100.000
2		ONE HOUR	✓	797	100.000
3		ONE HOUR	✓	728	100.000
4		ONE HOUR	✓	681	100.000

Origin-Destination Data

Demand (PCU/hr)

		To			
		1	2	3	4
From	1	0	506	171	273
	2	341	0	154	302
	3	574	22	100	32
	4	601	64	14	2

Vehicle Mix

Heavy Vehicle Percentages

		To			
		1	2	3	4
From	1	0	0	0	0
	2	0	0	0	0
	3	0	0	0	0
	4	0	0	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	0.52	3.75	1.1	A	872	1308
2	0.56	5.29	1.3	A	731	1097
3	0.92	44.65	9.3	E	668	1002
4	0.98	75.31	15.3	F	625	937

Main Results for each time segment

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)	LOS
1	715	179	151	2041	0.350	713	1132	0.0	0.5	2.706	A
2	600	150	420	1648	0.364	598	444	0.0	0.6	3.420	A
3	548	137	689	1003	0.546	543	329	0.0	1.2	7.748	A
4	513	128	775	936	0.548	508	457	0.0	1.2	8.326	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)	LOS
1	854	214	180	2025	0.422	853	1355	0.5	0.7	3.070	A
2	716	179	502	1610	0.445	716	531	0.6	0.8	4.021	A
3	654	164	824	946	0.692	651	394	1.2	2.2	12.019	B
4	612	153	928	863	0.709	608	547	1.2	2.3	13.843	B

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)	LOS
1	1046	261	214	2007	0.521	1045	1620	0.7	1.1	3.736	A
2	878	219	612	1559	0.563	876	647	0.8	1.3	5.253	A
3	802	200	1009	868	0.923	778	479	2.2	7.9	33.744	D
4	750	187	1119	773	0.970	715	668	2.3	10.9	46.863	E

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)	LOS
1	1046	261	219	2004	0.522	1046	1650	1.1	1.1	3.755	A
2	878	219	615	1557	0.563	877	650	1.3	1.3	5.294	A
3	802	200	1011	868	0.924	796	482	7.9	9.3	44.651	E
4	750	187	1137	764	0.981	732	670	10.9	15.3	75.311	F

18:15 - 18:30

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)	LOS
1	854	214	192	2019	0.423	855	1430	1.1	0.7	3.099	A
2	716	179	509	1607	0.446	718	538	1.3	0.8	4.060	A
3	654	164	827	945	0.693	682	400	9.3	2.4	15.016	C
4	612	153	960	848	0.722	662	550	15.3	2.8	23.859	C

18:30 - 18:45

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)	LOS
1	715	179	154	2040	0.351	716	1151	0.7	0.5	2.723	A
2	600	150	423	1647	0.364	601	447	0.8	0.6	3.446	A
3	548	137	692	1002	0.547	553	332	2.4	1.2	8.090	A
4	513	128	785	931	0.551	519	459	2.8	1.3	8.860	A

Base 2022 + Com + Dev Ph 1, AM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Geometry	Arm 1 - Roundabout Geometry	Effective flare length is over 30m, which is outside the normal range. Treat capacities with increasing caution.
Warning	Vehicle Mix		HV% is zero for all movements / time segments. Vehicle Mix matrix should be completed whether working in PCUs or Vehs.

Junction Network

Junctions

Junction	Name	Junction Type	Arm order	Junction Delay (s)	Junction LOS
1	untitled	Standard Roundabout	1, 2, 3, 4	9.14	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
D10	Base 2022 + Com + Dev Ph 1	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		ONE HOUR	✓	652	100.000
2		ONE HOUR	✓	1219	100.000
3		ONE HOUR	✓	47	100.000
4		ONE HOUR	✓	474	100.000

Origin-Destination Data

Demand (PCU/hr)

		To			
		1	2	3	4
From	1	0	247	0	405
	2	728	0	0	491
	3	44	1	0	2
	4	421	35	0	18

Vehicle Mix

Heavy Vehicle Percentages

		To			
		1	2	3	4
From	1	0	0	0	0
	2	0	0	0	0
	3	0	0	0	0
	4	0	0	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	0.34	2.62	0.5	A	598	897
2	0.82	12.54	4.5	B	1119	1678
3	0.10	7.51	0.1	A	43	65
4	0.58	9.51	1.4	A	435	652

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)	LOS
1	491	123	40	2100	0.234	490	893	0.0	0.3	2.235	A
2	918	229	318	1696	0.541	913	212	0.0	1.2	4.571	A
3	35	9	1231	775	0.046	35	0	0.0	0.0	4.867	A
4	357	89	579	1029	0.347	355	687	0.0	0.5	5.325	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)	LOS
1	586	147	48	2096	0.280	586	1070	0.3	0.4	2.384	A
2	1096	274	380	1667	0.658	1093	254	1.2	1.9	6.244	A
3	42	11	1473	672	0.063	42	0	0.0	0.1	5.712	A
4	426	107	693	975	0.437	425	822	0.5	0.8	6.538	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)	LOS
1	718	179	59	2090	0.343	717	1305	0.4	0.5	2.621	A
2	1342	336	465	1627	0.825	1332	311	1.9	4.4	11.819	B
3	52	13	1797	535	0.097	52	0	0.1	0.1	7.438	A
4	522	130	845	903	0.578	520	1004	0.8	1.3	9.341	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)	LOS
1	718	179	59	2090	0.344	718	1313	0.5	0.5	2.623	A
2	1342	336	466	1627	0.825	1342	312	4.4	4.5	12.543	B
3	52	13	1807	531	0.097	52	0	0.1	0.1	7.506	A
4	522	130	851	900	0.580	522	1008	1.3	1.4	9.514	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)	LOS
1	586	147	49	2095	0.280	587	1081	0.5	0.4	2.386	A
2	1096	274	381	1666	0.658	1106	255	4.5	2.0	6.539	A
3	42	11	1487	667	0.063	42	0	0.1	0.1	5.771	A
4	426	107	701	971	0.439	428	828	1.4	0.8	6.662	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)	LOS
1	491	123	41	2100	0.234	491	901	0.4	0.3	2.238	A
2	918	229	319	1695	0.541	921	213	2.0	1.2	4.666	A
3	35	9	1239	771	0.046	35	0	0.1	0.0	4.896	A
4	357	89	584	1027	0.348	358	691	0.8	0.5	5.391	A

Base 2022 + Com + Dev Ph 1, PM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Geometry	Arm 1 - Roundabout Geometry	Effective flare length is over 30m, which is outside the normal range. Treat capacities with increasing caution.
Warning	Vehicle Mix		HV% is zero for all movements / time segments. Vehicle Mix matrix should be completed whether working in PCUs or Vehs.

Junction Network

Junctions

Junction	Name	Junction Type	Arm order	Junction Delay (s)	Junction LOS
1	untitled	Standard Roundabout	1, 2, 3, 4	6.40	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
D11	Base 2022 + Com + Dev Ph 1	PM	ONE HOUR	17:15	18:45	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		ONE HOUR	✓	753	100.000
2		ONE HOUR	✓	621	100.000
3		ONE HOUR	✓	310	100.000
4		ONE HOUR	✓	642	100.000

Origin-Destination Data

Demand (PCU/hr)

		To			
		1	2	3	4
From	1	0	489	0	264
	2	329	0	0	292
	3	283	10	0	17
	4	579	61	0	2

Vehicle Mix

Heavy Vehicle Percentages

		To			
		1	2	3	4
From	1	0	0	0	0
	2	0	0	0	0
	3	0	0	0	0
	4	0	0	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	0.40	2.88	0.7	A	691	1036
2	0.40	3.52	0.7	A	570	855
3	0.39	6.66	0.6	A	284	427
4	0.72	13.20	2.5	B	589	884

Main Results for each time segment

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)	LOS
1	567	142	55	2092	0.271	565	892	0.0	0.4	2.355	A
2	468	117	200	1750	0.267	466	420	0.0	0.4	2.801	A
3	233	58	666	1013	0.230	232	0	0.0	0.3	4.604	A
4	483	121	466	1082	0.447	480	432	0.0	0.8	5.948	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)	LOS
1	677	169	65	2087	0.324	676	1068	0.4	0.5	2.553	A
2	558	140	239	1732	0.322	558	503	0.4	0.5	3.065	A
3	279	70	797	958	0.291	278	0	0.3	0.4	5.294	A
4	577	144	559	1039	0.556	575	517	0.8	1.2	7.743	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)	LOS
1	829	207	80	2079	0.399	828	1306	0.5	0.7	2.877	A
2	684	171	293	1707	0.400	683	616	0.5	0.7	3.513	A
3	341	85	976	882	0.387	340	0	0.4	0.6	6.632	A
4	707	177	684	979	0.722	702	632	1.2	2.5	12.751	B

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)	LOS
1	829	207	80	2079	0.399	829	1311	0.7	0.7	2.880	A
2	684	171	293	1707	0.401	684	617	0.7	0.7	3.516	A
3	341	85	977	882	0.387	341	0	0.6	0.6	6.658	A
4	707	177	685	979	0.722	707	633	2.5	2.5	13.200	B

18:15 - 18:30

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)	LOS
1	677	169	66	2086	0.324	678	1076	0.7	0.5	2.556	A
2	558	140	239	1732	0.322	559	504	0.7	0.5	3.072	A
3	279	70	798	957	0.291	280	0	0.6	0.4	5.321	A
4	577	144	560	1038	0.556	582	518	2.5	1.3	7.988	A

18:30 - 18:45

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)	LOS
1	567	142	55	2092	0.271	567	899	0.5	0.4	2.361	A
2	468	117	200	1750	0.267	468	422	0.5	0.4	2.810	A
3	233	58	668	1012	0.231	234	0	0.4	0.3	4.630	A
4	483	121	469	1081	0.447	485	433	1.3	0.8	6.061	A