3.0 POPULATION AND HUMAN HEALTH

3.1 Introduction

This Chapter of the EIAR describes the human environment and identifies and assesses any impacts from proposed restoration activities at the Application Site. The human environment and potential impacts on the 'quality of life' as a consequence of the proposed development are discussed under the following headings:

- Land-use and social considerations;
- Populations;
- Economic Activity;
- Tourism and Recreation;
- Traffic; and
- Health and Safety.

Impacts on population and human health is one of the most important aspects considered in an EIAR. Interactions between humans and other facets of the environment are discussed under relevant sections of this EIAR, including:

- Biodiversity (Flora and Fauna) (Chapter 4.0);
- Water (Chapter 6.0);
- Air Quality and Climate (Chapter 7.0);
- Noise and Vibration (Chapter 8.0); and
- Landscape (Chapter 9.0).

3.2 Methodology

Information for the assessment of potential impacts on local populations was obtained by means of a desk-based review, and included the following sources:

- Census Returns (Central Statistics Office (CSO) 1991, 1996, 2002, 2006, 2011 and 2016 Census);
- Kildare County Council Development Plan (2017-2023);
- Field surveys of the Application Site;
- DCENR Eircode maps; and
- Aerial and ordnance survey maps of the area.

The existing / past environment is described. Any impacts from proposed activities at the Site are identified and assessed, and where possible mitigation measures are proposed.

3.3 Environment

3.3.1 Land-use and Social Consideration

The Application Site is situated in the Kilrainy electoral division in Co. Kildare. The closest population centres to the Application Site are the villages of Carbury and Cadamstown, which are located approximately 5 km south and 3 km east of the Site, respectively. The towns of Edenderry and Enfield are located ca. 8 km to the south-west and ca. 9 km to the north-east, respectively.

The Application Site and its surrounding lands can be predominantly characterised as rural in nature, with land uses in the area generally being agricultural, aggregate extraction and single-house residential.

There is an EPA licenced site, Moyvalley Meats (Licence Ref. No P0192-02), 500 m east of the Site. Moyvalley Meats is an abattoir and boning hall for beef and lamb licenced under Activity 7.4.1 – *The operation of slaughterhouses with a carcass production capacity of greater than 50 tonnes per day.*

Two existing sand and gravel quarry plants operated by Roadstone and the applicant, GCHL, are nearby adjacent to the Site to the west. The agricultural lands contiguous to the other boundaries of the Application Site are in pasture and tillage. Thin areas of scrub exist along the Application Site's boundary with a small watercourse (the River Glash) to the east.

Figure 3.1 presents residences which lie within 250 m and between 250 m and 500 m of the Application Site boundary (comprising 15 and 10 residences respectively). The number of residences is based on a review of the aerial photograph used in Figure 3.2, and DCENR eircode mapping. The total housing stock within the Kilrainy electoral division reported in the 2016 census was 250, of which vacant households numbered 11.

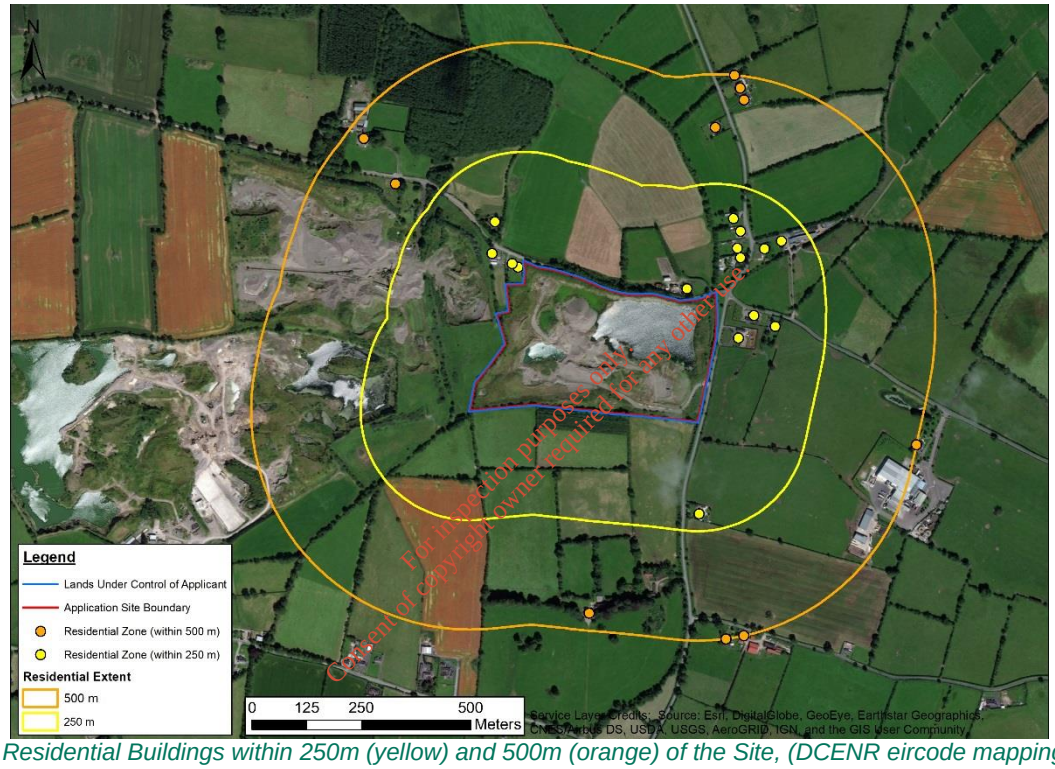

Figure 3.1 Residential Buildings within 250m (yellow) and 500m (orange) of the Site, (DCENR eircode mapping).

The following SACs occur within 15 km of the proposed development; as shown in Figure 3.2:

- Mt Hevey Bog SAC (Site Code – 2342) (also a pNHA);
- The River Boyne and River Blackwater SAC (Site Code – 2299);
- The Long Derries, Edenderry SAC (Site Code – 0925) (also a pNHA);
- Ballynafagh Lake SAC (Site Code – 1387) (also a pNHA);
- Carbury Bog NHA (Site Code – 1388);
- Black Castle Bog NHA (Site Code – 0570);
- Hodgestown Bog NHA (Site Code – 1393); and
- Molerick Bog NHA (Site Code – 1582).

The nearest Natura 2000 site is the River Boyne and River Blackwater SAC, which is approximately 5.9 km north of the site. Further details regarding these ecological designations are included in Chapter 4.0 of this EIAR.

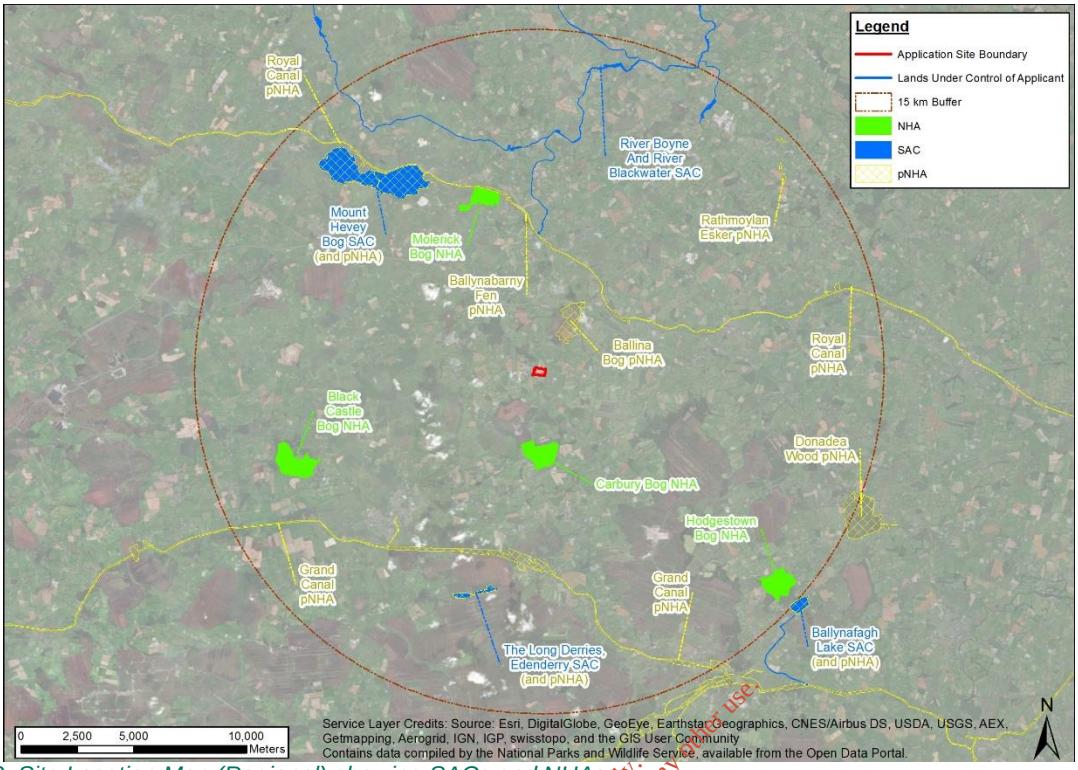

Figure 3.2: Site Location Map (Regional) showing SACs and NHAs

3.3.2 Populations

The census reports for 1991, 1996, 2002, 2006, 2011 and 2016 produced by the Central Statistics Office (CSO) presents population figures in terms of district electoral divisions and their respective populations. The Applicant Site is located within the District Electoral Division (DED) of Kilrainy (06051), which includes the following townlands: Ballinlig, Ballycowan, Ballinnet, Ballinderry, Claremount, Clonard New; Cornamucklagh, Derryart, Fearavolla, Kilglass, Killinagh, Kilrathmurry, Kilrainy, Nurney, and Williamstown.

Population statistics for Kilrainy are presented in Table 3.1. The figures indicate Kilrainy DED has had steady population increases from 1991 to 2016, with the largest increases observed between 1996 and 2006. The census results for 2016 show that the Kilrainy DED had a population of 753 persons, an increase of 1.8% on the 2011 population.

Table 3.1: Population Statistics for Kilrainy (06051) DED

Year	No. Persons	Actual Increase	Percentage Increase
1991	398	-	-
1996	405	7	1.8%
2002	501	96	24%
2006	626	125	25%
2011	740	114	18%
2016	753	13	1.8%

3.3.3 Economic Activity

As stated, the Application Site is located ca. 4 km north of Carbury village, and the towns of Edenderry and Enfield are located ca. 8 km to the south-west and ca. 9 km to the north-east, respectively. These towns are important economic and employment centres within this area. Furthermore, Naas and the Greater Dublin Region are considered important employment centres for Carbury and its surrounding area due to proximity and motorway linkages.

Census 2016 statistics show that 24 % of the workforce in the Kilrainy DED is employed in Professional Services, with a further 21 % working in the Commerce and Trade sector, as shown in Table 3.2. It is likely that the majority of these workers travel to the population centres mentioned above.

The Manufacturing category accounts for 15 % of the Kilrainy workforce, with the next highest employment sector being 'Other' Industries (10 %) followed by Building and Construction (10.0 %). Table 3.2 below presents the employment structure classified by broad occupational group for the Kilrainy DED as reported from the 2016, 2011 and 2006 Censuses.

Table 3.2: Employment Structure Classified by Broad Occupational Group for the Kilrainy DED during the 2006, 2011 and 2016 censuses

Industry	No. of Persons Employed 2006	No. of Persons Employed 2011	No. of Persons Employed 2016	% of Total 2006	% of Total 2011	% of Total 2016
Agricultural, Fishing and Forestry	10	26	21	4%	10%	7%
Building and Construction	35	19	29	15%	7%	10%
Manufacturing Industries	42	42	45	19%	16%	15%
Commerce and Trade	43	38	62	19%	15%	21%
Transport and Communications	12	14	21	5%	5%	7%
Public Administration	12	15	12	5%	6%	4%
Professional Services	44	59	73	19%	23%	24%
Other	28	45	36	12%	17%	12%
Total in Labour Force	226	258	299			

Table 3.3 below presents the time travelled by the population of Kilrainy to school, college or work, obtained from the Central Statistics Office from Census 2016.

Table 3.3: Population aged 5 years and over by journey time to work, school or college

Time	No. of Persons
Under 15 mins	158
1/4 hour - under 1/2 hour	107
1/2 hour - under 3/4 hour	85
3/4 hour - under 1 hour	53
1 hour - under 1 1/2 hours	67
1 1/2 hours and over	12
Not stated	27
Total	509

There are several industries within the local area of the Application Site, notably the abattoir as well as agriculture and the extractive industry. The abattoir employs approximately 170 employees and has been operational since 1974. Agriculture has long made contributions for local employment and economies through crop production, livestock husbandry, and meat processing.

This area of Kildare is noted to contain large quantities of natural sand and gravel deposits. This has resulted in a prosperous extractive industry in the locality for a number of decades which has contributed to local employment, and local and regional economies. The restoration activities outlined in the proposed development will assist in the continued economic and social growth of the mid-Kildare region.

3.3.4 Tourism and Recreation

The Kildare County Development Plan 2017-2023 outlines the importance of the tourism sector to the internal economy of the county. Tourism and recreation make a positive contribution to the economic and social wellbeing of the county. Kildare's close proximity to Dublin offers significant opportunities to expand the existing tourism offer and brand for the county. With Dublin being the sixth most popular city region in Europe for city breaks, Kildare's location, its rich built and natural heritage along with its horse racing and golfing attractions provide opportunities to attract spin-off tourism from the city region and neighbouring counties, including Wicklow.

The nearest population centres provide a variety of restaurants, pubs, hotels and B&B's. Tourism attractions in the vicinity of the Site include Moyvalley Hotel & Golf Resort and Carbury Castle & Motte.

3.3.5 Traffic

Effects of traffic on the local community are addressed in Section 3.4.5. A detailed Traffic and Transportation Assessment (TTA) has been undertaken for the Application Site; and is included in Appendix 3.1.

3.3.6 Health and Safety

The Health and Safety considerations and standards for the Application Site have been documented in Section 3.4.6.

3.4 Assessment

3.4.1 Land-use and Social Considerations

Quarrying activities have been undertaken in the vicinity of the Application Site for a number of years prior to the development activities at the Site. The quarrying operations at Ballinderry were intended to act as a replacement reserve to support GCHL's Kilglass site, located approximately 1 km south-west of the Site. The Kilglass quarry operated by Roadstone is located directly west of the Site, separated by two private dwellings. Similarly, with respect to social considerations, there has been little or no change to local activities as a result of quarrying activities in the vicinity of the Site since operations began.

In addition, an abattoir and boning hall employing approximately 170 people is located 500 m east of the Site. In the greater area, turf cutting is taking place 2 km to the north and 1 km to the south of the Site.

3.4.2 Populations

It is not anticipated that the development will result in any change in population as a result of the proposed activities at the Application Site.

3.4.3 Economic Activity

The Applicant proposes that the permitted hours of operation for the development are from 07:00 hours to 18:00 hours Monday to Friday and 07:00 hours to 14:00 hours on Saturdays, with the waste facility being closed on Sundays and Public/Bank Holidays.

It is expected that when the proposed activity is fully operational that 2 persons will be employed on a full-time basis as operatives. It is therefore considered that the operation of the Application Site will have a positive impact on economic activity in the area.

3.4.4 Tourism and Recreation

Given that any existing facilities in the vicinity of the Site have developed in recent years while quarrying has been undertaken in the vicinity, it is unlikely that the establishment of the Application Site will impact the tourist potential of the local area. Further information regarding landscape and visual impact and mitigation measures is included in Chapter 9.0 (Landscape) of this EIAR.

A considered distribution and design of perimeter embankments coupled with an increased program of planting will consolidate the screening of receptors to the south and east of the proposed quarry. Consequently, it is concluded that the development will have little or no impact on tourism and recreation in the area once the restoration plan has been affected.

3.4.5 Traffic

An in-depth analysis of the impact of the proposed development in terms of traffic was carried out through the preparation of a Traffic and Transport Assessment (TTA).

PMCE Limited was commissioned to undertake a review of the traffic impacts associated with the operation of the proposed quarry at Ballinderry. The TTA report prepared by PMCE is included in Appendix 3.1. The main conclusions of the TTA are as follows:

3.4.5.1 Sightlines

Sightlines at the proposed quarry entrance have been assessed against Transport Infrastructure Ireland (TII) Publications document reference DN-GEO-03060 Section 5.6, which requires 160 m of unobstructed visibility (where design speed is 85 kph) at a point 3.0 m (for Stop type junctions) back from the edge of the carriageway. A design speed of 85 kph was assumed for this section of the L1002 roadway at the proposed Site entrance due to the posted speed limit of 80 kph. The current sightlines from the site access require improvement to meet this requirements. Visibility to the north and south along the L1002 for a driver exiting the Site is restricted by the hedgerow and trees on the western side of L1002 (the eastern boundary of the Site).

The following measures will be taken at the Site entrance prior to operations commencing:

- The area within the visibility splays will be cleared to provide a level surface no higher than 250 mm above the level of the adjoining carriageway and will be retained and kept clear thereafter. Any pole or column materially affecting visibility will also be removed;
- The line of any new fence or wall will be positioned behind the visibility splays to allow for future growth and some species will require additional set back; and
- All additional planting will be kept trimmed behind visibility splays.

3.4.5.2 Link and Junction Capacity Analyses with Local Road Network

Link capacity analysis was carried out on the surrounding road network which the development traffic is expected to travel on including the L1002, L5004 and the R418 and it was determined that these roads will continue to operate within capacity for each of the assessment years 2019, 2024, and 2034. The traffic generated by the proposed development represents between 7.08% and 8.66% of total traffic on the L1002 between 2018 and 2034.

Junction capacity analysis at 2 existing junctions was undertaken with, and without, the proposed development traffic and indicates that they will continue to operate within capacity for each of the assessment years 2019, 2024 and 2034.

Junction capacity analysis at the Site access indicates that it will operate within capacity for each of the assessment years 2019, 2024 and 2034.

The assessment also indicates that the proposed development will have a minor impact on traffic flows on the existing road network.

3.4.6 Health and Safety

A Site Manager will be responsible for safety management on site.

All site employees, contractors and subcontractors are required to wear a minimum personal protective equipment (PPE) whilst on site, these are steel toed boots and a high visibility jacket or vest. Other task specific PPE which will be used at the Application Site include, safety glasses/goggles, hard hats, gloves and hearing protection. The requirement to use such additional PPE is documented in task specific risk assessments.

All contractors and subcontractors operating at the Application Site will be required to comply with GCHL's control of contractors' procedures. All contractors must possess appropriate insurances, and be appropriately qualified. Risk assessments and method statements must be produced by the respective contractor prior to the commencement of works.

Fencing will be maintained around the perimeter of the Site to reduce the risk of livestock and the public accessing the Site. The entrance gate will be locked during periods when the Site is closed, this will be controlled by the site management.

Exposed edges in the quarry will be appropriately protected with low embankments and berms. These edges will also be sign posted appropriately to identify the raised edge hazard.

In the event that emergency services are required at the Application Site the closest Accident and Emergency unit operates out of Naas General Hospital. Fire emergency services for Carbury operate out of Edenderry.

3.4.7 Air Quality

The impact of the proposed development on climate and air quality is outlined in Chapter 7 of this EIAR. It is expected that impacts from dust as a result of the proposed development will be not significant. The mitigation measures outlined in Chapter 7 include the implementation of proven site management practices including; wet suppression techniques and screening berms to minimise dust emissions. In summary, there will be no adverse impacts on ambient air quality in the vicinity of the facility, on local residences or on the local environment as a result of emissions from the proposed activities at the Site.

3.4.8 Noise and Vibration

An assessment of the noise impacts associated with the proposed development, and mitigation measures has been conducted in Chapter 8 of this EIAR. With the implementation of proven management practices there will be no adverse noise impacts predicted at noise sensitive receptors in the vicinity of the Site as a result of the proposed development.

3.4.9 Landscape and Visual

Chapter 9.0 of the EIAR assesses the landscape and visual impact of the proposed development. Two types of assessment were carried out to fully assess the landscape and visual impacts of the proposed development. A Landscape Impact Assessment was carried out to assess changes in the physical landscape brought about by the proposed development, and how the development may alter the character of the landscape and how it is experienced. In addition, a Visual Impact Assessment was undertaken which relates to changes in the composition of views, how the views are perceived and the effects of visual amenity as a result of changes to the landscape.

The context of the Landscape Impact Assessment is key, as landscape itself is the sole receptor in the assessment and not human eyes viewing that landscape. While the landscape of the central study area consists of several hundred acres, the total application boundary area is 13.9 ha, within which the final restoration area is approximately 10 ha.

In accordance with the Guidelines for landscape and Visual Impact Assessment (GLVIA- 2013) landscape sensitivity / susceptibility is relative to the nature of the development proposed. In this instance, the development in question is the infilling and restoration of an existing quarry and thus, there is very little susceptibility to the changes proposed. Overall, it is considered that the Landscape sensitivity of the receiving landscape concurs with the Kildare CDP – **Low**.

Visual impacts have been assessed from 6 no. representative viewpoints using photomontages that depict the end use, grassed mound. In all instances, the effect on infilling and restoring the existing quarry to agricultural grassland is deeded to result in an **Imperceptible / Positive** significance of impact.

3.4.10 Water

The impact of the proposed development on the hydrology and hydrogeology of the area is assessed in Chapter 6 of this EIAR. In terms of the predicted impact on human beings it is noted that restoration of the site will include dewatering and infilling of two ponds containing exposed groundwater providing added protection to the groundwater body below the site. The development area is not located within a Source Protection Area for public water supply scheme, and there are no changes in the hydrology or hydrogeology of the area expected; it is therefore considered that there will be no impact on human beings as a result.

3.5 Mitigation

Mitigation measures for air quality, noise and visual impacts are described in Chapter 7.0 (Air Quality and Climate), Chapter 8.0 (Noise and Vibration), Chapter 9.0 (Landscape) and Chapter 10.0 (Material Assets). Once the appropriate measures have been implemented, it is considered that no significant effects on the socio-economic and human being environment in the vicinity of the Application Site will occur.

3.6 Residual/Likely Significant Impacts

Once implemented the Application Site will adhere to standard environmental, health and safety policies. Potential emissions during restoration activities, which relate to dust, water and noise are dealt with in the relevant chapters of the EIAR.

3.7 Cumulative Impacts

Other quarrying activities are currently taking place in the vicinity of the Application Site. Cumulative impacts for each of the subjects are considered in each of the respective chapters. Cumulative impacts of the various facilities on Air Quality of the Human environment are considered not significant due to distances from receptors and site management practices employed. There is no discernible effect in cumulative noise anticipated as a result of proposed activities at the Application Site.

3.8 References

Central Statistics office - www.cso.ie.

Central Statistics Office. Census Returns 1991, 1996, 2002, 2006, 2011 and 2016 - http://www.cso.ie/en/census/ - Accessed: 16 May 2018.

Kildare County Council Development Plan. 2017-2023 - http://kildare.ie/countycouncil/planning/developmentplans/kildarecountydevelopmentplan2017-2023/ - Accessed: 14th May 2018.

Transport Infrastructure Ireland. April 2017. Geometric Design of Junctions (priority junctions, direct accesses, roundabouts, grade separated and compact grade separated junctions). DN-GEO-03060.

APPENDIX 3.1

Traffic and Transport Assessment

Golders Associates Ireland

Ballinderry Sand and Gravel Backfilling, Carbury, Co. Kildare

Traffic and Transport Assessment

P·M·C·E

March 2018

Golders Associates Ireland

Ballinderry Sand and Gravel Backfilling, Carbury, Co. Kildare

Traffic and Transport Assessment

Document Ref:	P18-016-RP-001

Rev	Prepared By	Reviewed By	Approved By	Issue Date	Reason for Revision
3.0	AOR	TAG	TAG	28th March 2018	Revised Report
2.0	AOR	TAG	TAG	28th March 2018	Draft Report
1.0	AOR			23rd March 2018	Working Draft

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Executive Summary

This report addresses the traffic related impacts of the proposed backfilling of the existing Sand and Gravel Quarry at Ballinderry, near Carbury, Co. Kildare. Access to the quarry is provided directly from the existing L1002 local road. The L1002 Local Road runs in a north to south direction from its junction with the R148 at its northern extent to its junction with the L1006 at the Calfstown Crossroads at its southern extents.

The existing quarry has historically been used for the extraction of sand and gravel but is now no longer in operation. It is now proposed to backfill the quarry site.

Twelve-hour classified turning counts were carried out on the 8th of March 2018 at two locations, including the Tanderagee Crossroads (L1002/L5004 and L5005 junction) and the priority t-junction of the R148 and the L1002. The total forecast number of trips resulting from the backfilling operation is 164 per day, 82 inbound trips and 82 outbound trips.

Link capacity analysis was carried out on the L1002 (North and south of the Tanderagee Crossroads), the L5004 (west of the Tanderagee Crossroads), the L5005 (east of the Tanderagee Crossroads), the R148 (east and west of the R148/L1002 junction) and the L1002 (south of the R148/L1002 junction). In all cases, it was determined that the roads will continue to operate within capacity for each of the assessment years 2019, 2024 and 2034.

Junction capacity analysis at the Tanderagee Crossroads, the L1002/R148 junction and the site access junction indicate that they will continue to operate within capacity for each of the assessment years 2019, 2024 and 2034.

Traffic generated by the backfilling operation will access the quarry via the existing site entrance on the L1002 south of the Tanderagee Crossroads.

The current sightlines from the site access require improvement to meet the requirement of the DMRB. Visibility to the north and south along the L1002 for an exiting driver is restricted by the hedgerow and trees on the western side of the L1002. To achieve the required visibility, it is proposed to remove the existing trees and hedgerow. Stop roadmarkings will be provided in accordance with the Traffic Signs Manual at the exit from the site at its junction with the L1002 local road.

Glossary of Terms

Road Network: The existing and proposed public and private roads within the study area.

Traffic Growth: The normal expected growth in traffic over time.

Trip: One movement, in or out of the study area by foot, cycle or vehicle.

Thresholds: Minimum intervention levels at which Transport and Traffic Assessments are to be conducted.

Generated Trips: Additional trips made as a result of the presence of a development.

Peak Time: Time of day at which the transport demands from a development are greatest.

Capacity Calculations: Standardised methods of estimating traffic capacity on links and at junctions.

Trip Distribution: The estimated directional distribution of the estimated traffic at each junction in the study area.

Trip Assignment: The final estimated flows of traffic for each direction of travel at each junction and along each link within the study area.

TRICS: A database containing empirically obtained trip generation data for a wide range of different types of developments.

AADT: Annual Average Daily Traffic – The mean daily traffic volume over the course of a year on a particular route.

Level of Service: Level of Service (LOS) is a measure of the capacity of a road related to the average vehicular speed and level of congestion on the road. It is ranges from LOS A to LOS F with A representing free flow and F representing stop/start traffic. LOS C represents stable flow conditions

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1 Introduction

1.1 General

PMCE Consultants were commissioned by Mr. Barry Balding of Golders Associates Ireland to undertake a review of the traffic impacts associated with the Ballinderry Sand and Gravel backfilling, in Carbury, Co. Kildare.

1.2 Information Reviewed

In preparing this report reference has been made to the following documents:-

- "Traffic and Transport Assessment Guidelines" (May 2014) published by Transport Infrastructure Ireland (TII), formerly the National Roads Authority;
- Unit 5.3 (Travel Demand Projections) of the "Project Appraisal Guidelines" (2016) published by TII;
- Unit 16.1 (Expansion Factors for Short Period Traffic Counts) of the "Project Appraisal Guidelines" (2016) published by TII;
- Traffic Count Survey Data, collected by Nationwide Data Collection; and
- Topographical Survey Data/Mapping provided by Golders Associates Ireland.

1.3 Scope

The objective of this report is to examine the traffic implications associated with the proposed backfilling operations. The report determines and quantifies the extent of additional trips generated by the backfilling operation, and the impact on operational performance of such trips on the existing local road network.

1.4 Methodology

The methodology adopted for this appraisal and report involved, in brief:-

- A site visit on the 23rd February 2018. The weather was dry, and the ground surface was dry;
- Trip Generation and Trip Assignment – This is used to derive trip rates for both the AM and PM Peaks and to provide information as to which direction of travel vehicles will travel to/from the proposed Ballinderry Sand and Gravel backfilling, Carbury, Co. Kildare;
- Link Capacity Assessment - To obtain an AADT value for the main road linking the Ballinderry Sand and Gravel backfilling, Carbury, Co. Kildare to the surrounding network;
- Existing Traffic Assessment – The traffic count data was used to develop a PICADY model for each of the junctions analysed; and
- Future Year Assessments – The estimated future year volumes on the study area network, as a result of the increase in background traffic and any site related traffic, was used to assess the future operational performance of the junctions and surrounding road network for 2019 (assumed year of opening) and at two future assessment years, the opening year +5 (2024) and the opening year +15 (2034).

1.5 Location plan

Figure 1-1 shows the location of the Ballinderry Sand and Gravel site, north of Carbury, Co. Kildare and the surrounding area.

FIGURE 1-1: LOCATION PLAN

2 Existing Conditions

2.1 The Site

The existing Sand and Gravel Quarry is located on the L1002 local road which extends in a south-north direction from its junction with the L1006 local road at Calfstown Crossroads to its junction with the R148 regional road immediately west of Moyvally, Co. Kildare. The entrance to the site is located approximately 200m south of the Tanderagee Crossroads (L1002/L5004/L5005 junction).

The quarry is currently not operational however it is proposed to backfill the site resulting in large vehicles transporting material to the site along the L1002 local road.

2.2 Proposed Route

The proposed route that vehicles transporting material to the quarry will take is shown in Figure 2-1. Vehicles will approach the site from the north-east travelling along the M4 motorway as far as Junction 9, where they will leave the motorway and travel via the R402 and R148, continuing on the R148 as far as its junction with the L1002 local road. Vehicles will then turn right onto the L1002 and continue southwards through Broadford and through the Tanderagee Crossroads.

Once the material has been deposited at the site vehicles will undertake the reverse journey along the same route to access the M4 motorway.

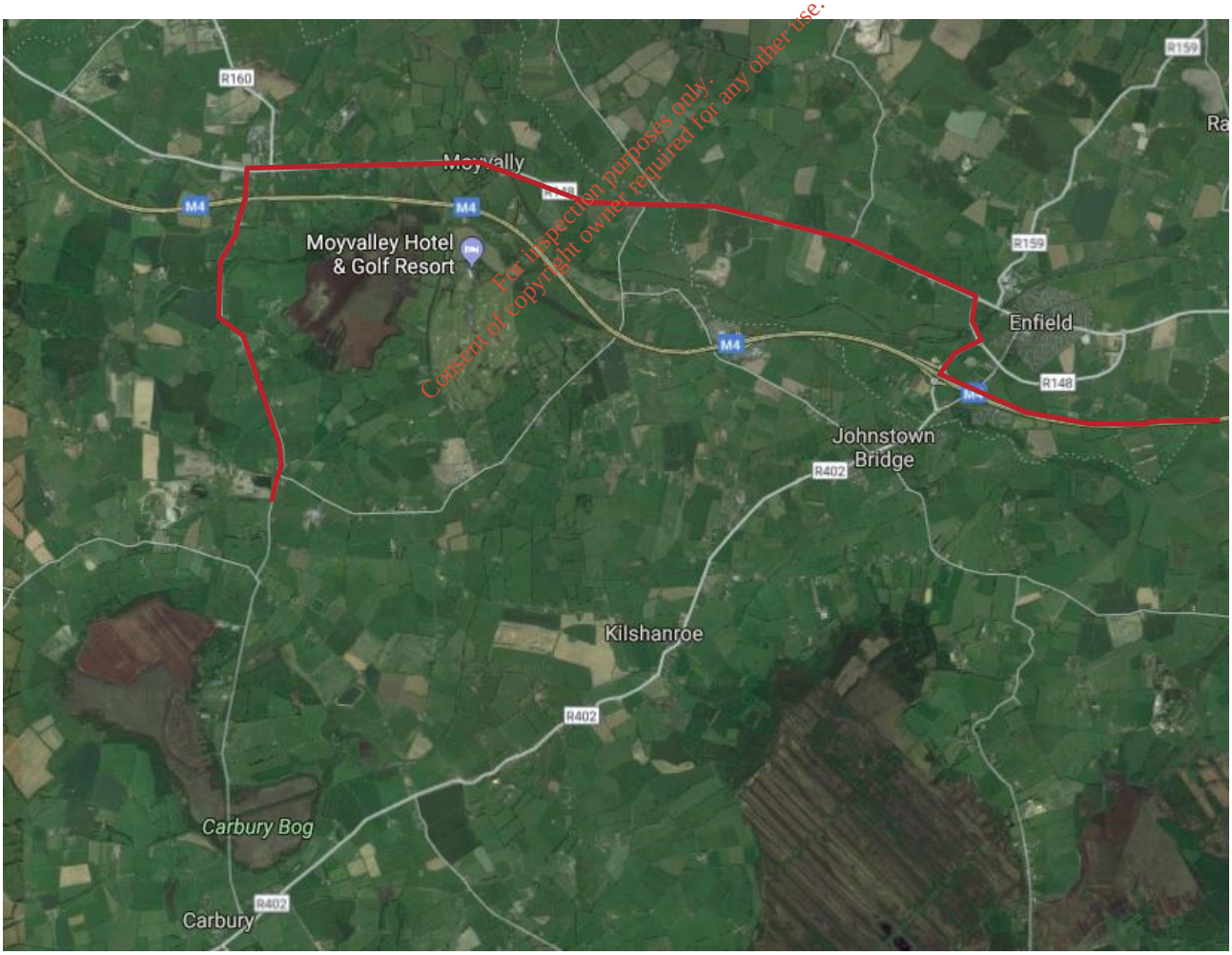


FIGURE 2-1: PROPOSED ROUTE TO/FROM QUARRY

2.3 Existing Road Network

2.3.1 L1002 Local Road

The L1002 Local Road runs in a north to south direction from its junction with the R148 at its northern extent to its junction with the L1006 at the Calfstown Crossroads at its southern extents. At the quarry access the L1002 is 7m wide and has a relatively straight alignment. There are narrow grassed verges on both sides of the carriageway and boundary hedges run along the back of the verge on the eastern side of the L1002. There is a ditch and stream which runs along the western side of the carriageway at the back of the verge, travelling beneath the paved access to the quarry. There is a solid centreline on the L1002 at this location. There are no edge of carriageway roadmarkings on either side of the L1002.

2.3.2 Tanderagee Crossroads

The Tanderagee Crossroads is located approximately 200m north of the access to the quarry. The L1002 runs from north to south through the Tanderagee Crossroads. There is a large area of open space in the south-western quadrant of the crossroads where landscaping, decorative stones and a religious monument are located. The stream on the western side of the L1002 continues northwards to the back of this grassed area. There are residential properties located in the norther-western and south-eastern quadrants of the junction and there is a field in the north-eastern quadrant of the junction. There are residential properties on the L5004 and L5005 close to the crossroads and there is a cluster of residential properties on both sides of the L1002 to the north of the crossroads.

The L5004 forms the western arm at the crossroads. It is approximately 6m wide. The L5004 crosses the stream flowing along the western side of the L1002 via a bridge immediately upstream of the junction. There is an access on the northern side of the L5004 upstream of the junction. On the immediate approach to the Stop line at the crossroads junction there is a boundary hedge on the northern side of the L5005 and a stone parapet wall on the southern side of the L5005. Visibility to the south at the Stop line is unrestricted while visibility to the north is partially restricted by the adjacent boundary hedge. The Stop sign is located upstream of the boundary hedge and Stop line as there is limited space adjacent to the Stop line to facilitate a Stop sign that will be sufficiently visible on approach.

The L5005 forms the eastern arm of the crossroads. It is approximately 6m wide. There is a wide, raised grass verge on the southern side of the L5005 immediately upstream of the junction. There is evidence of rutting at the exit from the junction from large left-turning vehicles. The Stop line and roadmarkings at the junction are faded and the carriageway is in poor condition on both corner radii of the junction. The carriageway is also in a poor condition at the Stop line. There is a drainage gully located within the junction offset from the edge of the carriageway. Visibility to the north at the Stop is limited by the horizontal alignment of the L1002 while visibility to the south is restricted by the adjacent boundary fence. At the time of the site visit the Stop sign at the junction of the L1002/L5005 was completely twisted on its support post such that it was facing drivers approaching the junction from the L5004.

2.3.3 R148 Regional Road

The L1002 intersects the R148 Regional Road at its northern extents, passing through the small town of Broadford and over the M4 motorway to the south of the junction. There is a commercial premises (Moyvalley Stone) on the western side of the L1002 immediately south of the R148/L1002 junction. There is a farm located on the eastern side of the L1002 opposite the entrance to the commercial premises. The entrance to the farm appears to be used as a 'park and share' facility as numerous parked vehicles were noted at the time of the site visit. There is a large landscaped are, including picnic benches, to the west of the junction. The L1002 is very wide on the approach to the junction, the approach lane measuring 7m. The R148 is a wide single carriageway road. There is a long right turn lane, approximately 100m in length, provided for vehicles turning right into the L1002. There is a left turn lane provided from the R148 and an auxiliary lane is provided on the R148 for left turning vehicles exiting the L1002.

Footpaths are provided on both sides of the L1002 between Broadford and the R148 junction. The footpath on the western side of the L1002 terminates at the entrance to the Moyvalley Stone retail development. The footpath on the eastern side of the L1002 continues around the junction and along the southern side of the R148 as far as a bus stop. The Stop sign on the L1002 at the junction with the R148 is faded and is mounted low on its support post.

2.4 Traffic Volumes

Classified traffic turning counts were carried out on the 8th of March at the Tanderagee Crossroads (L1002/L5004/L5005 junction) and at the R148/L1002 junction. The traffic counts were carried out between 7:00am and 7:00pm, this time period encompassing the main hours during which the existing quarry will be backfilled. The time period also includes the peak hours on the adjacent road network. Surveyed vehicles were broken down into two categories as follows: -

- LV (cars, vans. Light goods vehicles etc.); and
- HV (vans greater than 3.5 tonnes, trucks greater than 2-axles, double decker buses, coaches etc.).

2.4.1 Junction 1: Priority Crossroads Junction of the L1002/L5004 & L5005

The results of the traffic survey at the priority crossroad junction of the L1002, the L5004 and the L5005 are summarised in Table 2-1.

The count data has been converted to Annual Average Daily Traffic (AADT) values using the methods described in "Expansion Factors for Short Period Traffic Counts" (Unit 16.1 TII Project Appraisal Guidelines, October 2016), Annexes A to C.

From the survey data the peak hours at Junction 1 have been established as follows: -

- 08:30hrs to 09:30hrs – AM Peak Hour

  A combined factor of 0.811 was arrived at by combining the individual hourly factors for the count duration. This factor was then used to determine the 24-hour traffic flow. This was then converted to a Weekly Average Daily Traffic using an index of 0.94 for the Thursday traffic count. Finally, this was converted to AADT using an index of 1.02 for the month of March.

- 16:30hrs to 17:30hrs –PM Peak Hour

A combined factor of 0.811 was arrived at by combining the individual hourly factors for the count duration. This factor was then used to determine the 24-hour traffic flow. This was then converted to a Weekly Average Daily Traffic using an index of 0.94 for the Thursday traffic count. Finally, this was converted to AADT using an index of 1.02 for the month of March.

TABLE 2-1: JUNCTION 1 - PRIORITY CROSSROADS JUNCTION OF THE L1002/L5004 & L5005

Hour Ending	L1002 (N)	L5004	L5005	L1002 (S)
08:00	116	18	52	122
09:00	148	13	43	164
10:00	116	15	39	118
11:00	88	8	32	86
12:00	79	13	45	87
13:00	83	17	35	87
14:00	83	13	31	95
15:00	97	20	40	85
16:00	125	23	46	122
17:00	159	23	63	179
18:00	183	26	72	189
19:00	165	14	43	178
Period Total	1,442	203	541	1,512
Period Total HGVs	*151*	*20*	*83*	*160*
% HGVs	*10.5*	*9.9*	*15.3*	*10.6*
Total AADT	1,705	240	640	1,788

2.4.2 Junction 2: Priority T-junction of the R148 & the L1002

The results of the traffic survey at the priority crossroad junction of the L1002, the L5004 and the L5005 are summarised in Table 2-2.

The count data has been converted to Annual Average Daily Traffic (AADT) values using the methods described in “Expansion Factors for Short Period Traffic Counts” (Unit 16.1 TII Project Appraisal Guidelines, October 2016), Annexes A to C.

From the survey data the peak hours at Junction 2 have been established as follows: -

- 08:00hrs to 09:00hrs – AM Peak Hour

  A combined factor of 0.811 was arrived at by combining the individual hourly factors for the count duration. This factor was then used to determine the 24-hour traffic flow. This was then converted to a Weekly Average Daily Traffic using an index of 0.94 for the Thursday traffic count. Finally, this was converted to AADT using an index of 1.02 for the month of March.

- 17:30hrs to 18:30hrs –PM Peak Hour

  A combined factor of 0.811 was arrived at by combining the individual hourly factors for the count duration. This factor was then used to determine the 24-hour traffic flow. This was then converted to a Weekly Average Daily Traffic using an index of 0.94 for the Thursday traffic count. Finally, this was converted to AADT using an index of 1.02 for the month of March.

TABLE 2-2: JUNCTION 2 - PRIORITY T-JUNCTION OF THE R148 & THE L1002

Hour Ending	R148 (W)	R148 (E)	L1002
08:00	548	552	132
09:00	619	630	171
10:00	454	511	155
11:00	382	393	99
12:00	376	372	100
13:00	404	417	125
14:00	402	419	117
15:00	426	460	122
16:00	495	524	153
17:00	645	626	161
18:00	722	740	214
19:00	655	662	203
Period Total	6,128	6,306	1,752
Period Total HGVs	*869*	*875*	*172*
% HGVs	*14.2*	*13.9*	*9.8*
Total AADT	7,245	7,455	2,071

3 Proposed Backfilling Operation

3.1 General

It is proposed to backfill an existing quarry located on the L1002 local road at Ballinderry, near Carbury, Co. Kildare with a total of 1,500,000 tonnes of material. It is envisaged that the proposed backfilling will operate at a maximum rate of 160 truck movements per day. If this rate remains consistent the backfilling operation will last for approximately 3.5 years with approximately 440,000 tonnes delivered to the quarry per annum.

The backfilling is expected to commence in 2019. Operating hours will be between 08:00 hours and 18:00 hours, Monday to Friday inclusive and between 08:00 hours and 14:00 hours on Saturdays. Backfilling is not expected on Sundays, Bank Holidays or Public Holidays.

3.2 Trip Generation

3.2.1 General

440,000 tonnes per annum equates to approximately 160 vehicle movements per day (see Table 3-1) based on the following assumptions: -

- The facility will operate for 50 weeks per year;
- The facility will operate for six days per week (Monday to Saturday) inclusive; and
- The facility opening times will be between 08:00 hours and 18:00 hours, Monday to Friday inclusive and between 08:00 hours and 14:00 hours on Saturdays.

Table 3-1 Imported Backfilling Material by Vehicle Movements

Exported Quantities of Quarried Material (based upon vehicle movements per annum)	
Tonnes of imported material per annum	440,000
Quantity per week (50 operational weeks / year)	8,800
Loads per week (20 tonnes / load (max.))	440
Loads per day (5.5 working days / per week)	80

The 80 loads per day will comprise of 80 inbound and 80 outbound daily trips.

3.2.2 Staff Trips

A total of 2 staff members will be present on site during operational hours throughout the backfilling operation. These staff members will travel to/from the site in personal vehicles which will be parked on site daily. Staff movements will generate a maximum of 2 peak hour trips, 2 trips inbound in the morning and 2 trips outbound in the evening peak.

3.2.3 Derived Trip Rate

Table 3-2 contains a summary of the predicted trips associated with the backfilling operation. 160 HGV vehicle movements per day was used to calculate the total predicted daily trips at the quarry. The total number of trips resulting from the site upon opening is expected to be in the order of 164 based on the figures used in Table 3-2.

Table 3-2: Summary of Predicted Daily Trips

	Daily Trips 2019		
	Arrivals	**Departures**	**Total**
Imported Backfilling Material	80	80	**160**
Staff	2	2	**4**
Total	**82**	**82**	**164**

3.3 Trip Distribution and Assignment

3.3.1 Trip Distribution

Appendix A contains extracts from the TRICS database giving the forecast arrival/departure distribution for standard quarry sites. This was considered the most relevant site type to depict movements at the quarry. By inspection, it can be seen that the pattern of arrivals/departures is consistent with a short turn around within the sites, e.g. that vehicles generally arrive and depart within a short time period, likely to be less than an hour.

The TRICS database indicates that the AM peak accounts for 12.30% of total daily arrivals and 9.50% of the total departures at the proposed quarry entrance.

The TRICS database indicates that the PM peak accounts for 6.20% of total daily arrivals and 15.80% of the total departures at the proposed quarry entrance.

A summary of the predicted daily trips during peak hours at the proposed quarry entrance is shown in Table 3-3.

Table 3-3: Summary of Forecast Peak Hour Site Traffic

	AM Peak		PM Peak	
	Arrivals	**Departures**	**Arrivals**	**Departures**
HGV movements	10 (80 x 0.123)	8 (80 x 0.095)	5 (80 x 0.062)	13 (80 x 0.158)
Staff	2	-	-	2
Total	**12**	**8**	**5**	**15**

3.3.2 Trip Assignment

The trip assignment is derived from the proposed route that vehicles will take when travelling to and from the site, as detailed in Section 2.2. 100% of incoming vehicles are predicted to arrive at the quarry from the north. Similarly, 100% of all vehicles leaving the quarry will travel north. When travelling through the Tanderagee Crossroads all vehicles will travel on the L1002 with no vehicles entering or leaving the L1002 from, or to, the L5004 or L5005. At the R148/L1002 junction all vehicles travelling to the site will turn left off the R148 and all vehicles travelling from the site will turn right onto the R148. The forecast trip assignment is shown in Figure 3-1. Appendix B to this report contains traffic turning count diagrams at all junctions analysed for assessment years 2018 to 2034.

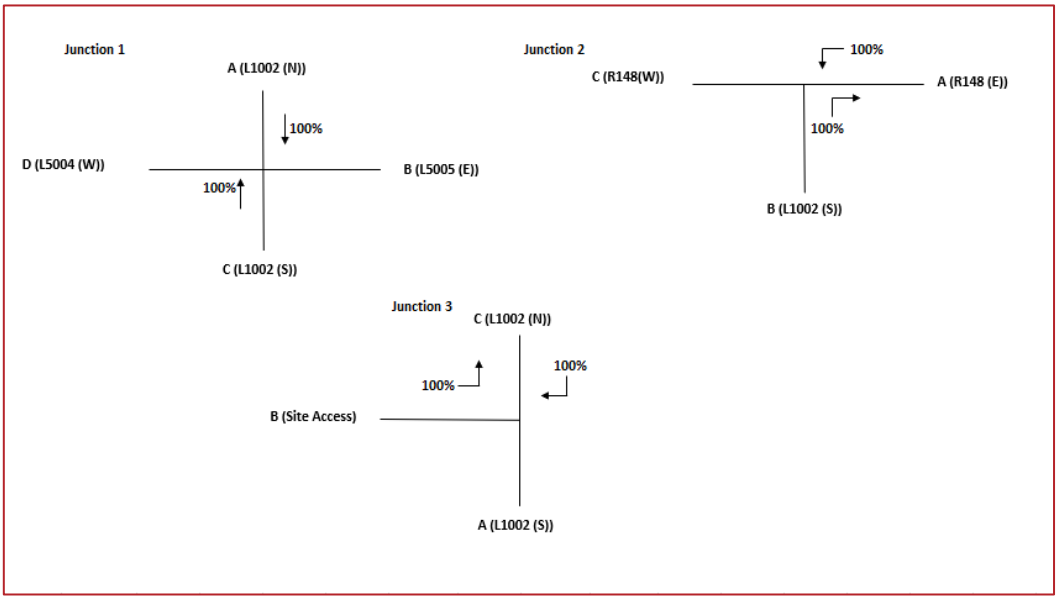


Figure 3-1: Traffic Distribution to/from Quarry Access

4 Road Impacts

4.1 Assessment Years

The “Traffic and Transport Assessment Guidelines” published by the National Roads Authority recommend the assessment of traffic in the Opening Year, the Opening Year +5 years and the Opening Year +15 years. The year of opening is assumed to be 2019. The assessment years for the impact assessment are therefore 2019, 2024 and 2034.

4.2 Traffic Growth

The "Project Appraisal Guidelines - Unit 5.3" published by Transport Infrastructure Ireland has been used to determine future year traffic flows on the network from the existing 2018 traffic count data. Table 4-1 contains a summary of the traffic growth factors published in Table 5.3.2 (Link-Based Growth Rates Annual Growth Factors) contained in the "Project Appraisal Guidelines for National Roads Unit 5.3 – Travel Demand Projections". For this assessment, the Central Growth scenario has been adopted as per the guidance in the Project Appraisal Guidelines.

TABLE 4-1: FUTURE YEAR TRAFFIC GROWTH FACTORS FOR THE MID-EAST (KILDARE, MEATH, WICKLOW)

Year	Central Growth	
	LV	HV
2013-2030	**1.014**	**1.0237**
2030-2050	**1.0048**	**1.0176**

4.3 Link Capacity Assessment

A link capacity assessment was undertaken for each road within the scope of study. The calculated AADT for each road assessed is given in Section 2.4 and is used in the link capacity assessment. The TII Publications document reference DN-GEO-03031 provides guidance on recommended rural road layouts in Table 6/1. It advises that the capacity of a Type 3 Single Carriageway road with 6.0m cross-section is 5,000 AADT for a Level of Service D (LOS D) and a Type 1 Single Carriageway road with 7.3m cross-section is 11,600 AADT for a Level of Service D (LOS D).

4.3.1 L1002 (S) South of the Tanderagee Crossroads and adjacent to the Quarry Access

The L1002, south of the Tanderagee Crossroads, has an average cross-section width of approximately 7.0m with no hard shoulders present. Therefore, the L1002 is most similar to the Type 3 Single Carriageway.

The combined background and Site Traffic volumes are summarised in Table 4-2 for each of the assessment years. It is considered that the L1002 will continue to operate within capacity for each of the assessment years. The traffic associated with the proposed backfilling operation represents between 7.08% and 8.30% of the total traffic on the L1002 during the assessment years 2019 to 2034.

TABLE 4-2: COMBINED AADT FOR EACH ASSESSMENT YEAR (L1002 (S) AT THE QUARRY ACCESS)

	Assessment Year			
	2018	**2019**	**2024**	**2034**
Background Traffic	1,788	1,813	1,944	2,153
Additional Development Traffic	-	164	164	164
Combined Traffic (Background + Additional Dev. Traffic)	1,788	1,977	2,108	2,317
Additional Traffic as % of Combined Traffic	-	8.30%	7.78%	7.08%

4.3.2 L1002 (N) Local Road at Tanderagee Crossroads

The L1002, north of the Tanderagee Crossroads, has an average cross-section width of approximately 6.8m with no hard shoulders present. Therefore, the L1002 is most similar to the Type 3 Single Carriageway.

The combined background and Site Traffic volumes are summarised in Table 4-3 for each of the assessment years. It is considered that the L1002 will continue to operate within capacity for each of the assessment years. The traffic associated with the proposed backfilling operation represents between 7.40% and 8.66% of the total traffic on the L1002 during the assessment years 2019 to 2034.

TABLE 4-3: COMBINED AADT FOR EACH ASSESSMENT YEAR (L1002 (N))

	Assessment Year			
	2018	**2019**	**2024**	**2034**
Background Traffic	1,705	1,729	1,853	2,054
Additional Development Traffic	-	164	164	164
Combined Traffic (Background + Additional Dev. Traffic)	1,705	1,893	2,017	2,218
Additional Traffic as % of Combined Traffic	-	8.66%	8.13%	7.40%

4.3.3 L5004 Local Road at Tanderagee Crossroads

The L5004, west of the Tanderagee Crossroads, has an average cross-section width of approximately 5.5m with no hard shoulders present. Therefore, the L5004 is most similar to the Type 3 Single Carriageway.

The combined background and Site Traffic volumes are summarised in Table 4-4 for each of the assessment years. It is considered that the L5004 will continue to operate within capacity for each of the assessment years. The traffic associated with the proposed backfilling operation represents between 36.20% and 40.26% of the total traffic on the L5004 during the assessment years 2019 to 2034. It should be noted though that traffic generated by the backfilling operation will not travel via the L5004.

TABLE 4-4: COMBINED AADT FOR EACH ASSESSMENT YEAR (L5004)

	Assessment Year			
	2018	**2019**	**2024**	**2034**
Background Traffic	240	243	261	289
Additional Development Traffic	-	164	164	164
Combined Traffic (Background + Additional Dev. Traffic)	240	407	425	453
Additional Traffic as % of Combined Traffic	-	40.26%	38.60%	36.20%

4.3.4 L5005 Local Road at Tanderagee Crossroads

The L5005, east of the Tanderagee Crossroads, has an average cross-section width of approximately 5.5m with no hard shoulders present. Therefore, the L5005 is most similar to the Type 3 Single Carriageway.

The combined background and Site Traffic volumes are summarised in Table 4-5 for each of the assessment years. It is considered that the L5005 will continue to operate within capacity for each of the assessment years. The traffic associated with the proposed backfilling operation represents between 17.54% and 20.17% of the total traffic on the L5005 during the assessment years 2019 to 2034. It should be noted though that traffic generated by the backfilling operation will not travel via the L5005.

TABLE 4-5: COMBINED AADT FOR EACH ASSESSMENT YEAR (L5005)

	Assessment Year			
	2018	**2019**	**2024**	**2034**
Background Traffic	640	649	696	771
Additional Development Traffic	-	164	164	164
Combined Traffic (Background + Additional Dev. Traffic)	640	813	860	935
Additional Traffic as % of Combined Traffic	-	20.17%	19.08%	17.54%

4.3.5 L1002 (S) Local Road at R148 junction

The L1002, south of the R148/L1002 junction, has an average cross-section width of approximately 7m with no hard shoulders present. Therefore, the L1002 is most similar to the Type 3 Single Carriageway.

The combined background and Site Traffic volumes are summarised in Table 4-6 for each of the assessment years. It is considered that the L1002 will continue to operate within capacity for each of the assessment years. The traffic associated with the proposed backfilling operation represents between 6.17% and 7.24% of the total traffic on the L1002 during the assessment years 2019 to 2034.

TABLE 4-6: COMBINED AADT FOR EACH ASSESSMENT YEAR (L1002 (S))

	Assessment Year			
	2018	**2019**	**2024**	**2034**
Background Traffic	2,071	2,100	2,251	2,494
Additional Development Traffic	-	164	164	164
Combined Traffic (Background + Additional Dev. Traffic)	2,071	2,264	2,415	2,658
Additional Traffic as % of Combined Traffic	-	7.24%	6.79%	6.17%

4.3.6 R148 (W)

The R148, south of the R148/L1002 junction, has an average cross-section width of approximately 11m with hard shoulders present. Therefore, the R148 is most similar to the Type 1 Single Carriageway.

The combined background and Site Traffic volumes are summarised in Table 4-7 for each of the assessment years. It is considered that the R148 will continue to operate within capacity for each of the assessment years. The traffic associated with the proposed backfilling operation represents between 1.84% and 2.18% of the total traffic on the R148 during the assessment years 2019 to 2034. It should be noted though that traffic generated by the backfilling operation will not travel via the R148 (W).

TABLE 4-7: COMBINED AADT FOR EACH ASSESSMENT YEAR (R148 (W))

	Assessment Year			
	2018	**2019**	**2024**	**2034**
Background Traffic	7,245	7,346	7,875	8,726
Additional Development Traffic	-	164	164	164
Combined Traffic (Background + Additional Dev. Traffic)	7,245	7,510	8,039	8,890
Additional Traffic as % of Combined Traffic	-	2.18%	2.04%	1.84%

4.3.7 R148 (E)

The R148, east of the R148/L1002 junction, has an average cross-section width of approximately 11m at the quarry entrance with hard shoulders present. Therefore, the R148 is most similar to the Type 1 Single Carriageway.

The combined background and Site Traffic volumes are summarised in Table 4-8 for each of the assessment years. It is considered that the R148 will continue to operate within capacity for each of the assessment years. The traffic associated with the proposed backfilling operation represents between 1.79% and 2.12% of the total traffic on the R148 during the assessment years 2019 to 2034.

TABLE 4-8: COMBINED AADT FOR EACH ASSESSMENT YEAR (R148 (E))

	Assessment Year			
	2018	**2019**	**2024**	**2034**
Background Traffic	7,455	7,559	8,104	8,979
Additional Development Traffic	-	164	164	164
Combined Traffic (Background + Additional Dev. Traffic)	7,455	7,723	8,268	9,143
Additional Traffic as % of Combined Traffic	-	2.12%	1.98%	1.79%

4.4 Junction Capacity Analysis

The capacity of the junctions in this study have been assessed using the Transport Research Laboratory's (TRL) computer programme PICADY (Priority Intersection CApacity and DelaY).

Junction performance is measured as a ratio between the flow and capacity (RFC). The capacity analysis has been carried out for both the AM and PM Peaks for each of the assessment years (2019, 2024 and 2034). A rural junction with an RFC below 0.85 is considered to be operating within capacity, and an RFC of 0.85 indicating a junction operating at capacity.

The detailed junction capacity analysis outputs for the junction for the final future forecast assessment year (2034), under the “with the proposed development” scenario, are contained within Appendix D to this report. Outputs for all other future forecast assessment years are available if required, including results for the “without the proposed development” scenario.

A summary of the junction capacity analysis results is shown in Table 4-9 to Table 4-11. The results indicate that all the junctions will continue to operate within capacity for each of the assessment years 2019, 2024 and 2034 for both AM and PM peak periods.

TABLE 4-9: JUNCTION 1: PRIORITY CROSSROAD JUNCTION OF THE L1002, THE L5004 AND THE L5005

Year	Peak	L1002 (N) (Arm A)			L5005 (Arm B)			L1002 (S) (Arm C)			L5004 (Arm D)		
		Max RFC	Max Queue (Veh)	Queuing Delay (Min/Veh)	Max RFC	Max Queue (Veh)	Queuing Delay (Min/Veh)	Max RFC	Max Queue (Veh)	Queuing Delay (Min/Veh)	Max RFC	Max Queue (Veh)	Queuing Delay (Min/Veh)
2019	AM Peak	0.004	0	0.1	0.045	0.05	0.2	0.028	0.03	0.1	0.015	0.02	0.1
	PM Peak	0.010	0.01	0.1	0.074	0.08	0.1	0.040	0.04	0.1	0.023	0.02	0.1
2024	AM Peak	0.004	0	0.1	0.050	0.05	0.2	0.030	0.03	0.1	0.016	0.02	0.1
	PM Peak	0.010	0.01	0.1	0.083	0.09	0.1	0.047	0.05	0.1	0.027	0.03	0.1
2034	AM Peak	0.004	0	0.1	0.056	0.06	0.2	0.035	0.04	0.1	0.019	0.02	0.1
	PM Peak	0.012	0.01	0.1	0.091	0.10	0.1	0.054	0.06	0.1	0.028	0.03	0.1

TABLE 4-10: JUNCTION 2: PRIORITY T-JUNCTION OF THE L1002 AND THE R148

Year	Peak	R148 (E) (Arm A)			L1002 (Arm B)			R148 (W) (Arm C)		
		Max RFC	Max Queue (Veh)	Queuing Delay (Min/Veh)	Max RFC	Max Queue (Veh)	Queuing Delay (Min/Veh)	Max RFC	Max Queue (Veh)	Queuing Delay (Min/Veh)
2019	AM Peak	-	-	-	0.154	0.18	0.1	0.110	0.12	0.1
	PM Peak	-	-	-	0.156	0.18	0.2	0.088	0.10	0.1
2024	AM Peak	-	-	-	0.165	0.20	0.1	0.120	0.14	0.1
	PM Peak	-	-	-	0.174	0.21	0.2	0.098	0.11	0.1
2034	AM Peak	-	-	-	0.189	0.23	0.2	0.137	0.16	0.1
	PM Peak	-	-	-	0.200	0.25	0.2	0.115	0.13	0.1

TABLE 4-11: JUNCTION 3: PRIORITY T-JUNCTION OF THE L1002 AND THE SITE ACCESS

Year	Peak	L1002 (S) (Arm A)			Site Access (Arm B)			L1002 (N) (Arm C)		
		Max RFC	Max Queue (Veh)	Queuing Delay (Min/Veh)	Max RFC	Max Queue (Veh)	Queuing Delay (Min/Veh)	Max RFC	Max Queue (Veh)	Queuing Delay (Min/Veh)
2019	AM Peak	-	-	-	0.023	0.02	0.2	0.043	0.05	0.2
	PM Peak	-	-	-	0.044	0.05	0.2	0.011	0.01	0.2
2024	AM Peak	-	-	-	0.023	0.02	0.2	0.043	0.05	0.2
	PM Peak	-	-	-	0.044	0.05	0.2	0.011	0.01	0.2
2034	AM Peak	-	-	-	0.023	0.02	0.2	0.044	0.05	0.2
	PM Peak	-	-	-	0.044	0.05	0.2	0.011	0.01	0.2

5 Road Safety

5.1 Sightlines

Traffic generated by the backfilling operation will access the quarry via the existing site entrance on the L1002 south of the Tanderagee Crossroads.

Section 17.7.1 of the Kildare County Development Plan 2017-2023 states that guidance on stopping sight distances and visibility splays is contained in the Design Manual for Roads and Bridges (DMRB). According to the DMRB, for a road with a posted speed limit of 80kph, such as the L1002 at the quarry access, the stopping sight distance/visibility splay should be 160m.

The current sightlines from the site access require improvement to meet these requirements. Visibility to the north and south along the L1002 for an exiting driver is restricted by the hedgerow and trees on the western side of the L1002.

To achieve the required visibility, it is proposed to remove the existing trees and hedgerow. The sightlines at the quarry entrance following these amendments are shown on drawing P18-016-DG-001 in Appendix C.

5.2 Site Access Junction

There are currently no stop roadmarkings at the site access junction. Stop roadmarkings will be provided in accordance with the Traffic Signs Manual at the exit from the site at its junction with the L1002 local road.

5.3 Parking

Throughout the backfilling operation a total of two staff members will be present on site daily. These staff members will travel to the site in personal vehicles and will park these vehicles on site during the day. The existing parking provision on site is considered adequate to cater for the parking demand.

5.4 Pedestrians & Cyclists

There are no pedestrian footways or cyclist provisions in place along the L1002 in the vicinity of the proposed quarry site.

5.5 Public Transport

There are no public transport provisions in place in the vicinity of the quarry site.

6 Conclusions

An assessment of both the link capacity of the L1002 and the R148, and of the junction capacity of the L1002/R148 junction, the Tanderagee Crossroads (L1002/L5004/L5005) and the site access concludes that they will operate within capacity for each of the assessment years.

The assessment also indicates that the proposed backfilling operation will have a minor impact on traffic flows on the existing road network.

It is recommended that, following removal of the hedgerow and trees on the western side of the L1002, normal verge/hedgerow maintenance is continued to be carried out over the lifetime of the backfilling operation to maximise the visibility envelope along the L1002 for exiting vehicles. Stop roadmarkings will be provided in accordance with the Traffic Signs Manual at the exit from the site at its junction with the L1002 local road.

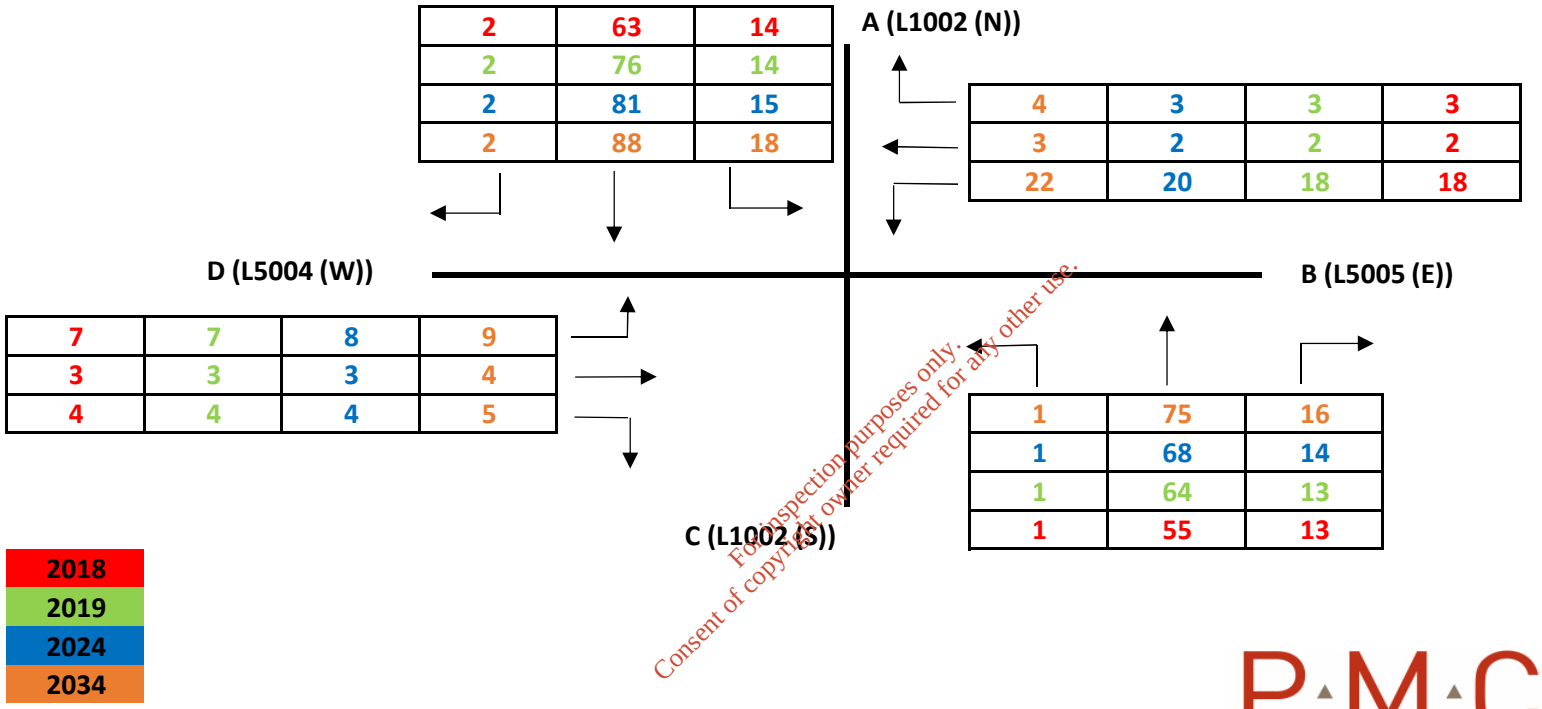
Appendix A – TRICS Output

TRICS – Arrivals

TRICS - Departures

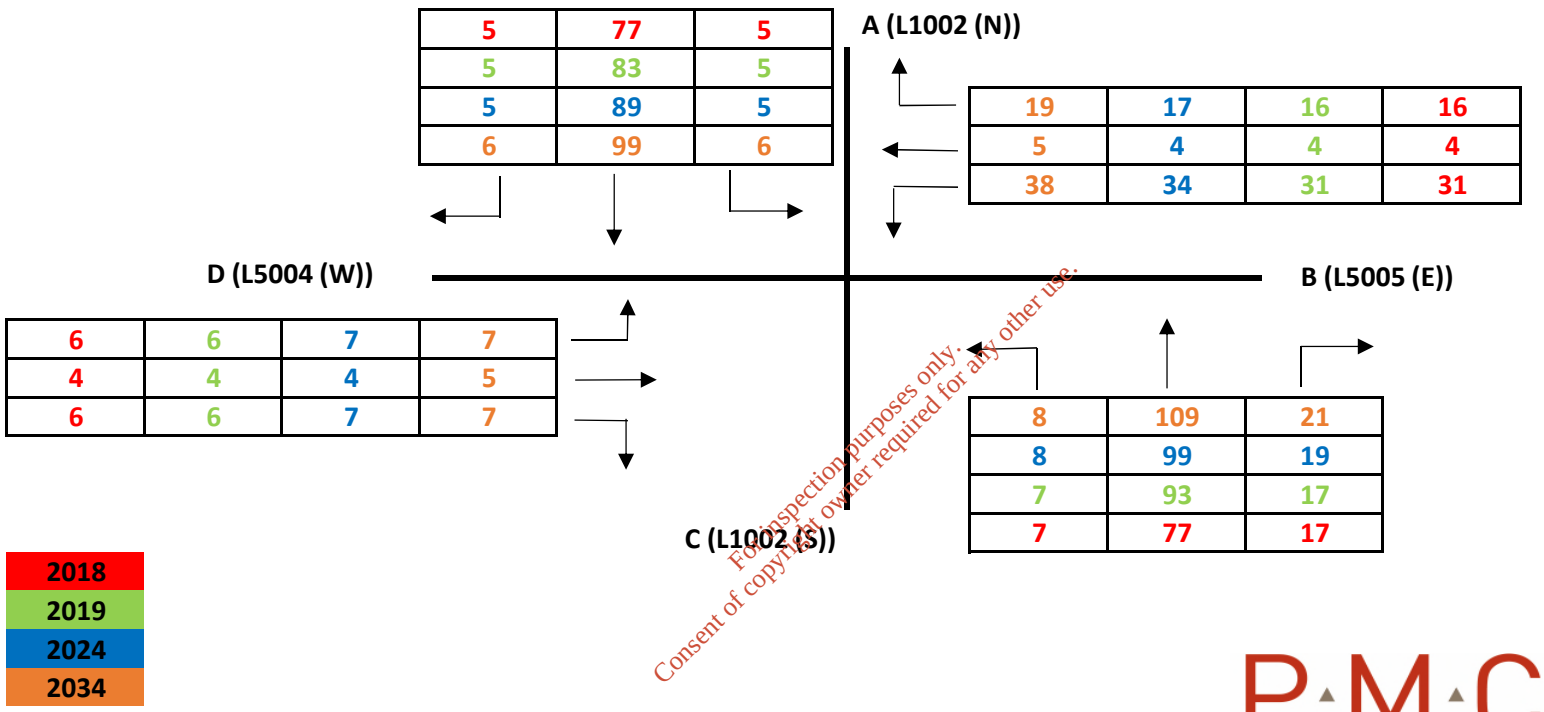
Appendix B – Junction Turning Counts (2018 – 2034)

Junction 1 - Tanderagee Crossroads (AM Peak)



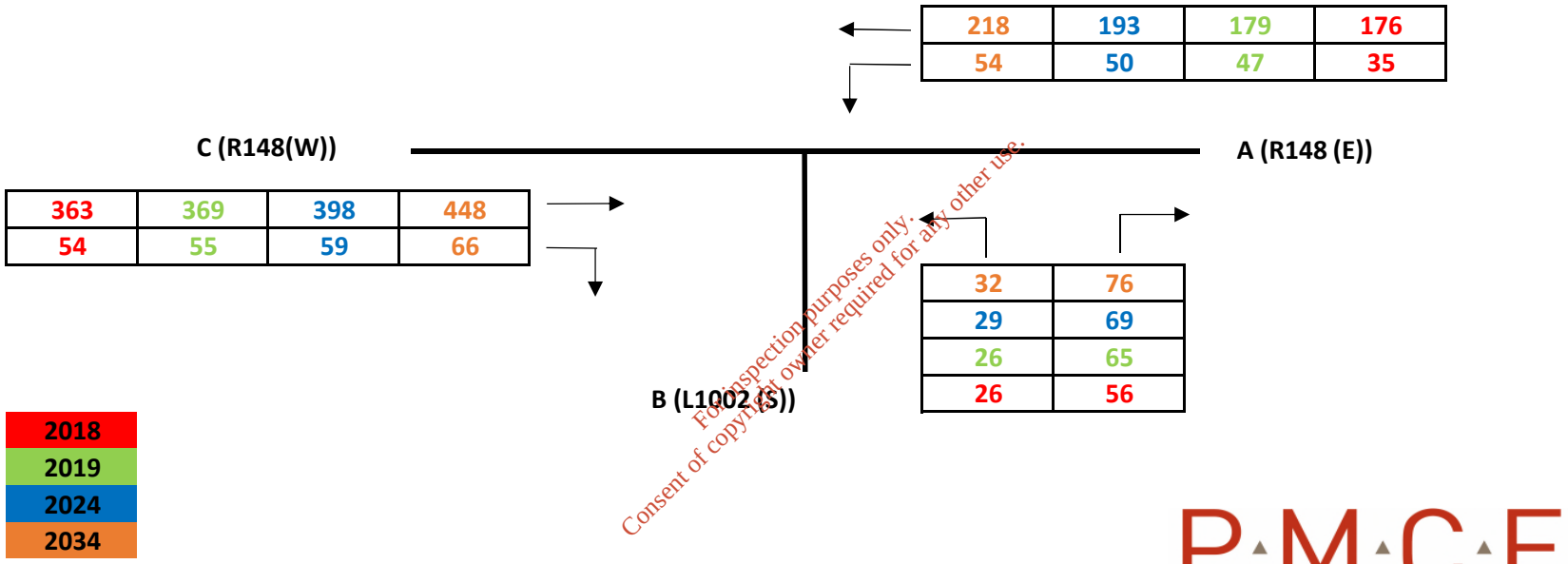
P·M·C·E

Junction 1 - Tanderagee Crossroads (PM Peak)



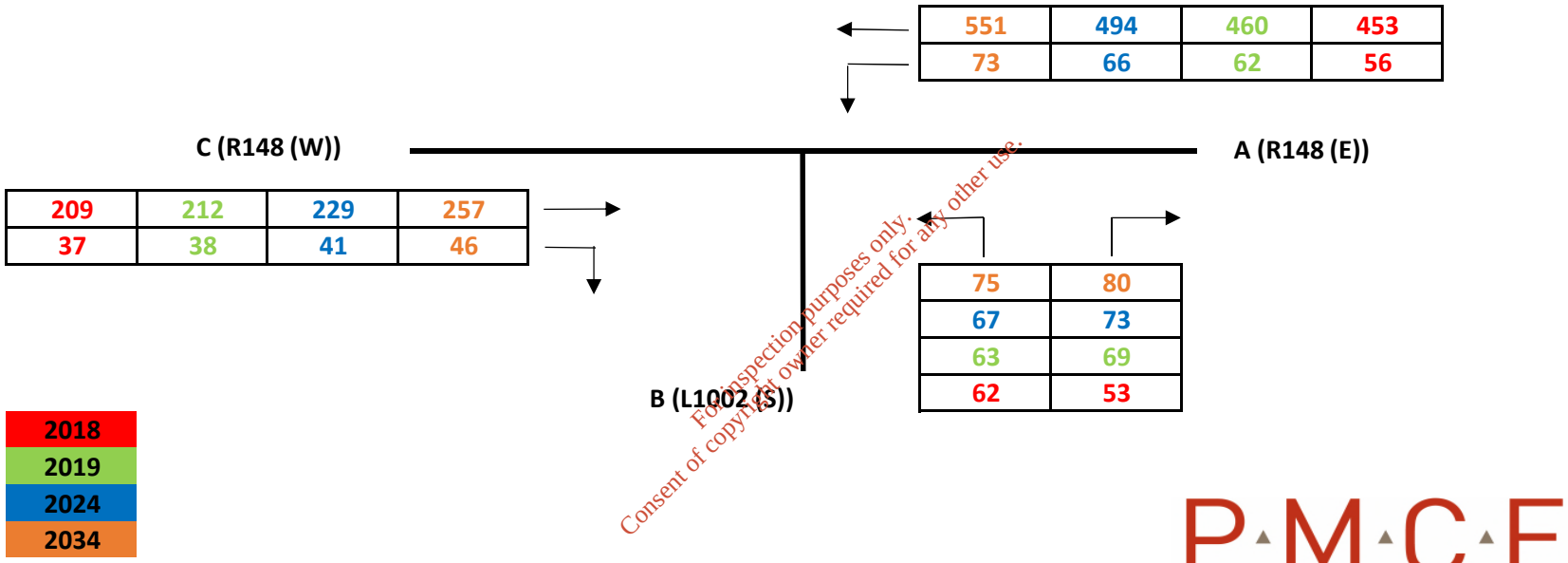
P·M·C·E

Junction 2 - R148/L1002 (AM Peak)



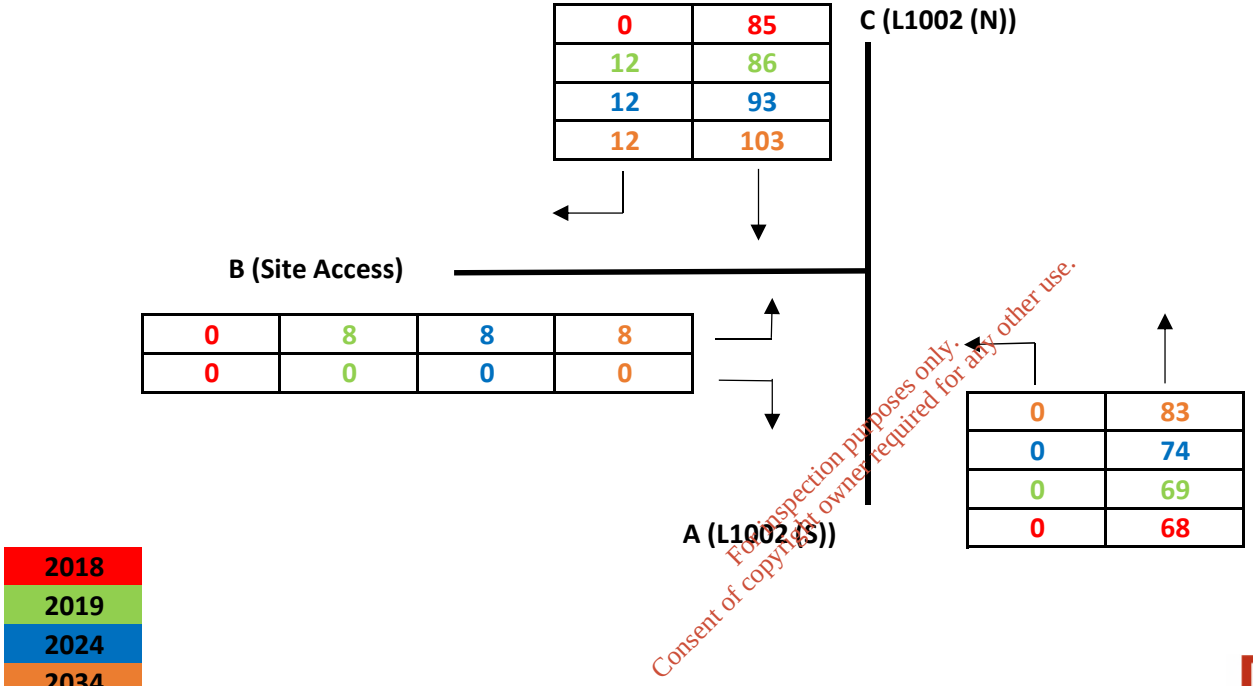
P·M·C·E

Junction 2 - R148/L1002 (PM Peak)



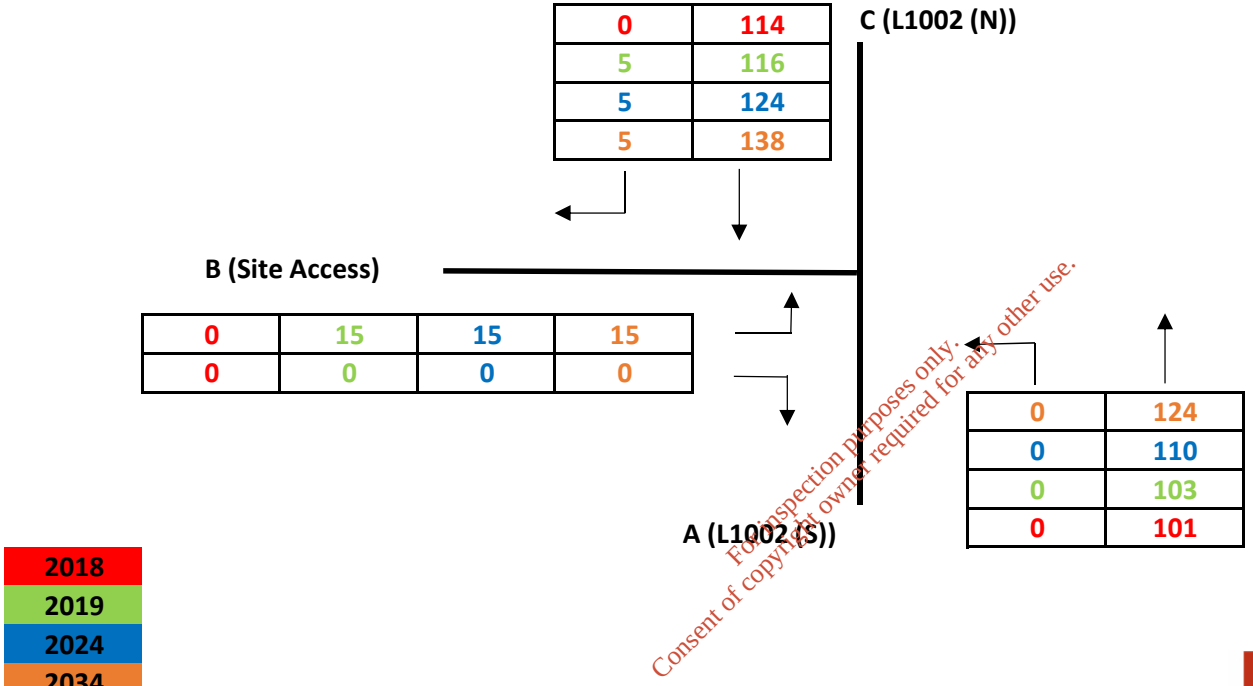
P·M·C·E

Junction 3 - L1002/Site Access (AM Peak)



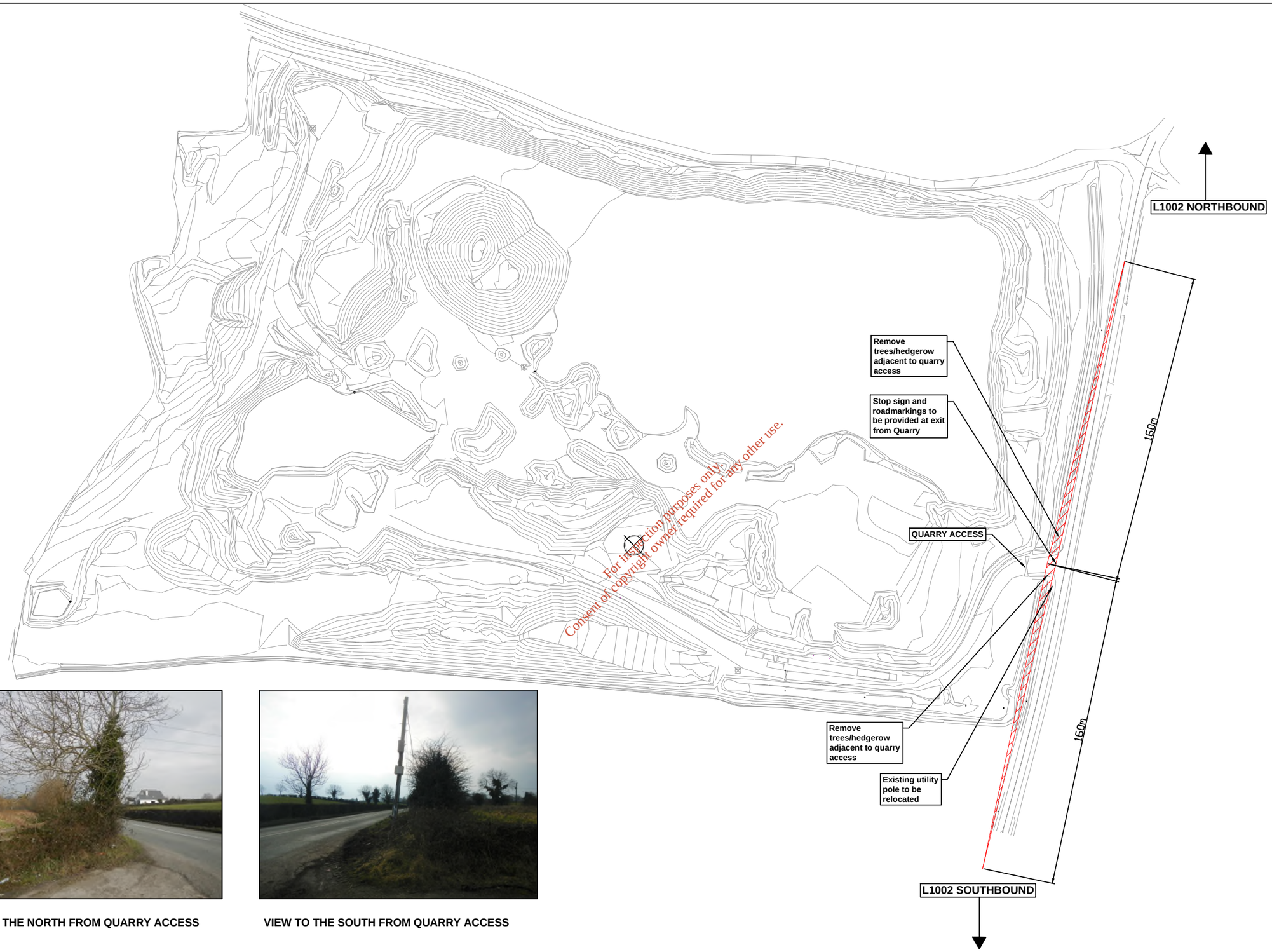
P·M·C·E

Junction 3 - L1002/Site Access (PM Peak)



P·M·C·E

Appendix C – Sightline Assessment Drawings



VIEW TO THE NORTH FROM QUARRY ACCESS

VIEW TO THE SOUTH FROM QUARRY ACCESS

PMCE Ltd.
Mona Villa
Lower Commons Road
Brownsbarn
Dublin 22

Tel: + 353 (1) 464 3041
Fax: + 353 (1) 459 1836
Email: info@pmceconsultants.com
Web: www.pmceconsultants.com

Client: Golder Associates

Rev.	Comment	Date

Notes:
1. Drawing is the property of PMCE Ltd.

Project:	TTA for the Ballinderry Sand and Gravel Backfilling
Drawing Title:	Quarry Access Sightlines
Drawn:	AOR
Date:	26/03/2018
Checked:	TAG
Scale:	1:1000
Approved:	TAG
Status:	Design
Drawing No:	P18-016-DG-001
Revision:	1.0

Appendix D – Picady Outputs (for Opening Year +15)

PICADY

GUI Version: 5.1 AE
Analysis Program Release: 5.0 (MAY 2010)

For sales and distribution information, program advice and maintenance, contact:

TRL Limited
Crowthorne House
Nine Mile Ride
Wokingham, Berks.
RG40 3GA, UK

Tel: +44 (0)1344 770758
Fax:+44 (0)1344 770864
E-mail: software@trl.co.uk
Web: www.trlsoftware.co.uk

Run Analysis

Parameter	Values
File Run	W:\..\Site 1 - Crossroads (L1002_L5004_L5005)\P18-016 - Site 1_Crossroads.vpi
Date Run	23 March 2018
Time Run	09:40:20
Driving Side	Drive On The Left

Arm Names and Flow Scaling Factors

Arm	Arm Name	Flow Scaling Factor (%)
Arm A	L1002 (N)	100
Arm B	L5005 (E)	100
Arm C	L1002 (S)	100
Arm D	L5004 (W)	100

Stream Labelling Convention

Stream A-B contains traffic going from A to B etc.

Run Information

Parameter	Values
Run Title	P18-016 - TTA for the Ballinderry Sand & Gravel backfilling
Location	Ballinderry, Carbury, Co. Kildare
Date	26 February 2018
Enumerator	oreillya [PMCE11]
Job Number	P18-016
Status	TIA
Client	Golders Associates Ireland
Description	Crossroads junction of the L1002 (north - south) and the L5004 (west) and the L5005 (east)

Errors and Warnings

Parameter	Values
Warning	No Errors Or Warnings

Geometric Data

Geometric Parameters

Parameter	Minor Arm B	Minor Arm D
Major Road Carriageway Width (m)	7.00	6.00
Major Road Kerbed Central Reserve Width (m)	0.00	0.00
Major Road Right Turning Lane Width (m)	2.20	2.20
Minor Road Width 0m Back from Junction (m)	10.00	10.00
Minor Road Width 5m Back from Junction (m)	5.90	5.70
Minor Road Width 10m Back from Junction (m)	3.30	3.40
Minor Road Width 15m Back from Junction (m)	2.80	2.80
Minor Road Width 20m Back from Junction (m)	2.70	2.50
Minor Road Flare Length (veh)	2	2
Minor Road Visibility To Right (m)	80	120
Minor Road Visibility To Left (m)	25	30
Major Road Right Turn Visibility (m)	56	160
Major Road Right Turn Blocks Traffic	Yes (if over 1 veh)	Yes (if over 1 veh)

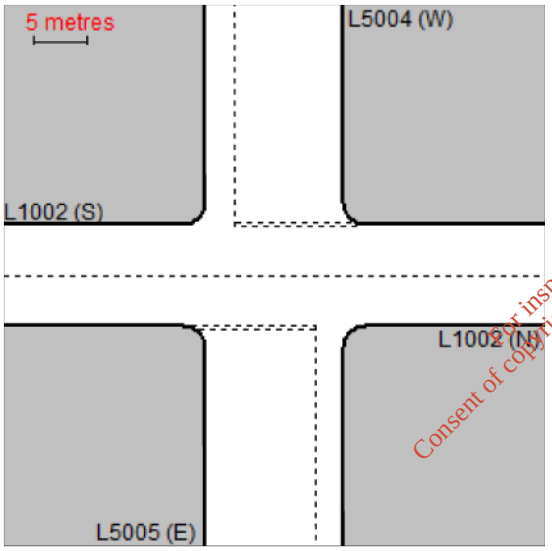
Slope and Intercept Values

Stream	Intercept for Stream	Slope for A-B	Slope for A-C	Slope for A-D	Slope for B-A	Slope for B-C	Slope for B-D	Slope for C-A	Slope for C-B	Slope for C-D	Slope for D-A	Slope for D-B	Slope for D-C
C-B	606.393	0.225	0.225	0.321	-	-	-	-	-	-	-	-	-
A-D	666.621	-	-	-	-	-	-	0.225	0.353	0.225	-	-	-
B-A	0.000	0.000	0.000	0.000	-	-	-	0.000	0.000	-	0.000	0.000	0.000
B-C	0.000	0.000	0.000	-	-	-	-	-	-	-	-	-	-
B-D(L)	0.000	0.000	0.000	0.000	-	-	-	0.000	0.000	0.000	-	-	-
D-A	0.000	-	-	-	-	-	-	0.000	-	0.000	-	-	-
D-B(L)	0.000	0.000	0.000	0.000	-	-	-	0.000	0.000	0.000	-	-	-
D-C	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	-	-	-
B-D(R)	0.000	0.000	0.000	0.000	-	-	-	0.000	0.000	0.000	-	-	-
D-B(R)	0.000	0.000	0.000	0.000	-	-	-	0.000	0.000	0.000	-	-	-

Note: Streams may be combined in which case capacity will be adjusted
These values do not allow for any site-specific corrections

Streams marked with '(L)' and '(R)' refer to the 'left' and 'right' lane of the minor arm that the originating traffic is on.

Junction Diagram



Demand Data

Modelling Periods

Parameter	Period	Duration (min)	Segment Length (min)
First Modelling Period	08:30-09:30	60	15
Second Modelling Period	16:30-17:30	60	15

Direct Entry Flows

Demand Set: AM Peak 2034
Modelling Period: 08:30-09:30

Segment: 08:30-08:45

Arm	Flow (veh/interval)
Arm A	25.00
Arm B	6.00
Arm C	17.00
Arm D	5.00

Segment: 08:45-09:00

Arm	Flow (veh/interval)
Arm A	28.00
Arm B	10.00
Arm C	22.00
Arm D	4.00

Segment: 09:00-09:15

Arm	Flow (veh/interval)
Arm A	23.00
Arm B	5.00
Arm C	22.00
Arm D	5.00

Segment: 09:15-09:30

Arm	Flow (veh/interval)
Arm A	20.00
Arm B	8.00
Arm C	23.00
Arm D	4.00

Demand Set: PM Peak 2034
Modelling Period: 16:30-17:30

Segment: 16:30-16:45

Arm	Flow (veh/interval)
Arm A	29.00
Arm B	10.00
Arm C	36.00
Arm D	7.00

Segment: 16:45-17:00

Arm	Flow (veh/interval)
Arm A	20.00
Arm B	22.00
Arm C	31.00
Arm D	5.00

Segment: 17:00-17:15

Arm	Flow (veh/interval)
Arm A	24.00
Arm B	12.00
Arm C	33.00
Arm D	4.00

Segment: 17:15-17:30

Arm	Flow (veh/interval)
Arm A	33.00
Arm B	18.00
Arm C	25.00
Arm D	4.00

Demand Set: AM Peak Development Traffic (80)
Modelling Period: 08:30-09:30

Segment: 08:30-08:45

Arm	Flow (veh/interval)
Arm A	3.00
Arm B	0.00
Arm C	2.00
Arm D	0.00

Segment: 08:45-09:00

Arm	Flow (veh/interval)
Arm A	3.00
Arm B	0.00
Arm C	2.00
Arm D	0.00

Segment: 09:00-09:15

Arm	Flow (veh/interval)
Arm A	3.00
Arm B	0.00
Arm C	2.00
Arm D	0.00

Segment: 09:15-09:30

Arm	Flow (veh/interval)
Arm A	3.00
Arm B	0.00
Arm C	2.00
Arm D	0.00

Demand Set: PM Peak Development Traffic (80)
Modelling Period: 16:30-17:30

Segment: 16:30-16:45

Arm	Flow (veh/interval)
Arm A	1.00
Arm B	0.00
Arm C	4.00
Arm D	0.00

Segment: 16:45-17:00

Arm	Flow (veh/interval)
Arm A	1.00
Arm B	0.00
Arm C	4.00
Arm D	0.00

Segment: 17:00-17:15

Arm	Flow (veh/interval)
Arm A	1.00
Arm B	0.00
Arm C	4.00
Arm D	0.00

Segment: 17:15-17:30

Arm	Flow (veh/interval)
Arm A	1.00
Arm B	0.00
Arm C	4.00
Arm D	0.00

Turning Counts

Demand Set: AM Peak 2034
Modelling Period: 08:30-09:30

From/To	Arm A	Arm B	Arm C	Arm D
Arm A	-	18	76	2
Arm B	4	-	22	3
Arm C	67	16	-	1
Arm D	9	4	5	-

Demand Set: PM Peak 2034
Modelling Period: 16:30-17:30

From/To	Arm A	Arm B	Arm C	Arm D
Arm A	-	6	94	6
Arm B	19	-	38	5
Arm C	94	21	-	8
Arm D	7	5	7	-

Demand Set: AM Peak Development Traffic (80)
Modelling Period: 08:30-09:30

From/To	Arm A	Arm B	Arm C	Arm D
Arm A	-	0	12	0
Arm B	0	-	0	0
Arm C	8	0	-	0
Arm D	0	0	0	-

Demand Set: PM Peak Development Traffic (80)
Modelling Period: 16:30-17:30

From/To	Arm A	Arm B	Arm C	Arm D
Arm A	-	0	5	0
Arm B	0	-	0	0
Arm C	15	0	-	0
Arm D	0	0	0	-

Turning proportions are calculated from turning count data

Turning Proportions

Demand Set: AM Peak 2034
Modelling Period: 08:30-09:30

From/To	Arm A	Arm B	Arm C	Arm D
Arm A	0.000	0.188	0.792	0.021
Arm B	0.138	0.000	0.759	0.103
Arm C	0.798	0.190	0.000	0.012
Arm D	0.500	0.222	0.278	0.000

Demand Set: PM Peak 2034
Modelling Period: 16:30-17:30

From/To	Arm A	Arm B	Arm C	Arm D
Arm A	0.000	0.057	0.887	0.057
Arm B	0.306	0.000	0.613	0.081
Arm C	0.764	0.171	0.000	0.065
Arm D	0.368	0.263	0.368	0.000

Demand Set: AM Peak Development Traffic (80)
Modelling Period: 08:30-09:30

From/To

Demand Set: PM Peak Development Traffic (80)
Modelling Period: 16:30-17:30

From/To	Arm A	Arm B	Arm C	Arm D
Arm A	0.000	0.000	1.000	0.000
Arm B	0.000	0.000	0.000	0.000
Arm C	1.000	0.000	0.000	0.000
Arm D	0.000	0.000	0.000	0.000

Heavy Vehicles Percentages

Demand Set: AM Peak 2034
Modelling Period: 08:30-09:30

From/To	Arm A	Arm B	Arm C	Arm D
Arm A	-	22.2	3.9	0.0
Arm B	25.0	-	13.6	33.3
Arm C	9.0	18.8	-	0.0
Arm D	11.1	0.0	0.0	-

Demand Set: PM Peak 2034
Modelling Period: 16:30-17:30

From/To	Arm A	Arm B	Arm C	Arm D
Arm A	-	0.0	6.4	0.0
Arm B	5.3	-	2.6	20.0
Arm C	10.6	28.6	-	0.0
Arm D	0.0	0.0	0.0	-

Demand Set: AM Peak Development Traffic (80)
Modelling Period: 08:30-09:30

From/To	Arm A	Arm B	Arm C	Arm D
Arm A	-	0.0	83.3	0.0
Arm B	0.0	-	0.0	0.0
Arm C	100.0	0.0	-	0.0
Arm D	0.0	0.0	0.0	-

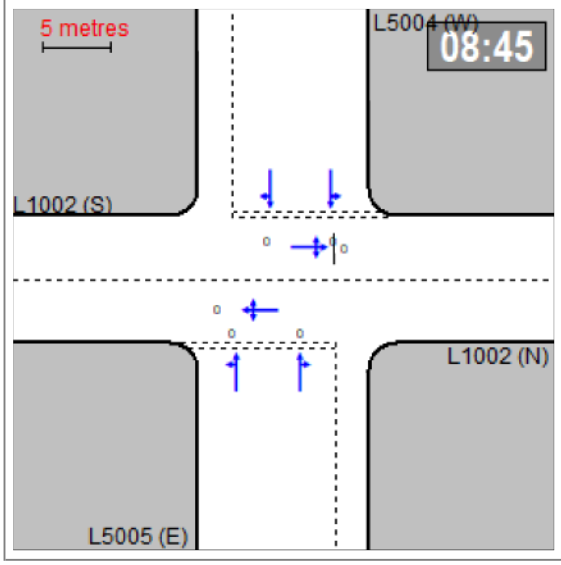
Demand Set: PM Peak Development Traffic (80)
Modelling Period: 16:30-17:30

From/To	Arm A	Arm B	Arm C	Arm D
Arm A	-	0.0	100.0	0.0
Arm B	0.0	-	0.0	0.0
Arm C	86.7	0.0	-	0.0
Arm D	0.0	0.0	0.0	-

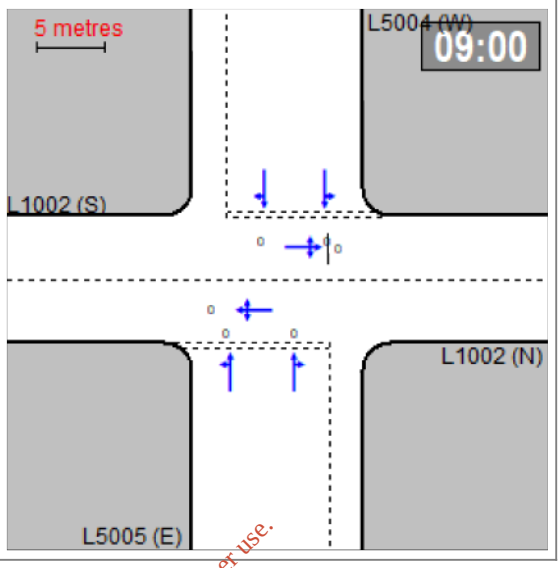
Queue Diagrams

Demand Set: Sum of Demand Sets for Modelling Period: 08:30 - 09:30
Modelling Period: 08:30-09:30
View Extent: 40m

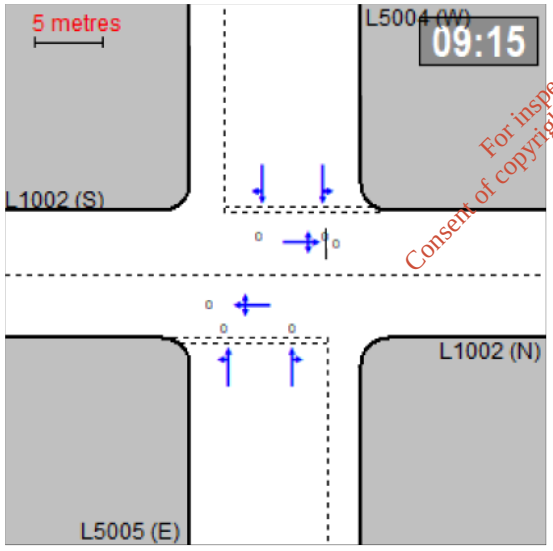
Queue Interval 1: 08:30-08:45



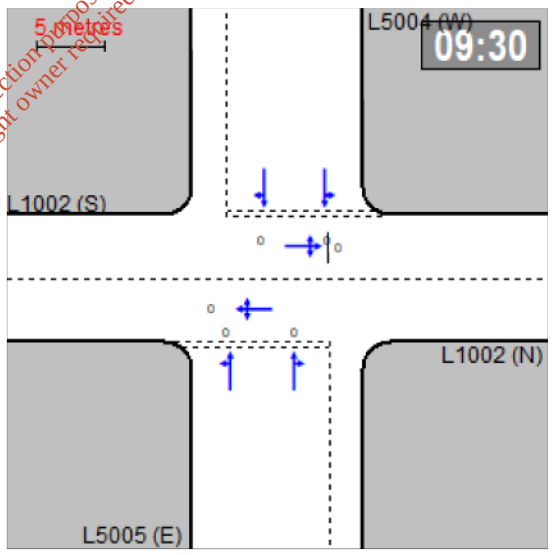
Queue Interval 2: 08:45-09:00



Queue Interval 3: 09:00-09:15

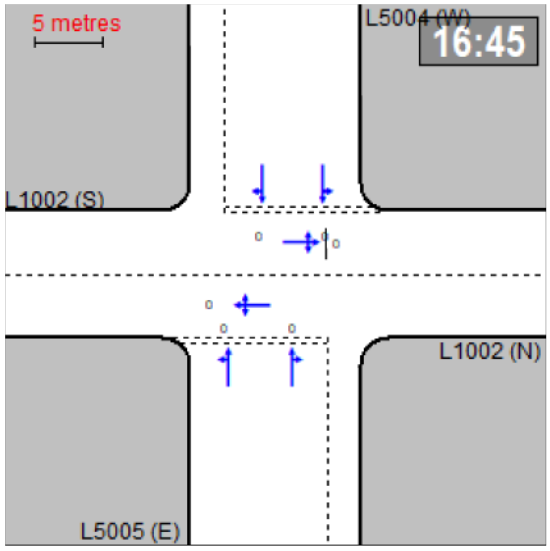


Queue Interval 4: 09:15-09:30

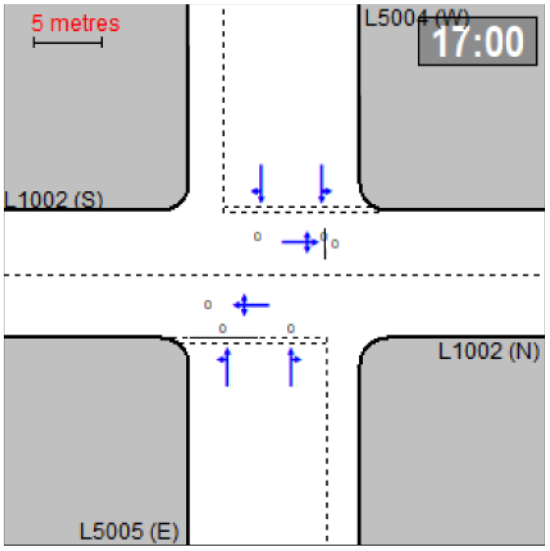


Demand Set: Sum of Demand Sets for Modelling Period: 16:30 - 17:30
Modelling Period: 16:30-17:30
View Extent: 40m

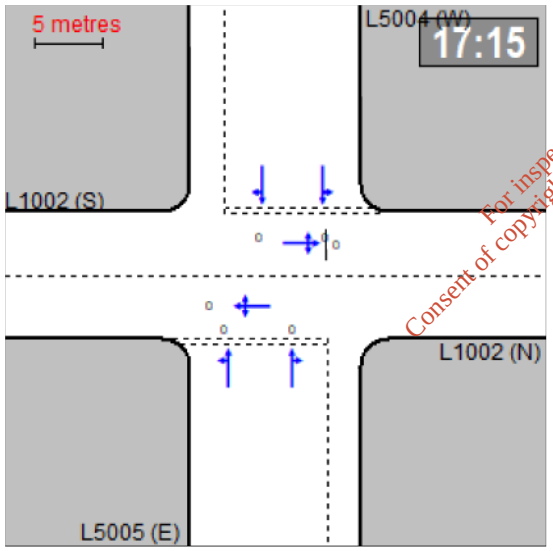
Queue Interval 1: 16:30-16:45



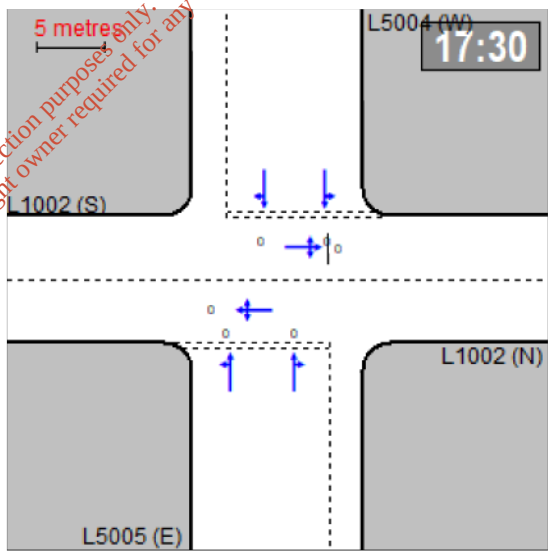
Queue Interval 2: 16:45-17:00



Queue Interval 3: 17:00-17:15

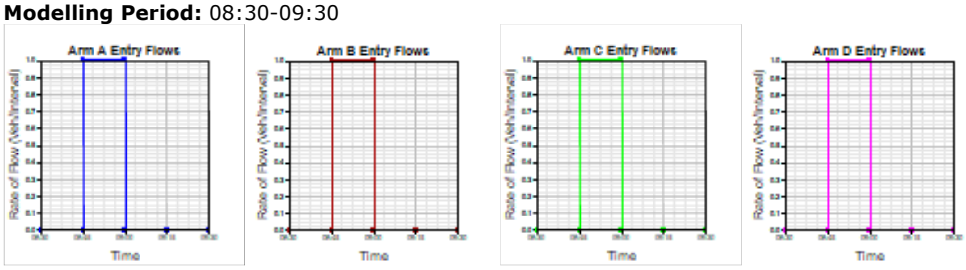


Queue Interval 4: 17:15-17:30

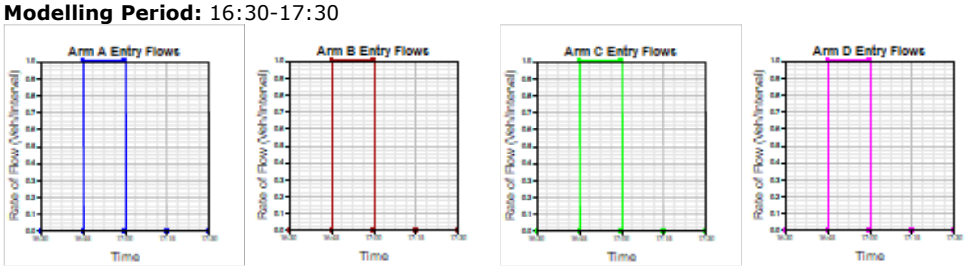


Demand Data Graph

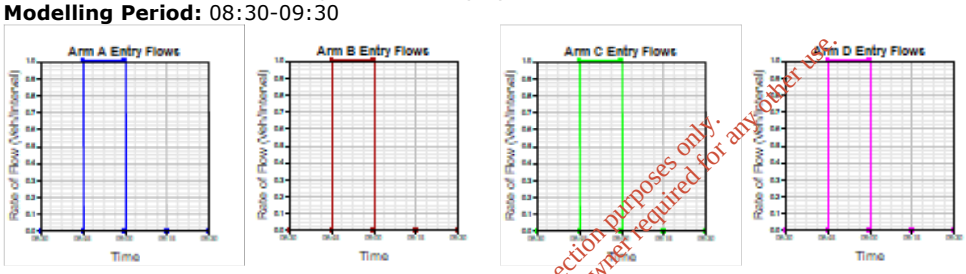
Demand Set: AM Peak 2034
Modelling Period: 08:30-09:30



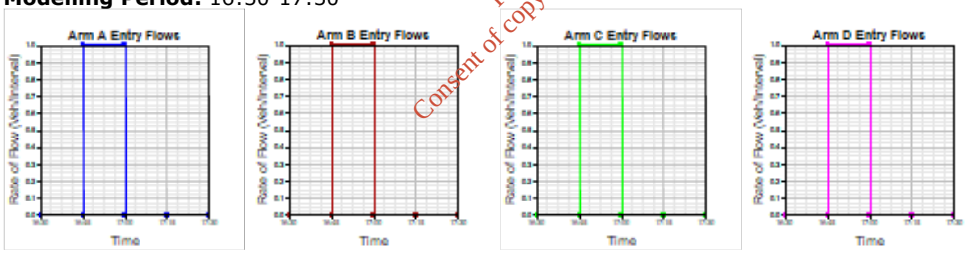
Demand Set: PM Peak 2034
Modelling Period: 16:30-17:30



Demand Set: AM Peak Development Traffic (80)
Modelling Period: 08:30-09:30

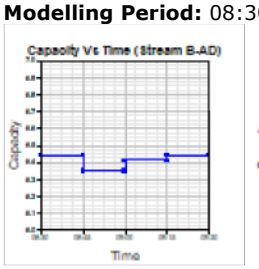


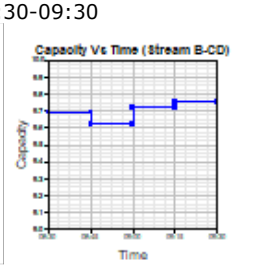
Demand Set: PM Peak Development Traffic (80)
Modelling Period: 16:30-17:30

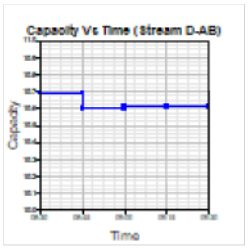


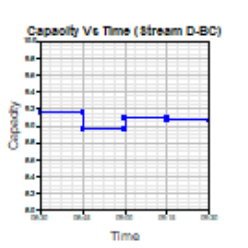
Capacity Graph

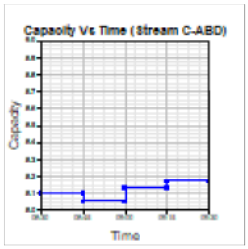
Demand Set: Sum of Demand Sets for Modelling Period: 08:30 - 09:30
Modelling Period: 08:30-09:30

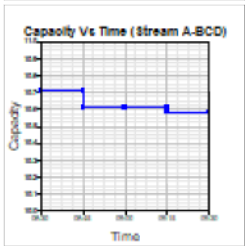




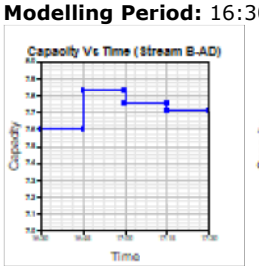


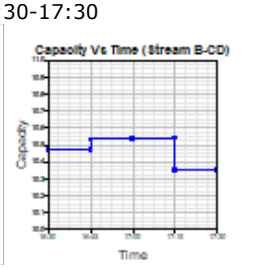


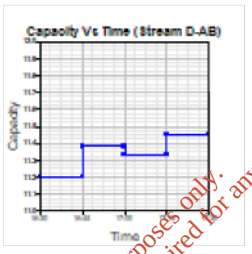


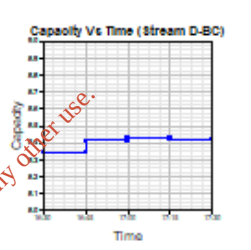


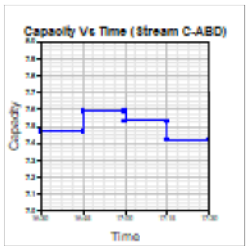
Demand Set: Sum of Demand Sets for Modelling Period: 16:30 - 17:30
Modelling Period: 16:30-17:30

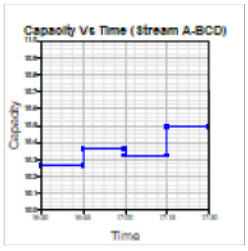






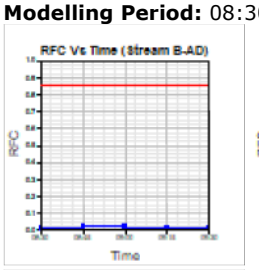


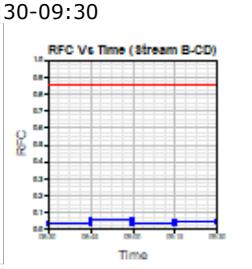


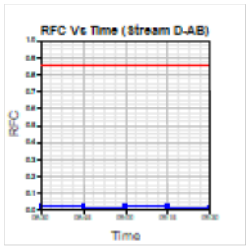


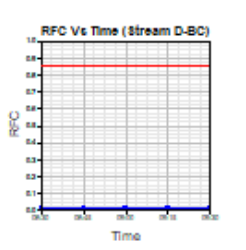
RFC Graph

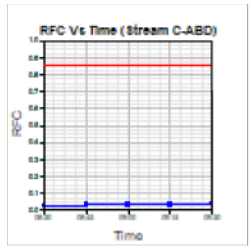
Demand Set: Sum of Demand Sets for Modelling Period: 08:30 - 09:30
Modelling Period: 08:30-09:30

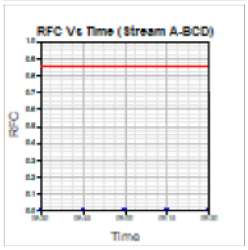




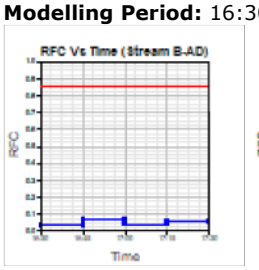


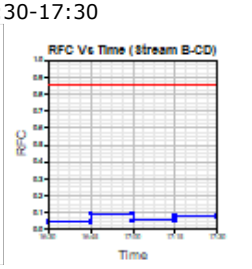


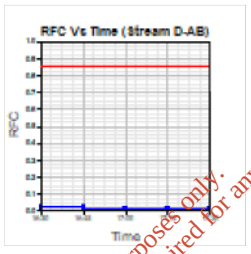


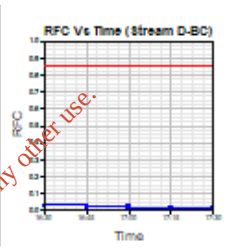


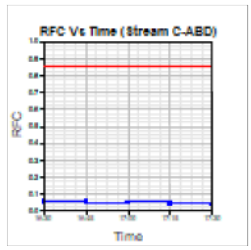
Demand Set: Sum of Demand Sets for Modelling Period: 16:30 - 17:30
Modelling Period: 16:30-17:30

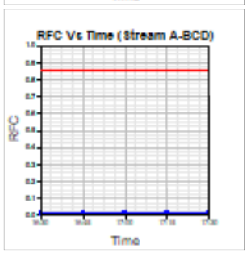






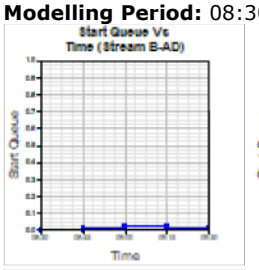


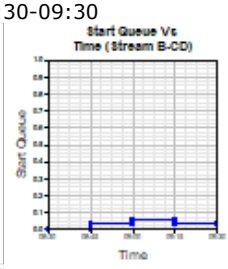


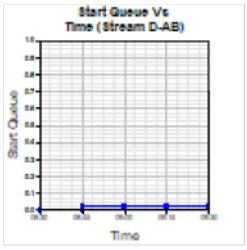


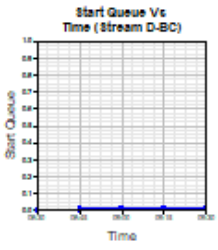
Start Queue Graph

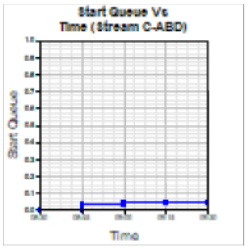
Demand Set: Sum of Demand Sets for Modelling Period: 08:30 - 09:30
Modelling Period: 08:30-09:30

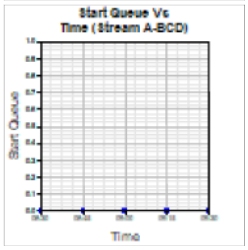




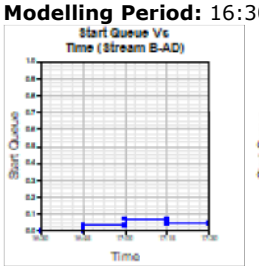


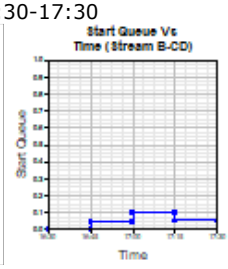


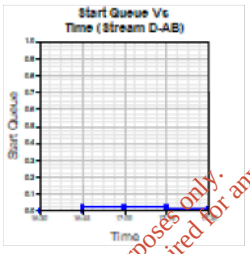


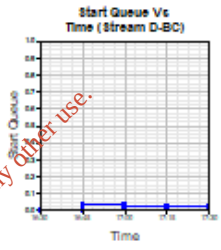


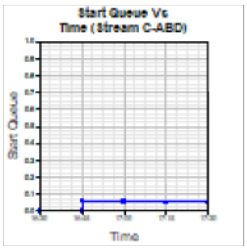
Demand Set: Sum of Demand Sets for Modelling Period: 16:30 - 17:30
Modelling Period: 16:30-17:30

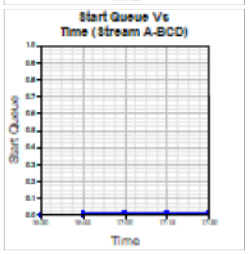






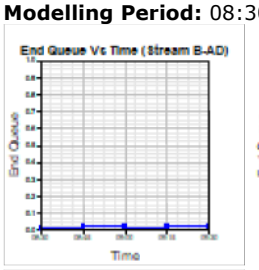


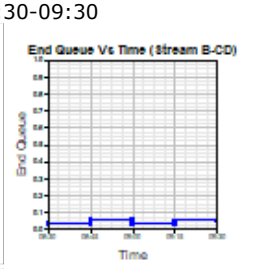


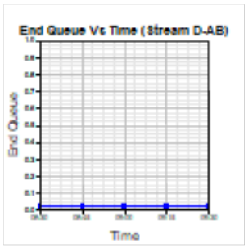


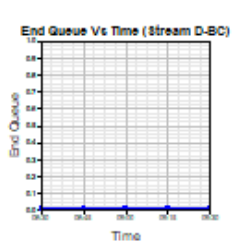
End Queue Graph

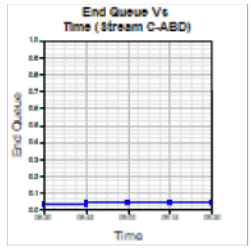
Demand Set: Sum of Demand Sets for Modelling Period: 08:30 - 09:30
Modelling Period: 08:30-09:30

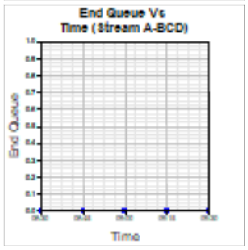




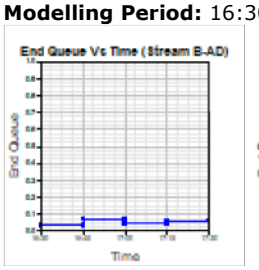


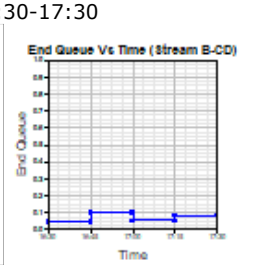


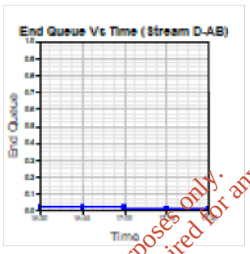


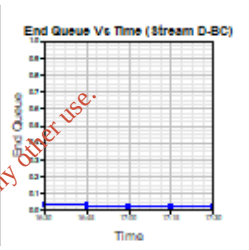


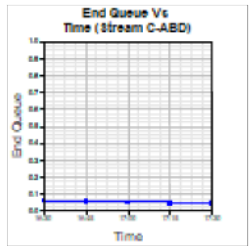
Demand Set: Sum of Demand Sets for Modelling Period: 16:30 - 17:30
Modelling Period: 16:30-17:30

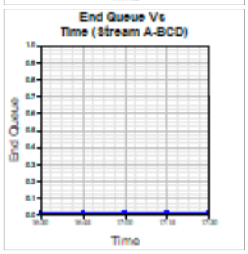






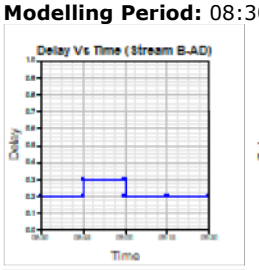


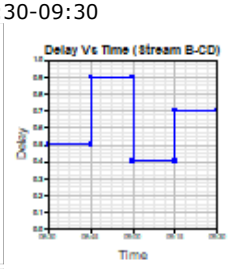


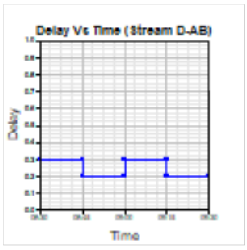


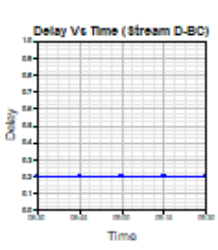
Delay Graph

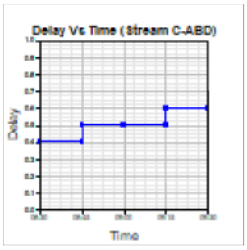
Demand Set: Sum of Demand Sets for Modelling Period: 08:30 - 09:30
Modelling Period: 08:30-09:30

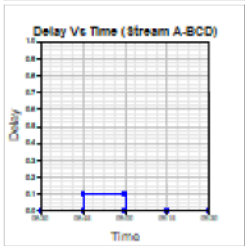




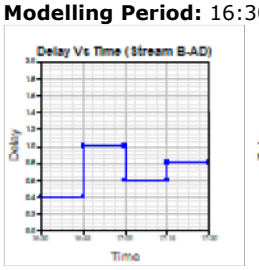


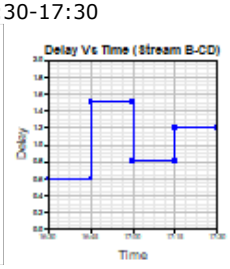


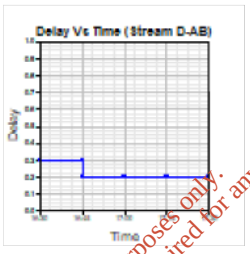


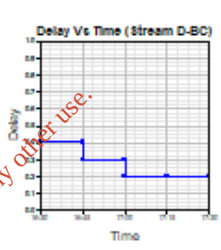


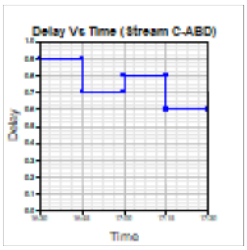
Demand Set: Sum of Demand Sets for Modelling Period: 16:30 - 17:30
Modelling Period: 16:30-17:30

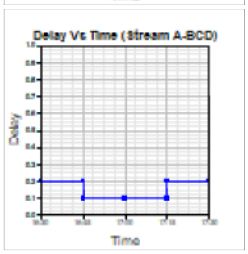












Queues & Delays

Demand Set: Sum of Demand Sets for Modelling Period: 08:30 - 09:30
Modelling Period: 08:30-09:30

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
08:30-08:45	B-AD	0.08	6.44	0.012	-	0.00	0.01	-	0.2	0.16
	B-CD	0.32	9.69	0.033	-	0.00	0.03	-	0.5	0.11
	D-AB	0.20	10.69	0.019	-	0.00	0.02	-	0.3	0.10
	D-BC	0.13	9.15	0.014	-	0.00	0.01	-	0.2	0.11
	C-ABD	0.22	8.10	0.027	-	0.00	0.03	-	0.4	0.13
	C-A	-	-	-	-	-	-	-	-	-
	C-D	-	-	-	-	-	-	-	-	-
	A-BCD	0.03	10.71	0.003	-	0.00	0.00	-	0.0	0.09
	A-B	-	-	-	-	-	-	-	-	-
	A-C	-	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
08:45-09:00	B-AD	0.13	6.35	0.020	-	0.01	0.02	-	0.3	0.16
	B-CD	0.54	9.62	0.056	-	0.03	0.06	-	0.9	0.11
	D-AB	0.16	10.60	0.015	-	0.02	0.02	-	0.2	0.10
	D-BC	0.10	8.96	0.012	-	0.01	0.01	-	0.2	0.11
	C-ABD	0.28	8.05	0.035	-	0.03	0.04	-	0.5	0.13
	C-A	-	-	-	-	-	-	-	-	-
	C-D	-	-	-	-	-	-	-	-	-
	A-BCD	0.04	10.61	0.004	-	0.00	0.00	-	0.1	0.09
	A-B	-	-	-	-	-	-	-	-	-
	A-C	-	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
09:00-09:15	B-AD	0.06	6.41	0.010	-	0.02	0.01	-	0.2	0.16
	B-CD	0.27	9.72	0.028	-	0.06	0.03	-	0.4	0.11
	D-AB	0.20	10.61	0.019	-	0.02	0.02	-	0.3	0.10
	D-BC	0.13	9.09	0.014	-	0.01	0.01	-	0.2	0.11
	C-ABD	0.28	8.13	0.034	-	0.04	0.04	-	0.5	0.13
	C-A	-	-	-	-	-	-	-	-	-
	C-D	-	-	-	-	-	-	-	-	-
	A-BCD	0.03	10.61	0.003	-	0.00	0.00	-	0.0	0.09
	A-B	-	-	-	-	-	-	-	-	-
	A-C	-	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
09:15-09:30	B-AD	0.10	6.44	0.016	-	0.01	0.02	-	0.2	0.16
	B-CD	0.43	9.75	0.044	-	0.03	0.05	-	0.7	0.11
	D-AB	0.16	10.61	0.015	-	0.02	0.02	-	0.2	0.10
	D-BC	0.10	9.06	0.011	-	0.01	0.01	-	0.2	0.11
	C-ABD	0.29	8.17	0.035	-	0.04	0.04	-	0.6	0.13
	C-A	-	-	-	-	-	-	-	-	-

	C-D	-	-	-	-	-	-	-	-	-
	A-BCD	0.03	10.58	0.003	-	0.00	0.00	-	0.0	0.09
	A-B	-	-	-	-	-	-	-	-	-
	A-C	-	-	-	-	-	-	-	-	-

Demand Set: Sum of Demand Sets for Modelling Period: 16:30 - 17:30
Modelling Period: 16:30-17:30

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
16:30-16:45	B-AD	0.23	7.60	0.030	-	0.00	0.03	-	0.4	0.14
	B-CD	0.44	10.47	0.042	-	0.00	0.04	-	0.6	0.10
	D-AB	0.23	11.20	0.021	-	0.00	0.02	-	0.3	0.09
	D-BC	0.23	8.34	0.028	-	0.00	0.03	-	0.4	0.12
	C-ABD	0.40	7.47	0.054	-	0.00	0.06	-	0.9	0.14
	C-A	-	-	-	-	-	-	-	-	-
	C-D	-	-	-	-	-	-	-	-	-
	A-BCD	0.11	10.26	0.011	-	0.00	0.01	-	0.2	0.10
	A-B	-	-	-	-	-	-	-	-	-
	A-C	-	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
16:45-17:00	B-AD	0.51	7.83	0.064	-	0.03	0.07	-	1.0	0.14
	B-CD	0.96	10.53	0.091	-	0.04	0.10	-	1.5	0.10
	D-AB	0.17	11.38	0.015	-	0.02	0.02	-	0.2	0.09
	D-BC	0.17	8.41	0.020	-	0.03	0.02	-	0.3	0.12
	C-ABD	0.35	7.59	0.047	-	0.06	0.05	-	0.7	0.14
	C-A	-	-	-	-	-	-	-	-	-
	C-D	-	-	-	-	-	-	-	-	-
	A-BCD	0.08	10.36	0.007	-	0.01	0.01	-	0.1	0.10
	A-B	-	-	-	-	-	-	-	-	-
	A-C	-	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
17:00-17:15	B-AD	0.28	7.75	0.036	-	0.07	0.04	-	0.6	0.13
	B-CD	0.52	10.54	0.050	-	0.10	0.05	-	0.8	0.10
	D-AB	0.13	11.33	0.012	-	0.02	0.01	-	0.2	0.09
	D-BC	0.13	8.43	0.016	-	0.02	0.02	-	0.2	0.12
	C-ABD	0.37	7.53	0.050	-	0.05	0.05	-	0.8	0.14
	C-A	-	-	-	-	-	-	-	-	-
	C-D	-	-	-	-	-	-	-	-	-
	A-BCD	0.09	10.32	0.009	-	0.01	0.01	-	0.1	0.10
	A-B	-	-	-	-	-	-	-	-	-
	A-C	-	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
17:15-17:30	B-AD	0.41	7.71	0.054	-	0.04	0.06	-	0.8	0.14
	B-CD	0.79	10.35	0.076	-	0.05	0.08	-	1.2	0.10
	D-AB	0.13	11.45	0.012	-	0.01	0.01	-	0.2	0.09
	D-BC	0.13	8.42	0.016	-	0.02	0.02	-	0.2	0.12
	C-ABD	0.29	7.42	0.039	-	0.05	0.04	-	0.6	0.14
	C-A	-	-	-	-	-	-	-	-	-
	C-D	-	-	-	-	-	-	-	-	-
	A-BCD	0.12	10.49	0.012	-	0.01	0.01	-	0.2	0.10
	A-B	-	-	-	-	-	-	-	-	-
	A-C	-	-	-	-	-	-	-	-	-

Entry capacities marked with an '(X)' are dominated by a pedestrian crossing in that time segment.
In time segments marked with a '(B)', traffic leaving the junction may block back from a crossing so impairing normal operation of the junction.
Delays marked with '##' could not be calculated.

Overall Queues & Delays

Queueing Delay Information Over Whole Period

Demand Set: Sum of Demand Sets for Modelling Period: 08:30 - 09:30
Modelling Period: 08:30-09:30

Stream	Total Demand (veh)	Total Demand (veh/h)	Queueing Delay (min)	Queueing Delay (min/veh)	Inclusive Delay (min)	Inclusive Delay (min/veh)
B-AD	5.5	5.5	0.8	0.2	0.8	0.2
B-CD	23.5	23.5	2.5	0.1	2.5	0.1
D-AB	11.0	11.0	1.0	0.1	1.0	0.1
D-BC	7.0	7.0	0.8	0.1	0.8	0.1
C-ABD	16.0	16.0	2.0	0.1	2.0	0.1
C-A	-	-	-	-	-	-
C-D	-	-	-	-	-	-
A-BCD	2.0	2.0	0.2	0.1	0.2	0.1
A-B	247.0	247.0	7.4	0.0	7.4	0.0
A-C	-	-	-	-	-	-
All	**-**	**-**	**-**	**-**	**-**	**-**

Demand Set: Sum of Demand Sets for Modelling Period: 16:30 - 17:30
Modelling Period: 16:30-17:30

Stream	Total Demand (veh)	Total Demand (veh/h)	Queueing Delay (min)	Queueing Delay (min/veh)	Inclusive Delay (min)	Inclusive Delay (min/veh)
B-AD	21.4	21.4	2.8	0.1	2.8	0.1
B-CD	40.6	40.6	4.1	0.1	4.1	0.1
D-AB	10.0	10.0	0.9	0.1	0.9	0.1
D-BC	10.0	10.0	1.2	0.1	1.2	0.1
C-ABD	21.3	21.3	3.0	0.1	3.0	0.1
C-A	-	-	-	-	-	-
C-D	-	-	-	-	-	-
A-BCD	6.0	6.0	0.6	0.1	0.6	0.1
A-B	333.0	333.0	12.6	0.0	12.6	0.0
A-C	-	-	-	-	-	-
All	**-**	**-**	**-**	**-**	**-**	**-**

Delay is that occurring only within the time period.
Inclusive delay includes delay suffered by vehicles which are still queuing after the end of the time period.
These will only be significantly different if there is a large queue remaining at the end of the time period.

PICADY 5 Run Successful

PICADY

GUI Version: 5.1 AE
Analysis Program Release: 5.0 (MAY 2010)

For sales and distribution information, program advice and maintenance, contact:

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Fax:+44 (0)1344 770864
E-mail: software@trl.co.uk
Web: www.trlsoftware.co.uk

Run Analysis

Parameter	Values
File Run	W:\2018\P18-016\Site 2 - T-junction (R148_L1002)\P18-016 - Site 2_T-junction.vpi
Date Run	23 March 2018
Time Run	09:47:02
Driving Side	Drive On The Left

Arm Names and Flow Scaling Factors

Arm	Arm Name	Flow Scaling Factor (%)
Arm A	R148 (E)	100
Arm B	L1002 (S)	100
Arm C	R148 (W)	100

Stream Labelling Convention

Stream A-B contains traffic going from A to B etc.

Run Information

Parameter	Values
Run Title	P18-016 - TTA for Ballinderry Sand & Gravel backfilling
Location	Ballinderry, Carbury, Co. kildare
Date	26 February 2018
Enumerator	oreillya [PMCE11]
Job Number	P18-016
Status	TIA
Client	Golders Associates Ireland
Description	T-junction of the R148 (east to west) and the L1002 (south)

Errors and Warnings

Parameter	Values
Warning	No Errors Or Warnings

Geometric Data

Geometric Parameters

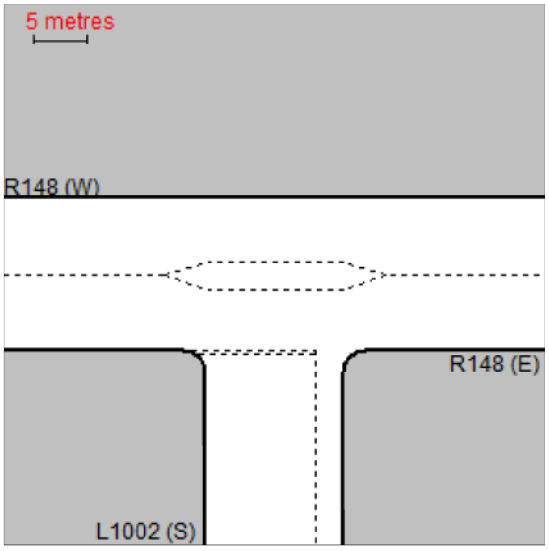
Parameter	Minor Arm B
Major Road Carriageway Width (m)	11.20
Major Road Kerbed Central Reserve Width (m)	0.00
Major Road Right Turning Lane Width (m)	2.60
Minor Road Width 0m Back from Junction (m)	10.00
Minor Road Width 5m Back from Junction (m)	9.70
Minor Road Width 10m Back from Junction (m)	7.40
Minor Road Width 15m Back from Junction (m)	7.20
Minor Road Width 20m Back from Junction (m)	7.20
Minor Road Flare Length (veh)	4
Minor Road Visibility To Right (m)	160
Minor Road Visibility To Left (m)	110
Major Road Right Turn Visibility (m)	160
Major Road Right Turn Blocks Traffic	Yes (if over 20 veh)

Slope and Intercept Values

Stream	Intercept for Stream	Slope for A-B	Slope for A-C	Slope for C-A	Slope for C-B
B-A	0.000	0.000	0.000	0.000	0.000
B-C	0.000	0.000	0.000	-	-
C-B	695.641	0.209	0.209	-	-

Note: Streams may be combined in which case capacity will be adjusted
These values do not allow for any site specific corrections

Junction Diagram



Demand Data

Modelling Periods

Parameter	Period	Duration (min)	Segment Length (min)
First Modelling Period	08:00-09:00	60	15
Second Modelling Period	17:30-18:30	60	15

Direct Entry Flows

Demand Set: AM Peak 2034
Modelling Period: 08:00-09:00

Segment: 08:00-08:15

Arm	Flow (veh/interval)
Arm A	69.00
Arm B	28.00
Arm C	124.00

Segment: 08:15-08:30

Arm	Flow (veh/interval)
Arm A	62.00
Arm B	29.00
Arm C	130.00

Segment: 08:30-08:45

Arm	Flow (veh/interval)
Arm A	68.00
Arm B	22.00
Arm C	151.00

Segment: 08:45-09:00

Arm	Flow (veh/interval)
Arm A	62.00
Arm B	22.00
Arm C	108.00

Demand Set: PM Peak 2034
Modelling Period: 17:30-18:30

Segment: 17:30-17:45

Arm	Flow (veh/interval)
Arm A	175.00
Arm B	32.00
Arm C	85.00

Segment: 17:45-18:00

Arm	Flow (veh/interval)
Arm A	150.00
Arm B	33.00
Arm C	74.00

Segment: 18:00-18:15

Arm	Flow (veh/interval)
Arm A	158.00
Arm B	36.00
Arm C	74.00

Segment: 18:15-18:30

Arm	Flow (veh/interval)
Arm A	135.00
Arm B	39.00
Arm C	69.00

Demand Set: AM Peak Development Traffic (80)
Modelling Period: 08:00-09:00

Segment: 08:00-08:15

Arm	Flow (veh/interval)
Arm A	3.00
Arm B	2.00
Arm C	0.00

Segment: 08:15-08:30

Arm	Flow (veh/interval)
Arm A	3.00
Arm B	2.00
Arm C	0.00

Segment: 08:30-08:45

Arm	Flow (veh/interval)
Arm A	3.00
Arm B	2.00
Arm C	0.00

Segment: 08:45-09:00

Arm	Flow (veh/interval)
Arm A	3.00
Arm B	2.00
Arm C	0.00

Demand Set: PM Peak Development Traffic (80)
Modelling Period: 17:30-18:30

Segment: 17:30-17:45

Arm	Flow (veh/interval)
Arm A	3.00
Arm B	2.00
Arm C	0.00

Segment: 17:45-18:00

Arm	Flow (veh/interval)
Arm A	3.00
Arm B	2.00
Arm C	0.00

Segment: 18:00-18:15

Arm	Flow (veh/interval)
Arm A	3.00
Arm B	2.00
Arm C	0.00

Segment: 18:15-18:30

Arm	Flow (veh/interval)
Arm A	3.00
Arm B	2.00
Arm C	0.00

Turning Counts

Demand Set: AM Peak 2034
Modelling Period: 08:00-09:00

From/To	Arm A	Arm B	Arm C
Arm A	-	42	218
Arm B	68	-	32
Arm C	448	66	-

Demand Set: PM Peak 2034
Modelling Period: 17:30-18:30

From/To	Arm A	Arm B	Arm C
Arm A	-	68	551
Arm B	65	-	75
Arm C	257	46	-

Demand Set: AM Peak Development Traffic (80)
Modelling Period: 08:00-09:00

From/To	Arm A	Arm B	Arm C
Arm A	-	12	0
Arm B	8	-	0
Arm C	0	0	-

Demand Set: PM Peak Development Traffic (80)
Modelling Period: 17:30-18:30

From/To	Arm A	Arm B	Arm C
Arm A	-	5	0
Arm B	15	-	0
Arm C	0	0	-

Turning proportions are calculated from turning count data

Turning Proportions

Demand Set: AM Peak 2034
Modelling Period: 08:00-09:00

From/To	Arm A	Arm B	Arm C
Arm A	0.000	0.162	0.838
Arm B	0.680	0.000	0.320
Arm C	0.872	0.128	0.000

Demand Set: PM Peak 2034
Modelling Period: 17:30-18:30

From/To	Arm A	Arm B	Arm C
Arm A	0.000	0.110	0.890
Arm B	0.464	0.000	0.536
Arm C	0.848	0.152	0.000

Demand Set: AM Peak Development Traffic (80)
Modelling Period: 08:00-09:00

From/To

Demand Set: PM Peak Development Traffic (80)
Modelling Period: 17:30-18:30

From/To	Arm A	Arm B	Arm C
Arm A	0.000	1.000	0.000
Arm B	1.000	0.000	0.000
Arm C	0.000	0.000	0.000

Heavy Vehicles Percentages

Demand Set: AM Peak 2034
Modelling Period: 08:00-09:00

From/To	Arm A	Arm B	Arm C
Arm A	-	2.4	18.8
Arm B	5.9	-	21.9
Arm C	15.2	10.6	-

Demand Set: PM Peak 2034
Modelling Period: 17:30-18:30

From/To	Arm A	Arm B	Arm C
Arm A	-	4.4	6.5
Arm B	9.2	-	1.3
Arm C	12.8	19.6	-

Demand Set: AM Peak Development Traffic (80)
Modelling Period: 08:00-09:00

From/To	Arm A	Arm B	Arm C
Arm A	-	83.3	0.0
Arm B	100.0	-	0.0
Arm C	0.0	0.0	-

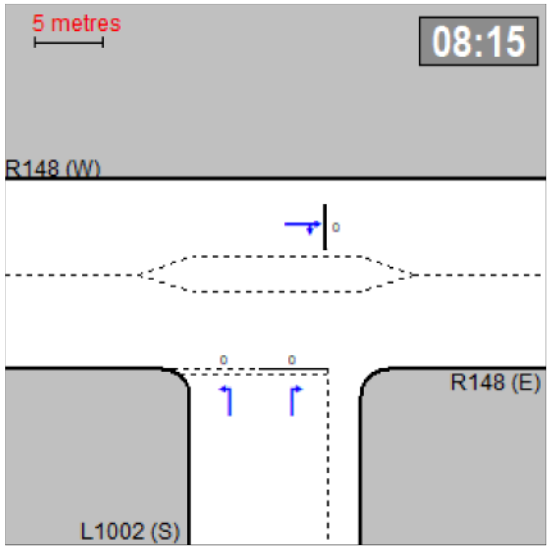
Demand Set: PM Peak Development Traffic (80)
Modelling Period: 17:30-18:30

From/To	Arm A	Arm B	Arm C
Arm A	-	100.0	0.0
Arm B	86.7	-	0.0
Arm C	0.0	0.0	-

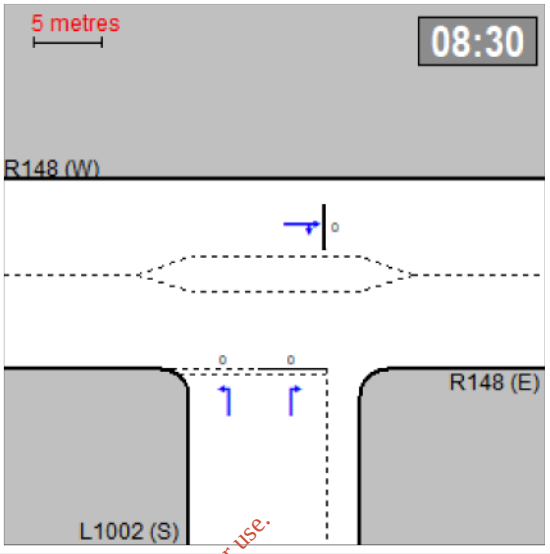
Queue Diagrams

Demand Set: Sum of Demand Sets for Modelling Period: 08:00 - 09:00
Modelling Period: 08:00-09:00
View Extent: 40m

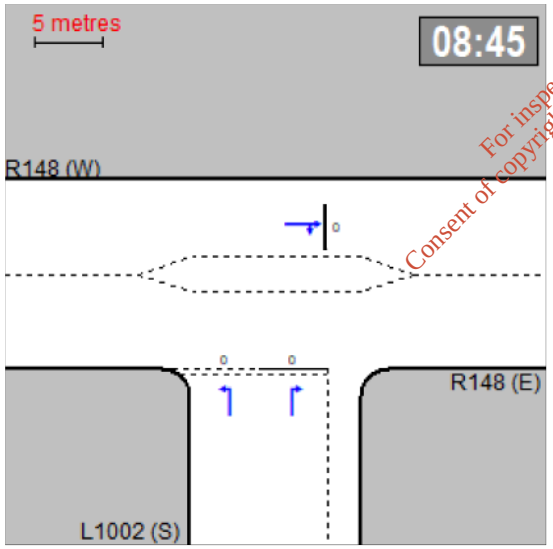
Queue Interval 1: 08:00-08:15



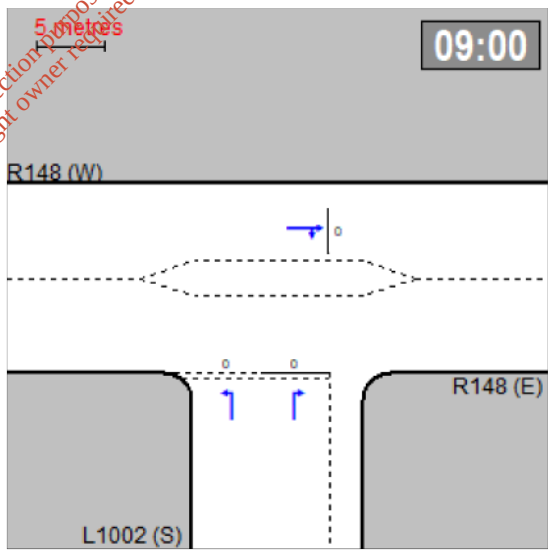
Queue Interval 2: 08:15-08:30



Queue Interval 3: 08:30-08:45

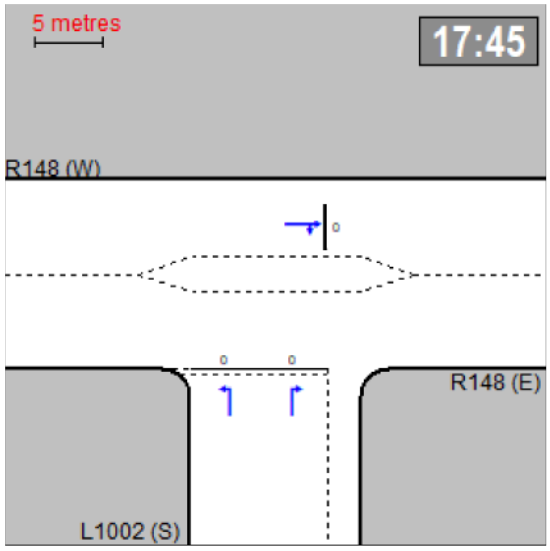


Queue Interval 4: 08:45-09:00

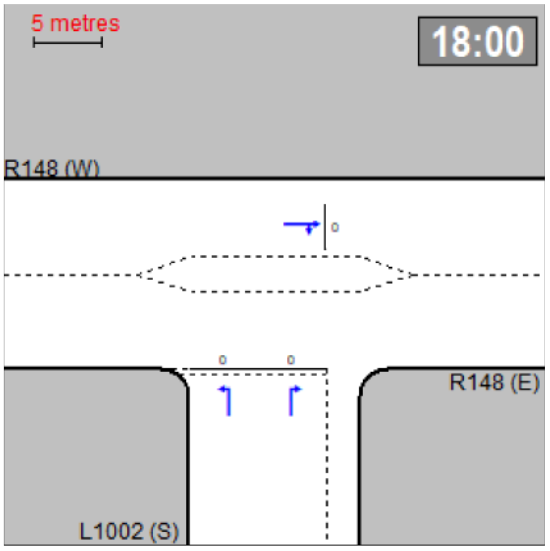


Demand Set: Sum of Demand Sets for Modelling Period: 17:30 - 18:30
Modelling Period: 17:30-18:30
View Extent: 40m

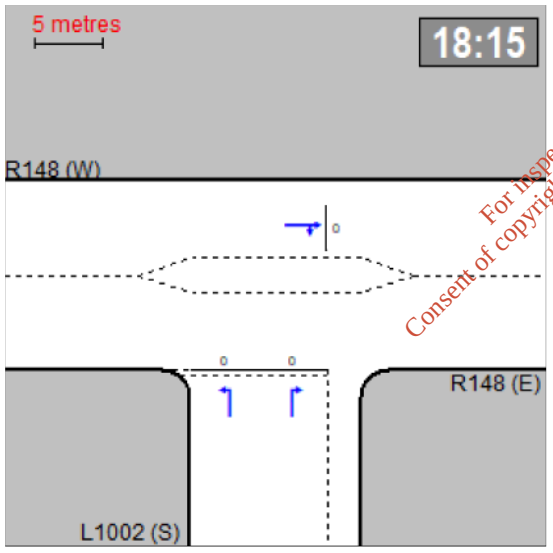
Queue Interval 1: 17:30-17:45



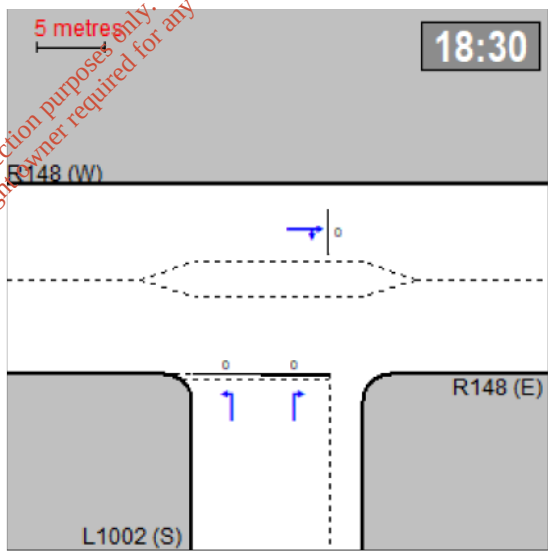
Queue Interval 2: 17:45-18:00



Queue Interval 3: 18:00-18:15

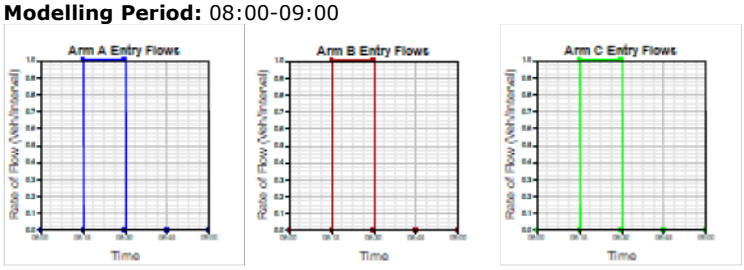


Queue Interval 4: 18:15-18:30

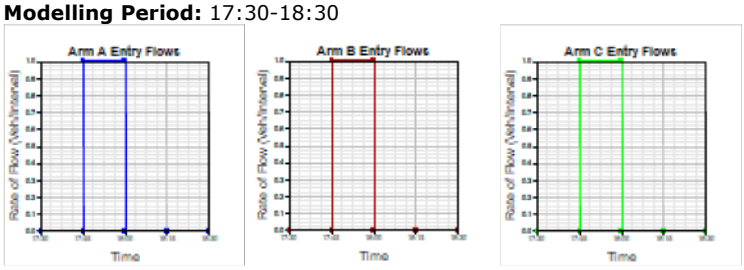


Demand Data Graph

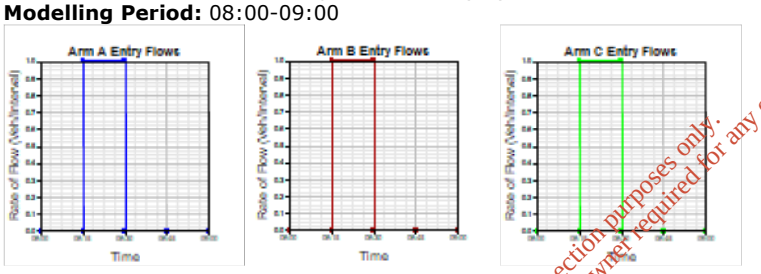
Demand Set: AM Peak 2034
Modelling Period: 08:00-09:00



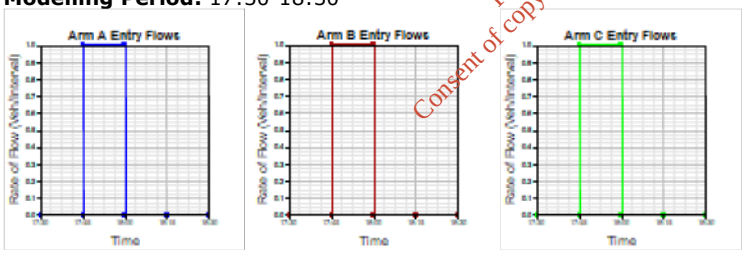
Demand Set: PM Peak 2034
Modelling Period: 17:30-18:30



Demand Set: AM Peak Development Traffic (80)
Modelling Period: 08:00-09:00

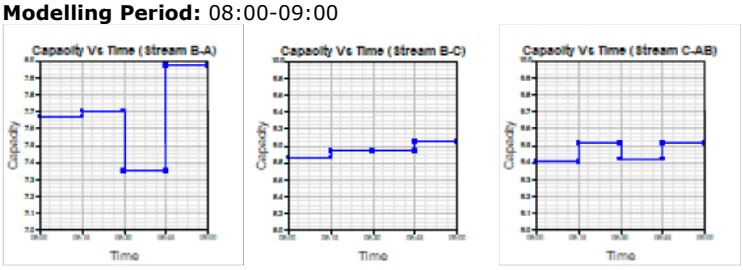


Demand Set: PM Peak Development Traffic (80)
Modelling Period: 17:30-18:30

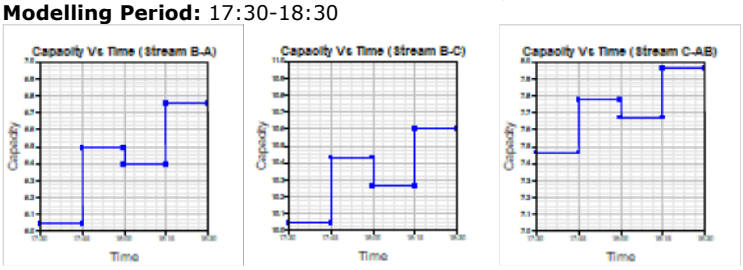


Capacity Graph

Demand Set: Sum of Demand Sets for Modelling Period: 08:00 - 09:00
Modelling Period: 08:00-09:00

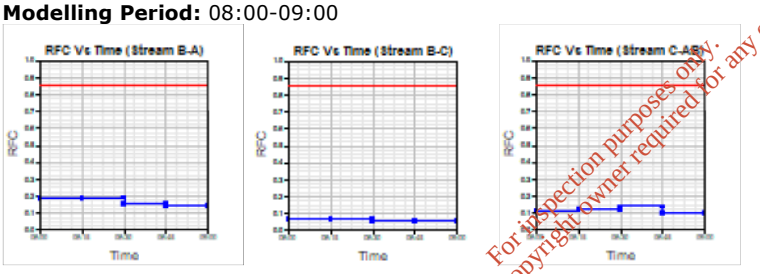


Demand Set: Sum of Demand Sets for Modelling Period: 17:30 - 18:30
Modelling Period: 17:30-18:30

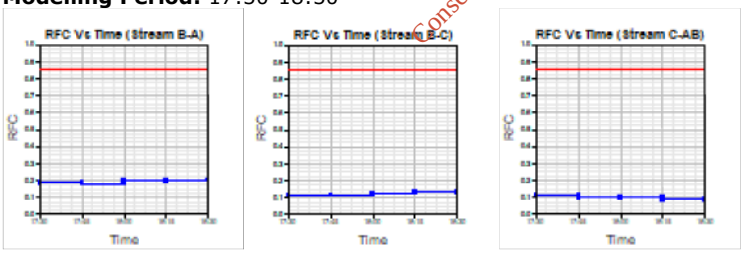


RFC Graph

Demand Set: Sum of Demand Sets for Modelling Period: 08:00 - 09:00
Modelling Period: 08:00-09:00

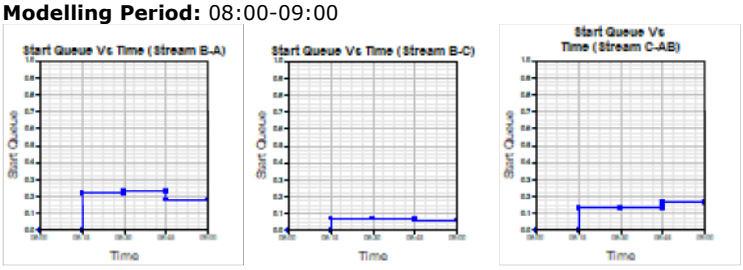


Demand Set: Sum of Demand Sets for Modelling Period: 17:30 - 18:30
Modelling Period: 17:30-18:30

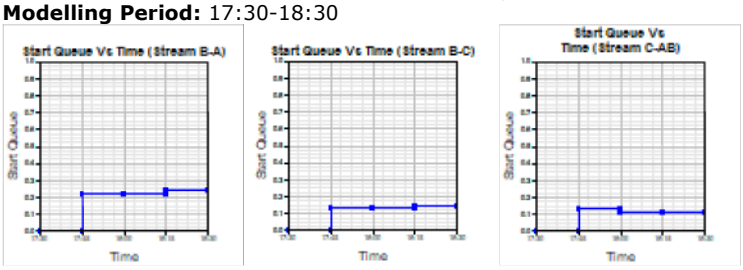


Start Queue Graph

Demand Set: Sum of Demand Sets for Modelling Period: 08:00 - 09:00
Modelling Period: 08:00-09:00

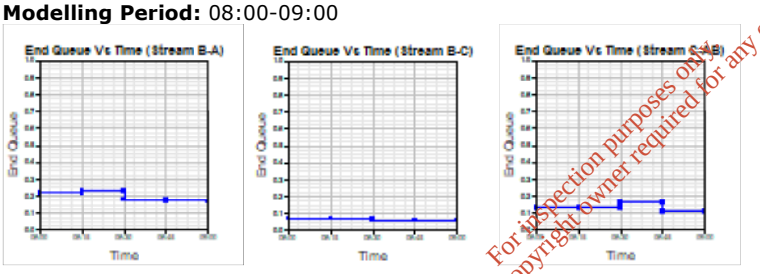


Demand Set: Sum of Demand Sets for Modelling Period: 17:30 - 18:30
Modelling Period: 17:30-18:30

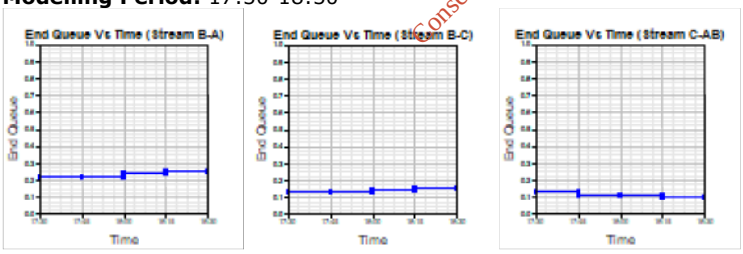


End Queue Graph

Demand Set: Sum of Demand Sets for Modelling Period: 08:00 - 09:00
Modelling Period: 08:00-09:00

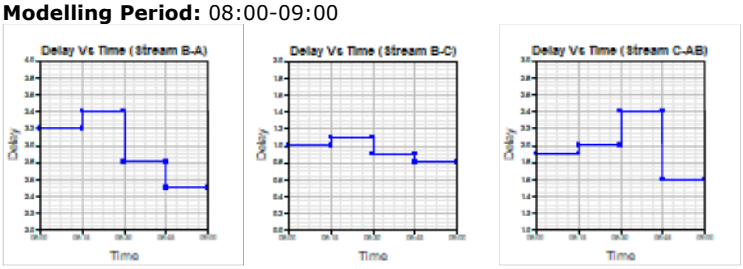


Demand Set: Sum of Demand Sets for Modelling Period: 17:30 - 18:30
Modelling Period: 17:30-18:30

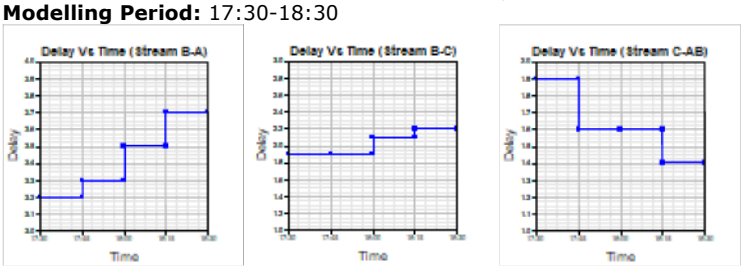


Delay Graph

Demand Set: Sum of Demand Sets for Modelling Period: 08:00 - 09:00
Modelling Period: 08:00-09:00



Demand Set: Sum of Demand Sets for Modelling Period: 17:30 - 18:30
Modelling Period: 17:30-18:30



Queues & Delays

Demand Set: Sum of Demand Sets for Modelling Period: 08:00 - 09:00
Modelling Period: 08:00-09:00

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
08:00-08:15	B-A	1.41	7.67	0.183	-	0.00	0.22	-	3.2	0.16
	B-C	0.59	8.86	0.067	-	0.00	0.07	-	1.0	0.12
	C-AB	1.06	9.40	0.113	-	0.00	0.13	-	1.9	0.12
	C-A	-	-	-	-	-	-	-	-	-
	A-B	0.95	-	-	-	-	-	-	-	-
	A-C	3.85	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
08:15-08:30	B-A	1.45	7.70	0.189	-	0.22	0.23	-	3.4	0.16
	B-C	0.61	8.93	0.069	-	0.07	0.07	-	1.1	0.12
	C-AB	1.11	9.51	0.117	-	0.13	0.13	-	2.0	0.12
	C-A	-	-	-	-	-	-	-	-	-
	A-B	0.86	-	-	-	-	-	-	-	-
	A-C	3.47	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
08:30-08:45	B-A	1.13	7.35	0.153	-	0.23	0.18	-	2.8	0.16
	B-C	0.47	8.94	0.053	-	0.07	0.06	-	0.9	0.12
	C-AB	1.29	9.42	0.137	-	0.13	0.16	-	2.4	0.12
	C-A	-	-	-	-	-	-	-	-	-
	A-B	0.94	-	-	-	-	-	-	-	-
	A-C	3.79	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
08:45-09:00	B-A	1.13	7.97	0.141	-	0.18	0.17	-	2.5	0.15
	B-C	0.47	9.04	0.052	-	0.06	0.06	-	0.8	0.12
	C-AB	0.92	9.51	0.097	-	0.16	0.11	-	1.6	0.12
	C-A	-	-	-	-	-	-	-	-	-
	A-B	0.86	-	-	-	-	-	-	-	-
	A-C	3.47	-	-	-	-	-	-	-	-

Demand Set: Sum of Demand Sets for Modelling Period: 17:30 - 18:30
Modelling Period: 17:30-18:30

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
17:30-17:45	B-A	1.12	6.04	0.185	-	0.00	0.22	-	3.2	0.20
	B-C	1.15	10.04	0.114	-	0.00	0.13	-	1.9	0.11
	C-AB	0.86	7.46	0.115	-	0.00	0.13	-	1.9	0.15
	C-A	-	-	-	-	-	-	-	-	-
	A-B	1.50	-	-	-	-	-	-	-	-
	A-C	10.36	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
17:45-18:00	B-A	1.15	6.49	0.177	-	0.22	0.22	-	3.3	0.19
	B-C	1.18	10.43	0.113	-	0.13	0.13	-	1.9	0.11
	C-AB	0.75	7.77	0.096	-	0.13	0.11	-	1.6	0.14
	C-A	-	-	-	-	-	-	-	-	-
	A-B	1.29	-	-	-	-	-	-	-	-
	A-C	8.91	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
18:00-18:15	B-A	1.25	6.39	0.196	-	0.22	0.24	-	3.5	0.19
	B-C	1.28	10.26	0.125	-	0.13	0.14	-	2.1	0.11
	C-AB	0.75	7.67	0.098	-	0.11	0.11	-	1.6	0.14
	C-A	-	-	-	-	-	-	-	-	-
	A-B	1.36	-	-	-	-	-	-	-	-
	A-C	9.37	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
18:15-18:30	B-A	1.35	6.75	0.200	-	0.24	0.25	-	3.7	0.19
	B-C	1.39	10.60	0.131	-	0.14	0.15	-	2.2	0.11
	C-AB	0.70	7.96	0.088	-	0.11	0.10	-	1.4	0.14
	C-A	-	-	-	-	-	-	-	-	-
	A-B	1.17	-	-	-	-	-	-	-	-
	A-C	8.03	-	-	-	-	-	-	-	-

Entry capacities marked with an '(X)' are dominated by a pedestrian crossing in that time segment.
In time segments marked with a '(B)', traffic leaving the junction may block back from a crossing so impairing normal operation of the junction.
Delays marked with '##' could not be calculated.

Overall Queues & Delays

Queueing Delay Information Over Whole Period

Demand Set: Sum of Demand Sets for Modelling Period: 08:00 - 09:00
Modelling Period: 08:00-09:00

Stream	Total Demand (veh)	Total Demand (veh/h)	Queueing Delay (min)	Queueing Delay (min/veh)	Inclusive Delay (min)	Inclusive Delay (min/veh)
B-A	76.7	76.7	12.0	0.2	12.0	0.2
B-C	32.3	32.3	3.8	0.1	3.8	0.1
C-AB	65.9	65.9	7.9	0.1	7.9	0.1
C-A	-	-	-	-	-	-
A-B	54.2	54.2	-	-	-	-
A-C	218.8	218.8	-	-	-	-
All	**895.0**	**895.0**	**23.7**	**0.0**	**23.7**	**0.0**

Demand Set: Sum of Demand Sets for Modelling Period: 17:30 - 18:30
Modelling Period: 17:30-18:30

Stream	Total Demand (veh)	Total Demand (veh/h)	Queueing Delay (min)	Queueing Delay (min/veh)	Inclusive Delay (min)	Inclusive Delay (min/veh)
B-A	73.0	73.0	13.7	0.2	13.7	0.2
B-C	75.0	75.0	8.1	0.1	8.1	0.1
C-AB	45.8	45.8	6.6	0.1	6.6	0.1
C-A	-	-	-	-	-	-
A-B	79.9	79.9	-	-	-	-
A-C	550.1	550.1	-	-	-	-
All	**1080.0**	**1080.0**	**28.4**	**0.0**	**28.4**	**0.0**

Delay is that occurring only within the time period.
Inclusive delay includes delay suffered by vehicles which are still queuing after the end of the time period.
These will only be significantly different if there is a large queue remaining at the end of the time period.

PICADY 5 Run Successful

PICADY

GUI Version: 5.1 AE
Analysis Program Release: 5.0 (MAY 2010)

For sales and distribution information, program advice and maintenance, contact:

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Fax:+44 (0)1344 770864
E-mail: software@trl.co.uk
Web: www.trlsoftware.co.uk

Run Analysis

Parameter	Values
File Run	W:\2018\P18-016\Site 3 - Site Access\P18-016 - Site 3_Access.vpi
Date Run	23 March 2018
Time Run	16:30:57
Driving Side	Drive On The Left

Arm Names and Flow Scaling Factors

Arm	Arm Name	Flow Scaling Factor (%)
Arm A	Arm L1002 (S)	100
Arm B	Site Access	100
Arm C	L1002 (N)	100

Stream Labelling Convention

Stream A-B contains traffic going from A to B etc.

Run Information

Parameter	Values
Run Title	P18-016 - Site 3 - Access
Location	Quarry, North of Carbury, Co. Kildare
Date	21 March 2018
Enumerator	oreillya [PMCE11]
Job Number	P18-016
Status	-
Client	Golders Associates Ireland
Description	-

Errors and Warnings

Parameter	Values
Warning	No Errors Or Warnings

Geometric Data

Geometric Parameters

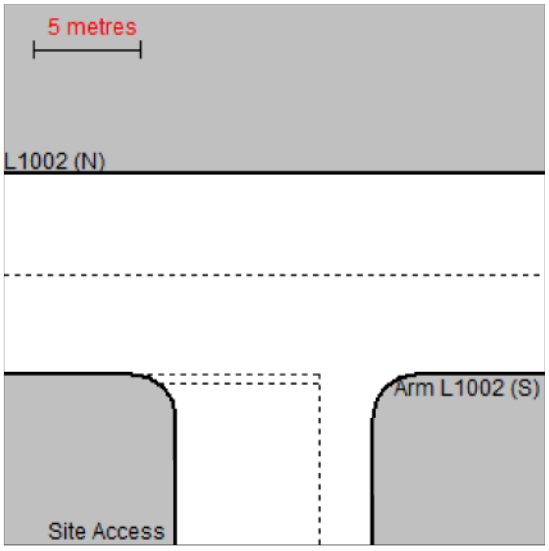
Parameter	Minor Arm B
Major Road Carriageway Width (m)	7.00
Major Road Kerbed Central Reserve Width (m)	0.00
Major Road Right Turning Lane Width (m)	2.20
Minor Road Width 0m Back from Junction (m)	6.60
Minor Road Width 5m Back from Junction (m)	4.64
Minor Road Width 10m Back from Junction (m)	4.10
Minor Road Width 15m Back from Junction (m)	3.80
Minor Road Width 20m Back from Junction (m)	3.80
Minor Road Flare Length (veh)	1
Minor Road Visibility To Right (m)	20
Minor Road Visibility To Left (m)	20
Major Road Right Turn Visibility (m)	160
Major Road Right Turn Blocks Traffic	Yes (if over 1 veh)

Slope and Intercept Values

Stream	Intercept for Stream	Slope for A-B	Slope for A-C	Slope for C-A	Slope for C-B
B-A	0.000	0.000	0.000	0.000	0.000
B-C	0.000	0.000	0.000	-	-
C-B	666.621	0.247	0.247	-	-

Note: Streams may be combined in which case capacity will be adjusted
These values do not allow for any site-specific corrections

Junction Diagram



Demand Data

Modelling Periods

Parameter	Period	Duration (min)	Segment Length (min)
First Modelling Period	08:30-09:30	60	15
Second Modelling Period	16:30-17:30	60	15

Direct Entry Flows

Demand Set: AM Peak (2034)
Modelling Period: 08:30-09:30

Segment: 08:30-08:45

Arm	Flow (veh/interval)
Arm A	17.00
Arm B	0.00
Arm C	25.00

Segment: 08:45-09:00

Arm	Flow (veh/interval)
Arm A	21.00
Arm B	0.00
Arm C	34.00

Segment: 09:00-09:15

Arm	Flow (veh/interval)
Arm A	22.00
Arm B	0.00
Arm C	19.00

Segment: 09:15-09:30

Arm	Flow (veh/interval)
Arm A	23.00
Arm B	0.00
Arm C	25.00

Demand Set: PM Peak (2034)
Modelling Period: 16:30-17:30

Segment: 16:30-16:45

Arm	Flow (veh/interval)
Arm A	36.00
Arm B	0.00
Arm C	36.00

Segment: 16:45-17:00

Arm	Flow (veh/interval)
Arm A	31.00
Arm B	0.00
Arm C	31.00

Segment: 17:00-17:15

Arm	Flow (veh/interval)
Arm A	33.00
Arm B	0.00
Arm C	30.00

Segment: 17:15-17:30

Arm	Flow (veh/interval)
Arm A	25.00
Arm B	0.00
Arm C	41.00

Demand Set: AM Peak Development Traffic (80)
Modelling Period: 08:30-09:30

Segment: 08:30-08:45

Arm	Flow (veh/interval)
Arm A	0.00
Arm B	2.00
Arm C	3.00

Segment: 08:45-09:00

Arm	Flow (veh/interval)
Arm A	0.00
Arm B	2.00
Arm C	3.00

Segment: 09:00-09:15

Arm	Flow (veh/interval)
Arm A	0.00
Arm B	2.00
Arm C	3.00

Segment: 09:15-09:30

Arm	Flow (veh/interval)
Arm A	0.00
Arm B	2.00
Arm C	3.00

Demand Set: PM Peak Development Traffic (80)
Modelling Period: 16:30-17:30

Segment: 16:30-16:45

Arm	Flow (veh/interval)
Arm A	0.00
Arm B	4.00
Arm C	1.00

Segment: 16:45-17:00

Arm	Flow (veh/interval)
Arm A	0.00
Arm B	4.00
Arm C	1.00

Segment: 17:00-17:15

Arm	Flow (veh/interval)
Arm A	0.00
Arm B	4.00
Arm C	1.00

Segment: 17:15-17:30

Arm	Flow (veh/interval)
Arm A	0.00
Arm B	0.00
Arm C	0.00

Turning Counts

Demand Set: AM Peak (2034)
Modelling Period: 08:30-09:30

From/To	Arm A	Arm B	Arm C
Arm A	-	0	83
Arm B	0	-	0
Arm C	103	0	-

Demand Set: PM Peak (2034)
Modelling Period: 16:30-17:30

From/To	Arm A	Arm B	Arm C
Arm A	-	0	124
Arm B	0	-	0
Arm C	138	0	-

Demand Set: AM Peak Development Traffic (80)
Modelling Period: 08:30-09:30

From/To	Arm A	Arm B	Arm C
Arm A	-	0	0
Arm B	0	-	8
Arm C	0	12	-

Demand Set: PM Peak Development Traffic (80)
Modelling Period: 16:30-17:30

From/To	Arm A	Arm B	Arm C
Arm A	-	0	0
Arm B	0	-	15
Arm C	0	5	-

Turning proportions are calculated from turning count data

Turning Proportions

Demand Set: AM Peak (2034)
Modelling Period: 08:30-09:30

From/To	Arm A	Arm B	Arm C
Arm A	0.000	0.000	1.000
Arm B	0.000	0.000	0.000
Arm C	1.000	0.000	0.000

Demand Set: PM Peak (2034)
Modelling Period: 16:30-17:30

From/To	Arm A	Arm B	Arm C
Arm A	0.000	0.000	1.000
Arm B	0.000	0.000	0.000
Arm C	1.000	0.000	0.000

Demand Set: AM Peak Development Traffic (80)
Modelling Period: 08:30-09:30

From/To

Demand Set: PM Peak Development Traffic (80)
Modelling Period: 16:30-17:30

From/To	Arm A	Arm B	Arm C
Arm A	0.000	0.000	0.000
Arm B	0.000	0.000	1.000
Arm C	0.000	1.000	0.000

Heavy Vehicles Percentages

Demand Set: AM Peak (2034)
Modelling Period: 08:30-09:30

From/To	Arm A	Arm B	Arm C
Arm A	-	0.0	10.8
Arm B	0.0	-	0.0
Arm C	5.8	0.0	-

Demand Set: PM Peak (2034)
Modelling Period: 16:30-17:30

From/To	Arm A	Arm B	Arm C
Arm A	-	0.0	12.9
Arm B	0.0	-	0.0
Arm C	5.1	0.0	-

Demand Set: AM Peak Development Traffic (80)
Modelling Period: 08:30-09:30

From/To	Arm A	Arm B	Arm C
Arm A	-	0.0	0.0
Arm B	0.0	-	100.0
Arm C	0.0	83.3	-

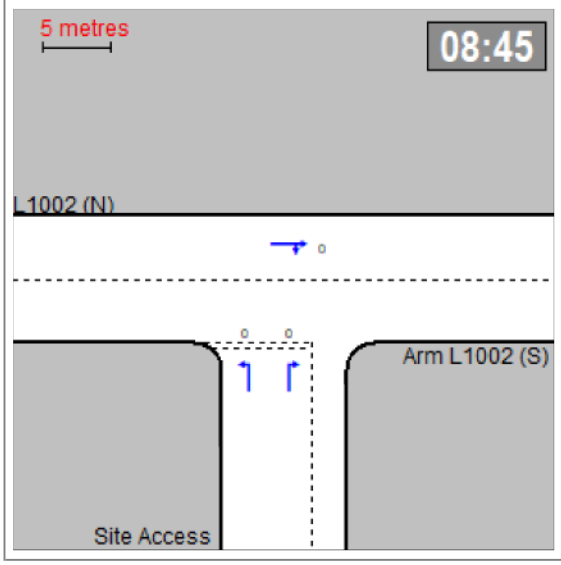
Demand Set: PM Peak Development Traffic (80)
Modelling Period: 16:30-17:30

From/To	Arm A	Arm B	Arm C
Arm A	-	0.0	0.0
Arm B	0.0	-	86.7
Arm C	0.0	100.0	-

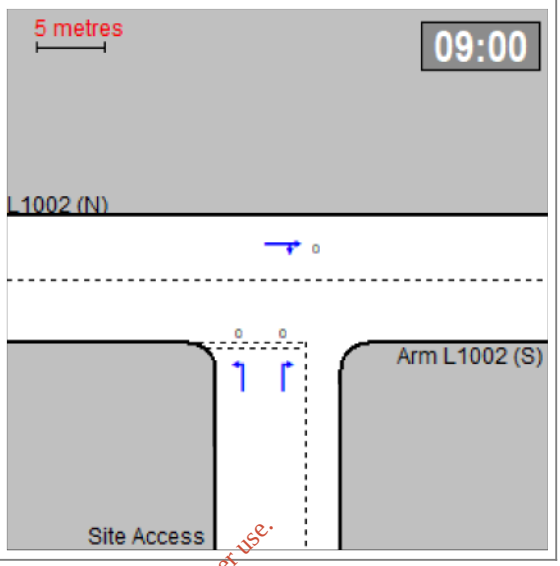
Queue Diagrams

Demand Set: Sum of Demand Sets for Modelling Period: 08:30 - 09:30
Modelling Period: 08:30-09:30
View Extent: 40m

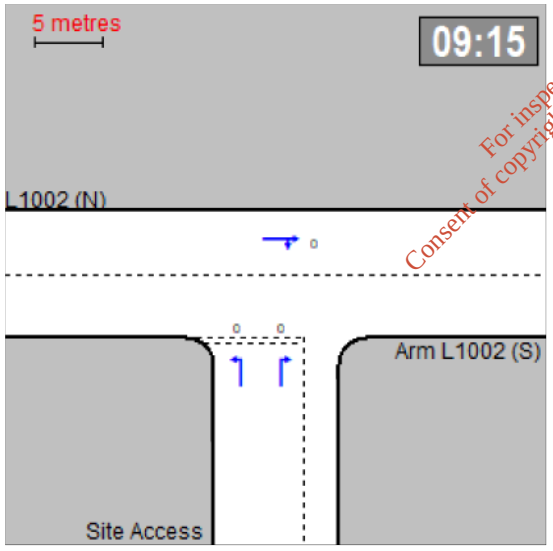
Queue Interval 1: 08:30-08:45



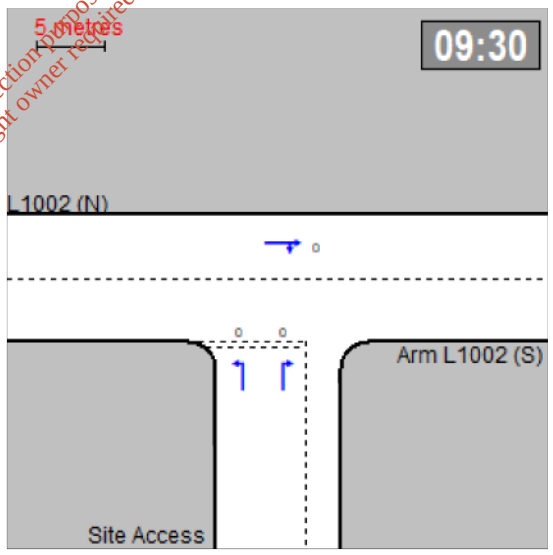
Queue Interval 2: 08:45-09:00



Queue Interval 3: 09:00-09:15

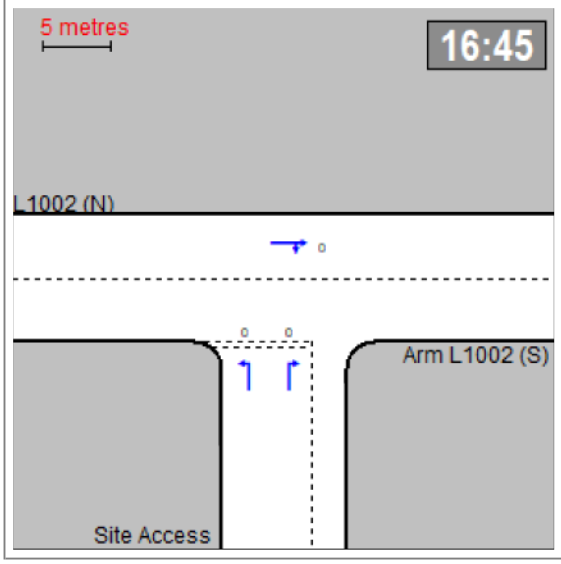


Queue Interval 4: 09:15-09:30

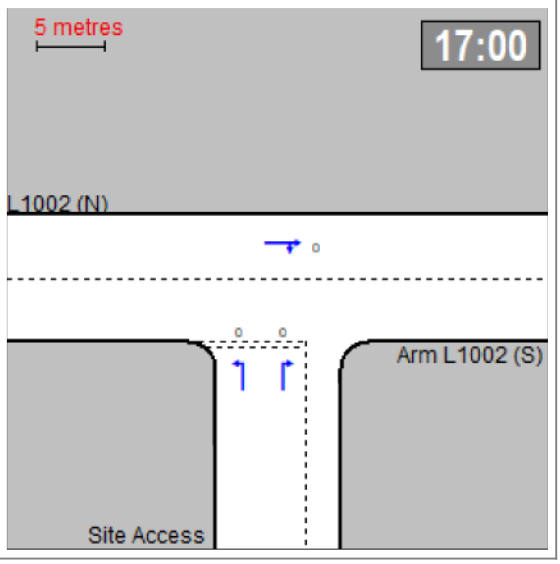


Demand Set: Sum of Demand Sets for Modelling Period: 16:30 - 17:30
Modelling Period: 16:30-17:30
View Extent: 40m

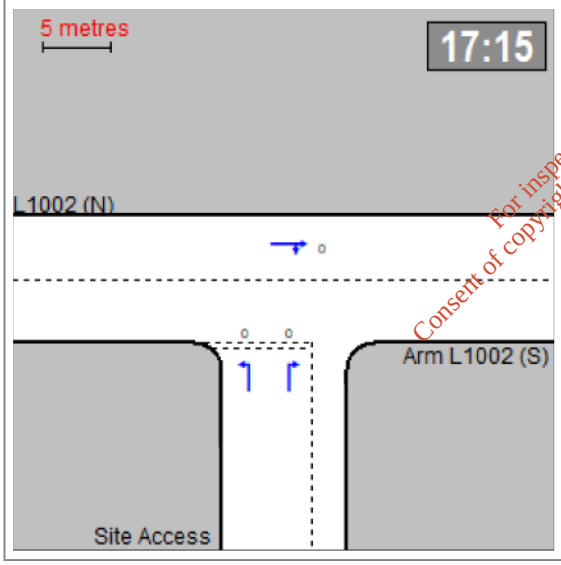
Queue Interval 1: 16:30-16:45



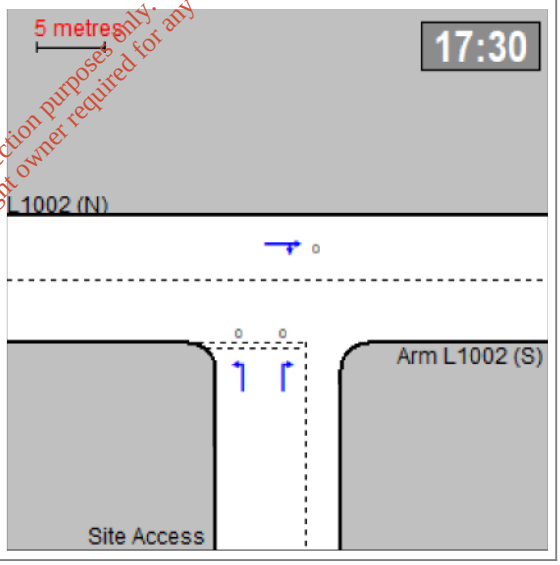
Queue Interval 2: 16:45-17:00



Queue Interval 3: 17:00-17:15

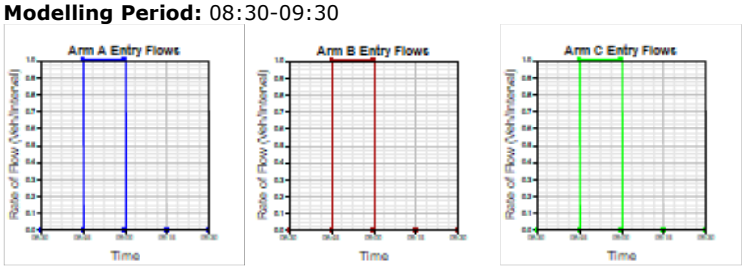


Queue Interval 4: 17:15-17:30

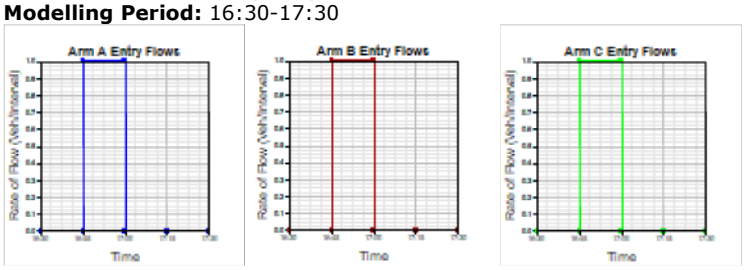


Demand Data Graph

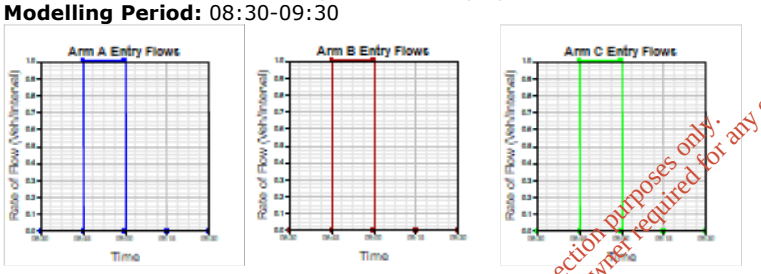
Demand Set: AM Peak (2034)
Modelling Period: 08:30-09:30



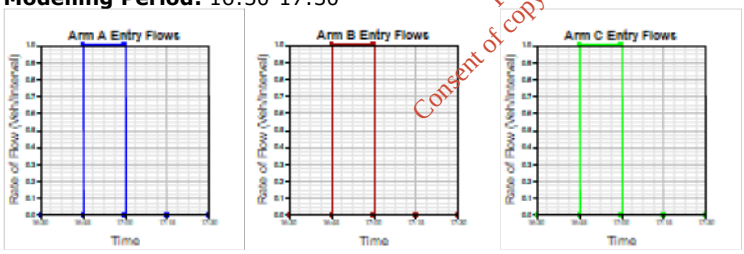
Demand Set: PM Peak (2034)
Modelling Period: 16:30-17:30



Demand Set: AM Peak Development Traffic (80)
Modelling Period: 08:30-09:30

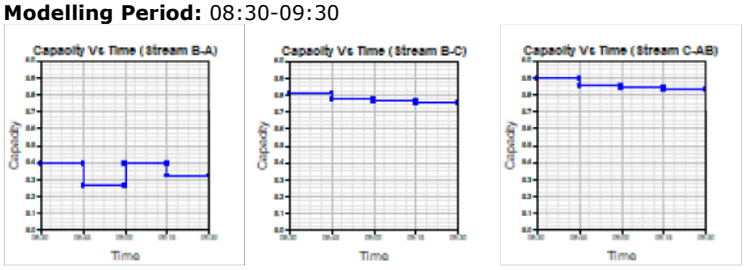


Demand Set: PM Peak Development Traffic (80)
Modelling Period: 16:30-17:30

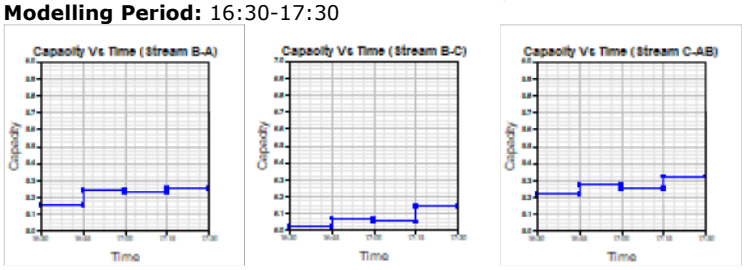


Capacity Graph

Demand Set: Sum of Demand Sets for Modelling Period: 08:30 - 09:30
Modelling Period: 08:30-09:30

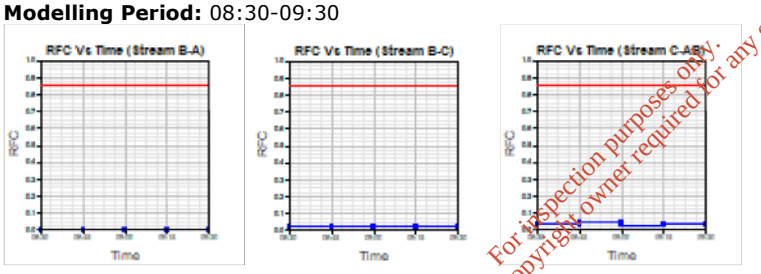


Demand Set: Sum of Demand Sets for Modelling Period: 16:30 - 17:30
Modelling Period: 16:30-17:30

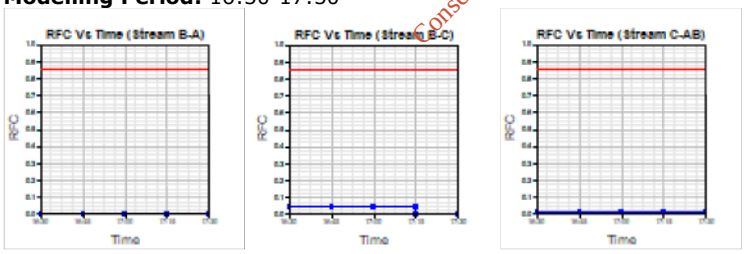


RFC Graph

Demand Set: Sum of Demand Sets for Modelling Period: 08:30 - 09:30
Modelling Period: 08:30-09:30

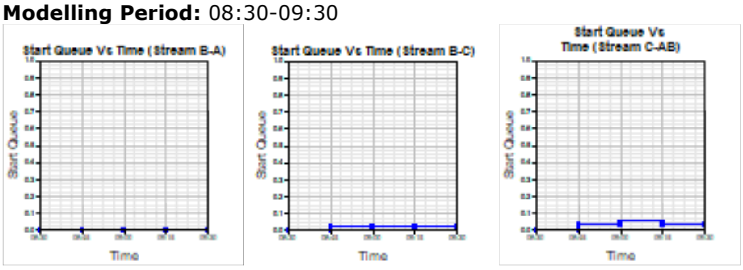


Demand Set: Sum of Demand Sets for Modelling Period: 16:30 - 17:30
Modelling Period: 16:30-17:30

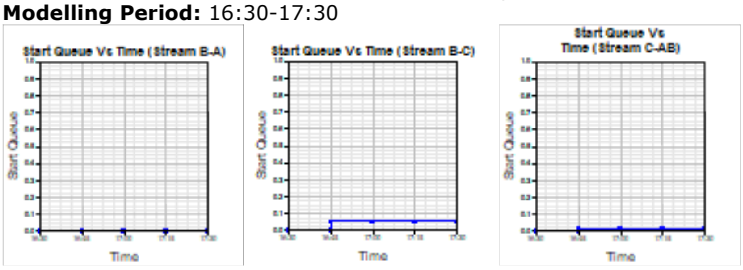


Start Queue Graph

Demand Set: Sum of Demand Sets for Modelling Period: 08:30 - 09:30
Modelling Period: 08:30-09:30

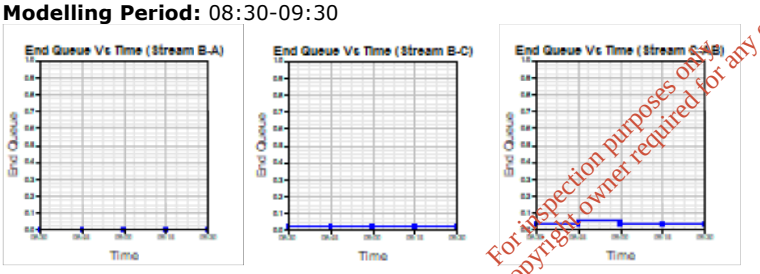


Demand Set: Sum of Demand Sets for Modelling Period: 16:30 - 17:30
Modelling Period: 16:30-17:30

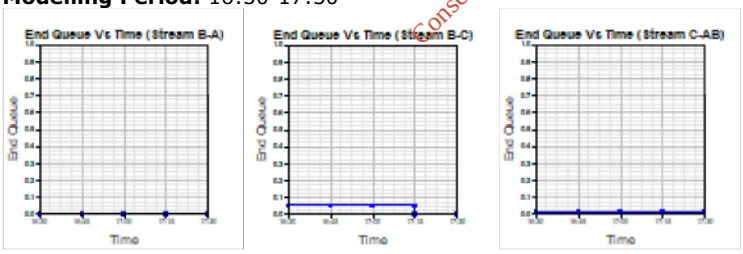


End Queue Graph

Demand Set: Sum of Demand Sets for Modelling Period: 08:30 - 09:30
Modelling Period: 08:30-09:30

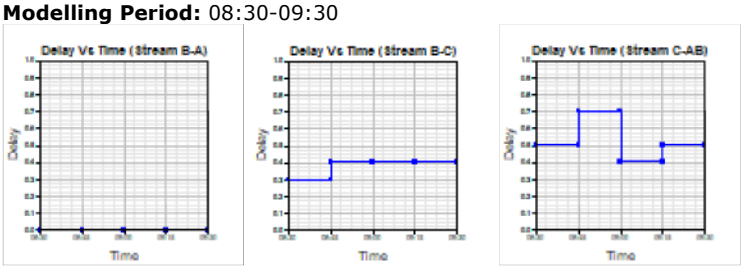


Demand Set: Sum of Demand Sets for Modelling Period: 16:30 - 17:30
Modelling Period: 16:30-17:30

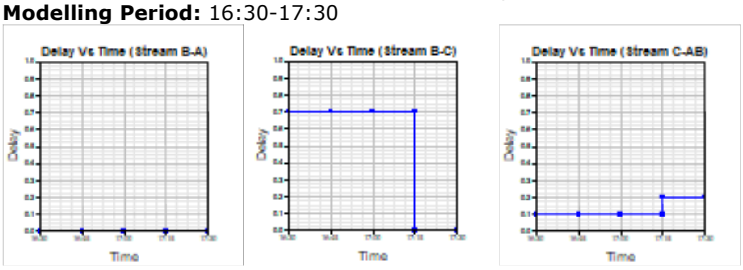


Delay Graph

Demand Set: Sum of Demand Sets for Modelling Period: 08:30 - 09:30
Modelling Period: 08:30-09:30



Demand Set: Sum of Demand Sets for Modelling Period: 16:30 - 17:30
Modelling Period: 16:30-17:30



Queues & Delays

Demand Set: Sum of Demand Sets for Modelling Period: 08:30 - 09:30
Modelling Period: 08:30-09:30

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
08:30-08:45	B-A	0.00	5.39	0.000	-	0.00	0.00	-	0.0	0.00
	B-C	0.13	5.81	0.023	-	0.00	0.02	-	0.3	0.18
	C-AB	0.19	5.89	0.033	-	0.00	0.03	-	0.5	0.18
	C-A	-	-	-	-	-	-	-	-	-
	A-B	0.00	-	-	-	-	-	-	-	-
	A-C	1.13	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
08:45-09:00	B-A	0.00	5.26	0.000	-	0.00	0.00	-	0.0	0.00
	B-C	0.13	5.77	0.023	-	0.02	0.02	-	0.4	0.18
	C-AB	0.26	5.85	0.044	-	0.03	0.05	-	0.7	0.18
	C-A	-	-	-	-	-	-	-	-	-
	A-B	0.00	-	-	-	-	-	-	-	-
	A-C	1.40	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
09:00-09:15	B-A	0.00	5.39	0.000	-	0.00	0.00	-	0.0	0.00
	B-C	0.13	5.76	0.023	-	0.02	0.02	-	0.4	0.18
	C-AB	0.15	5.84	0.026	-	0.05	0.03	-	0.4	0.18
	C-A	-	-	-	-	-	-	-	-	-
	A-B	0.00	-	-	-	-	-	-	-	-
	A-C	1.47	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
09:15-09:30	B-A	0.00	5.32	0.000	-	0.00	0.00	-	0.0	0.00
	B-C	0.13	5.75	0.023	-	0.02	0.02	-	0.4	0.18
	C-AB	0.19	5.83	0.033	-	0.03	0.03	-	0.5	0.18
	C-A	-	-	-	-	-	-	-	-	-
	A-B	0.00	-	-	-	-	-	-	-	-
	A-C	1.53	-	-	-	-	-	-	-	-

Demand Set: Sum of Demand Sets for Modelling Period: 16:30 - 17:30
Modelling Period: 16:30-17:30

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
16:30-16:45	B-A	0.00	5.15	0.000		0.00	0.00	-	0.0	0.00
	B-C	0.27	6.02	0.044		0.00	0.05	-	0.7	0.17
	C-AB	0.05	5.22	0.010	-	0.00	0.01	-	0.1	0.19
	C-A	-	-		-	-	-	-	-	-
	A-B	0.00	-		-	-	-	-	-	-
	A-C	2.40	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
16:45-17:00	B-A	0.00	5.24	0.000	-	0.00	0.00	-	0.0	0.00
	B-C	0.27	6.07	0.044	-	0.05	0.05	-	0.7	0.17
	C-AB	0.05	5.27	0.009	-	0.01	0.01	-	0.1	0.19
	C-A	-	-	-	-	-	-	-	-	-
	A-B	0.00	-	-	-	-	-	-	-	-
	A-C	2.07	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
17:00-17:15	B-A	0.00	5.23	0.000	-	0.00	0.00	-	0.0	0.00
	B-C	0.27	6.05	0.044	-	0.05	0.05	-	0.7	0.17
	C-AB	0.04	5.25	0.008	-	0.01	0.01	-	0.1	0.19
	C-A	-	-	-	-	-	-	-	-	-
	A-B	0.00	-	-	-	-	-	-	-	-
	A-C	2.20	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
17:15-17:30	B-A	0.00	5.25	0.000	-	0.00	0.00	-	0.0	0.00
	B-C	0.00	6.14	0.000	-	0.05	0.00	-	0.0	0.00
	C-AB	0.06	5.32	0.011	-	0.01	0.01	-	0.2	0.19
	C-A	-	-	-	-	-	-	-	-	-
	A-B	0.00	-	-	-	-	-	-	-	-
	A-C	1.67	-	-	-	-	-	-	-	-

Entry capacities marked with an '(X)' are dominated by a pedestrian crossing in that time segment.
In time segments marked with a '(B)', traffic leaving the junction may block back from a crossing so impairing normal operation of the junction.
Delays marked with '##' could not be calculated.

Overall Queues & Delays

Queueing Delay Information Over Whole Period

Demand Set: Sum of Demand Sets for Modelling Period: 08:30 - 09:30
Modelling Period: 08:30-09:30

Stream	Total Demand (veh)	Total Demand (veh/h)	Queueing Delay (min)	Queueing Delay (min/veh)	Inclusive Delay (min)	Inclusive Delay (min/veh)
B-A	0.0	0.0	0.0	0.0	0.0	0.0
B-C	8.0	8.0	1.4	0.2	1.4	0.2
C-AB	12.0	12.0	2.1	0.2	2.1	0.2
C-A	-	-	-	-	-	-
A-B	0.0	0.0	-	-	-	-
A-C	83.0	83.0	-	-	-	-
All	**206.0**	**206.0**	**3.5**	**0.0**	**3.5**	**0.0**

Demand Set: Sum of Demand Sets for Modelling Period: 16:30 - 17:30
Modelling Period: 16:30-17:30

Stream	Total Demand (veh)	Total Demand (veh/h)	Queueing Delay (min)	Queueing Delay (min/veh)	Inclusive Delay (min)	Inclusive Delay (min/veh)
B-A	0.0	0.0	0.0	0.0	0.0	0.0
B-C	12.0	12.0	2.0	0.2	2.0	0.2
C-AB	3.0	3.0	0.6	0.2	0.6	0.2
C-A	-	-	-	-	-	-
A-B	0.0	0.0	-	-	-	-
A-C	125.0	125.0	-	-	-	-
All	**278.0**	**278.0**	**2.6**	**0.0**	**2.6**	**0.0**

Delay is that occurring only within the time period.
Inclusive delay includes delay suffered by vehicles which are still queuing after the end of the time period.
These will only be significantly different if there is a large queue remaining at the end of the time period.

PICADY 5 Run Successful