TEESWORKS

DORMAN POINT ENVIRONMENTAL STATEMENT

VOLUME 3: TECHNICAL APPENDICES
APPENDICES TO CHAPTER C (TRANSPORT)

DECEMBER 2020

Dorman Point, South Tees
Volume 3: Appendices

Chapter C: Transport

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Appendix C1: Transport Assessment

South Tees Development Corporation

Dorman Point

Transport Assessment

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Contents

Appendices

1 Introduction

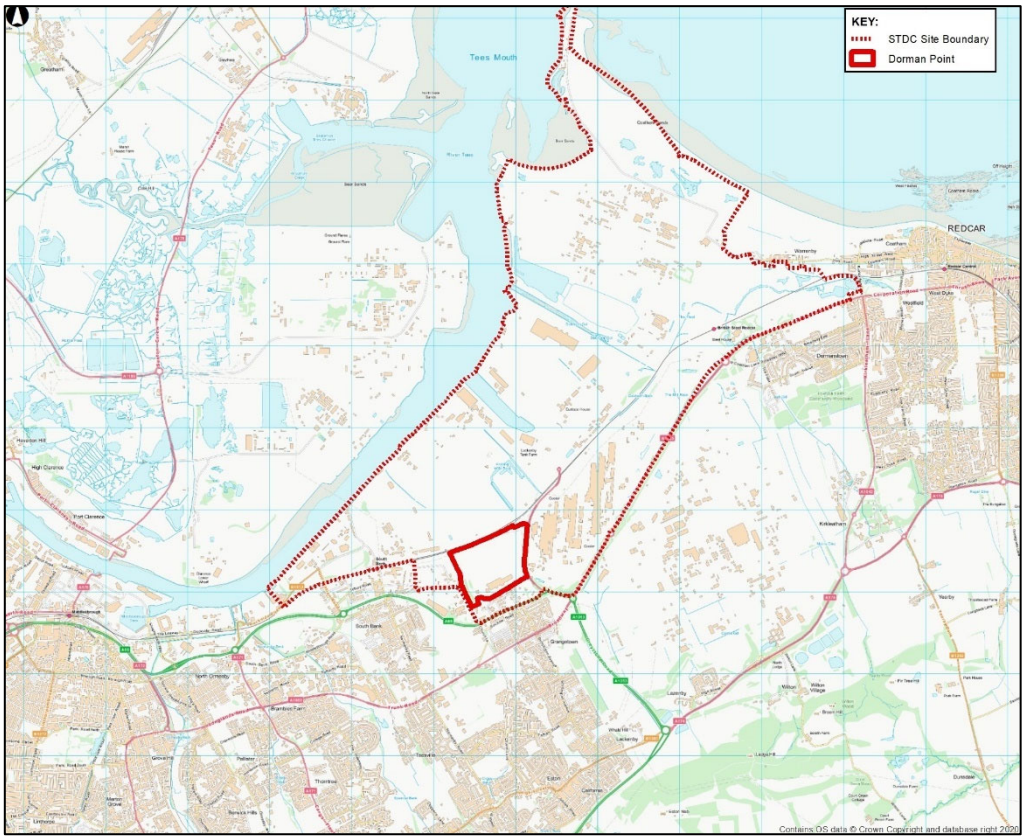
1.1 Background

Arup has been commissioned by the South Tees Development Corporation (STDC) to develop a Transport Assessment (TA), which incorporates a Travel Plan framework, in support of an outline planning application for the development of industrial (B2/B8) land use on the area known as Dorman Point within the STDC site. The STDC site is now known as 'Teesworks'.

The development site is located in the south-western part of the Teesworks area and the proposed maximum floorspace is just under 140,000sqm. It is largely free of active use, although the former Torpedo Ladle Workshop is present in the southern part of the site. It is proposed that the site will provide general industrial (B2) use and storage and distribution facilities (B8), with up to 10% ancillary office accommodation. The development is forecast to employ approximately 1,620 people when operational (direct and full-time jobs).

The site is located north of the A66, approximately 8km to the west of Redcar town centre and 8km to the east of Middlesbrough town centre. The site location is shown in **Figure 1** and an indicative site plan is attached in **Appendix A**.

Figure 1: Site Location



This document sets out the purpose, methodology, findings and recommendations of the TA. Arup has also prepared the traffic and transportation assessment chapter of the Environmental Statement (ES). This TA forms Appendix C1 of the ES.

The aim of this report is to demonstrate to Redcar and Cleveland Borough Council (RCBC), the local planning and highway authority, and Highways England (HE), that the development proposals are aligned with relevant planning policy and will not have a severe impact on surrounding transport networks.

1.2 Scoping

A TA Scoping Report for the proposed development was shared with RCBC, Middlesbrough Council (as the neighbouring highway authority) and HE on 26 November 2020. The report aimed to agree the methodology and main parameters of the transport assessment of the proposed development and is attached in **Appendix B**.

Consultation responses to the Scoping Report are included in **Appendix B** of this TA. Some of the issues raised by the consultees have been addressed. Specifically, HE asked that the study area be extended to include the SRN and that future growth scenarios should match those applied to the South Bank development (planning application number R/2020/0357/OOM). Further information about the mode share assumptions was requested, and it was advised that traffic distributions be informed by Census data. The methodology of the assessment for traffic forecasting follows the approach used for South Bank, and Census journey to work data has been analysed to inform trip distributions. The mode share assumptions, and adjustments to car mode share forecasts to account for the provision of a bus service, are outlined in this assessment.

RCBC noted that the assessment should set out how pedestrians and cyclists will access the site from first occupation. In addition, RCBC request that further infrastructure for electric vehicles and hydrogen filling stations should be considered. The application is for outline planning and therefore these matters have not been addressed in the assessment, however, they will be subject to review at reserved matters stage.

There may be some requests from stakeholders that have not been fully addressed prior to planning submission. Arup will continue to liaise with all parties on transport matters following submission and throughout the determination of the application.

1.3 Context

The proposed development is one of five outline planning applications being submitted for development on the Teesworks sites in December 2020. The other development sites are at Lackenby, Long Acres, The Foundry and Steel House. A plan is shown in **Figure 2**.

Figure 2: Location plan of Teesworks sites

The application follows a submission in summer 2020 for development on the South Bank site (planning application number R/2020/0357/OOM).

2 Planning Policy and Strategy Context

This section outlines the national, regional and local transport policy context within which the development is assessed. Planning policies and strategies relevant to the development proposal are as follows:

- National Planning Policy Framework;
- Tees Valley Combined Authority Strategic Transport Plan 2020 – 2030;
- Tees Valley Design Guide and Specification – Residential and Industrial Estates Development;
- Transport for the North Strategic Transport Plan;
- Redcar and Cleveland Local Plan;
- Redcar and Cleveland South Tees Area Supplementary Planning Document; and
- South Tees Regeneration Master Plan.

2.1 National Planning Policy

2.1.1 National Planning Policy Framework (2019)

The National Planning Policy Framework (NPPF) sets out the Government's planning policies for England and how these should be applied. It prepares a framework in which locally prepared plans for development could be produced.

Core planning principles related to sustainable transport and relevant to the proposed development are outlined below:

108. In assessing sites that may be allocated for development in plans, or specific applications for development, it should be ensured that:

    a. Appropriate opportunities to promote sustainable transport modes can be – or have been – taken up, given the type of development and its location;

    b. Safe and suitable access to the site can be achieved for all users; and

    c. Any significant impacts from the development on the transport network (in terms of capacity and congestion), or on highway safety, can be cost effectively mitigated to an acceptable degree.

109. Development should only be prevented or refused on highways grounds if there would be an unacceptable impact on highway safety, or the residual cumulative impacts on the road network would be severe.

110. Within this context, applications for development should:

    a. Give priority first to pedestrians and cycle movements, both within the scheme and with neighbouring areas; and second, so far as possible, to facilitating access to high quality public transport, with layouts that

maximise the catchment area for bus or other public transport services, and appropriate facilities that encourage public transport use;

b. Address the needs of people with disabilities and reduced mobility in relation to all modes of transport;

c. Create places that are safe, secure and attractive and which minimise the scope for conflicts between pedestrians, cyclists and vehicles, avoid unnecessary street clutter, and respond to local character and design standards;

d. Allow for the efficient delivery of goods, and access by service and emergency vehicles; and

e. Be designed to enable charging of plug-in and other ultra-low emission vehicles in safe, accessible and convenient locations.

111. All developments that will generate significant amounts of movement should be required to provide a travel plan, and the application should be supported by a transport statement or transport assessment so that the likely impacts of proposal can be assessed.

National Planning Policy Compliance

The application for the proposed development is accompanied by this Transport Assessment which assesses and mitigates, as far as reasonably possible, its forecast impact on the local highway network, as well as encouraging sustainable travel behaviours. The development meets these stated objectives as it will form part of the wider Teesworks site, for which a sustainable strategy is currently being developed. This TA also includes a Travel Plan framework with some initial measures that can be implemented at the development, in advance of the Transport Strategy being adopted.

The proposed development is therefore aligned with national transport policy.

2.2 Regional Policy

2.2.1 Tees Valley Combined Authority Strategic Transport Plan 2020-2030

The South Tees area is included in the Strategic Transport Plan (STP) as an area to be transformed into a hotbed of new industry and enterprise, which will help the regeneration of the area and will contribute to the delivery of sustainable, inclusive and cohesive communities.

The STP presents a package of transport improvements to transform the Tees Valley transport system and identifies the delivery of the South Tees Development Corporation Master Plan as one of the key actions towards achieving this goal.

The transport vision for Tees Valley that is set out in the STP is as follows:

"To provide a high quality, quick, affordable, reliable, low carbon and safe transport network for people and freight to move within, to and from Tees Valley."

The STP outlines key issues within the region such as high car mode share, despite a high majority of local residents working within the Tees Valley region. The STP therefore identifies opportunities from these issues and focuses on providing an effective transport system for local people and businesses by connecting centres, improving journey times, upgrading major roads and enhancing existing rail links.

The Plan identifies the following two core principles for the Teesworks site:

- Use the regeneration opportunity to strengthen transport connections with Redcar town centre and other urban centres, to realise improved economic and community benefits; and
- Deliver efficient connectivity across the South Tees area through enhanced on-site transport infrastructure to realise optimal functionality.

2.2.2 Tees Valley Design Guide and Specification – Residential and Industrial Estates Development

The Design Guide and Specification presents the standards for car parking and cycle parking provisions for residential and industrial developments in the Tees Valley area.

For industrial developments, the maximum car parking and minimum cycle parking standards are as follows:

- Sufficient operational parking and area for manoeuvring within the site;
- 1 space per 45m² gross floor area or 4 spaces per 10 employees (whichever is the greater); and
- Provision for the parking of 2 cycles per 200m² gross floor area.

The document also specifies that disabled car parking spaces should be in addition to the maximum parking standards for each site, and provision for car parks associated with employment premises and provided for employees and visitors should be as follows:

- Up to 10 spaces 1 space;
- Between 10 and 200 spaces; 5% of capacity, subject to a minimum of 2 spaces, to be reserved; and
- Over 200 spaces: 2% plus 6 spaces.

2.2.3 Transport for the North Strategic Transport Plan

Transport for the North (TfN) published its Strategic Transport Plan in 2019. The document sets out the priorities for transport infrastructure investment for the next 30 years. TfN's vision is of *'a thriving North of England, where world class*

transport supports sustainable economic growth, excellent quality of life and improved opportunities for all'.

Supporting the vision are four pan-Northern transport objectives which align with the Government's Industrial Strategy:

- Transforming economic performance;
- Increasing efficiency, reliability, integration and resilience in the transport system;
- Improving inclusivity, health and access opportunities for all; and
- Promoting and enhancing the built, historic, and natural environment.

The Investment Programme for the Transport Plan includes the following outcomes and actions which are of relevance to the proposed development and the wider Teesworks site:

Table 1: TfN Strategic Transport Plan Outcomes and Actions relevant to the Site

Outcome	Actions
Facilitating significant private sector investment to support economic growth and UK competitiveness	Allowing larger freight trains to access Tees Valley directly to/from the south through gauge enhancements and journey time improvements
Enhancing North-South strategic connections across the North to support UK competitiveness	Darlington Station Growth Hub, Northallerton to Newcastle capacity enhancements and New Tees Crossing
Improve connectivity and resilience to the Tees Valley City Region economic clusters, particularly the South Tees Development Corporation site	Journey time improvements on the Bishop and Saltburn railway lines, and between Middlesbrough and York A66 Darlington to Teesport capacity improvements A174 / A1053 Greystones Roundabout

The proposed development is expected to benefit from future improvements to the transport network delivered through the TfN Investment Programme.

Regional Planning Policy Compliance

The site will include active transport measures to connect to the existing network on the local roads in the vicinity of the site. In addition, there is the opportunity for the site to seek to align with the active transport principles in accordance with the emerging wider South Tees Transport Strategy once approved. Cycle parking and associated supporting facilities in exceedance of local standards will be provided within the site. The details of these provisions will be agreed once the detailed nature of the scheme is known.

The development is located in close proximity to South Bank railway station. The development will also benefit from new sustainable transport provisions across the wider site and improvements to existing provisions in the wider area, through the emerging Transport Strategy. The proposed development is therefore aligned with regional planning policy.

2.3 Local Planning Policy

2.3.1 Redcar and Cleveland Local Plan (2018)

The Redcar and Cleveland Local Plan was adopted in May 2018. The vision is that the Plan will ensure that by 2032 the needs and aspirations of local communities will be met through the delivery of sustainable development across the Borough.

Of particular relevance is Policy LS4: South Tees Spatial Strategy. With regards to transport, the policy seeks to:

- Improve links between South Tees and the Strategic Road Network;
- Support improvements to the road network to support economic growth;
- Deliver rail improvements to support rail freight;
- Investigate the feasibility of a new rail halt at Wilton International;
- Maintain and improve public transport connectivity;
- Support the extension of the road network to unlock the development potential of South Tees; and
- Maintain and enhance walking routes from nearby towns to the South Tees employment areas.

In March 2019, the Council agreed a motion which declared a climate emergency and made commitments to:

- Make the Borough carbon neutral by 2030 taking account of production and consumption emissions;
- Seek powers and resources from Government to make the 2030 target possible; and

- Work with other local and regional Governments (both within the UK and internationally).

The Local Plan also stresses the existing transport connectivity of the Teesworks site, which has access to a deep-water port, excellent road and rail links, access to energy and utilities. Specific policies of relevance include:

- Policy SD4 relates to the general development principles and includes the requirements for locating development on appropriate sites with compatible surroundings, ensuring development is located in a sustainable and safe location, and ensuring there is adequate infrastructure to serve the development.
- Policy LS4 includes the objective to improve the accessibility of employment sites by a range of transport methods.
- Policy TA1 relates to transport and new development and includes the requirement for new developments to encourage transport choice and non-car modes.
- Policies TA2 and TA3 relate to improving accessibility by bus across the borough and improving the walking cycling and public rights of way networks respectively.

With regards to connectivity opportunities, Policy TA2 identifies schemes for improving accessibility within and beyond the borough. One of the key actions included in the policy refers to the delivery of the South Tees Dockside Road access to the site.

Local Planning Policy Compliance

Junction capacity assessments have been undertaken at key junctions in the vicinity of the site, to assess the impact of the proposed development on the local and Strategic Road Network. Whilst the assessment has identified significant effects on specific junctions, it is noted that the assessment represents a worst-case scenario in terms of future mode share and potentially development vehicle traffic distribution. In reality, it is expected that the physical walking and cycling measures and the public transport improvements that will be provided as part of the sustainable transport measures of the emerging wider Transport Strategy will promote greater mode shift across the wider site.

The proposed development is therefore aligned with local planning policy.

2.4 South Tees Area Specific Documents

2.4.1 Redcar and Cleveland South Tees Area Supplementary Planning Document (2018)

The SPD for the South Tees area was adopted in May 2018. One of the key objectives of the SPD is delivering efficient connectivity across the South Tees

Area through making the best use of existing transport infrastructure, providing new and enhanced on-site transport infrastructure and creating an integrated and safe transport network, which takes account of the needs of a variety of users and includes sustainable travel measures.

In terms of phasing of the Teesworks site, the SPD indicates that early phases for the site should be the areas where transport access/egress is presently afforded.

With regards to transport infrastructure, Development Principle STDC5 states that the Council will, in partnership with the STDC and transport operators, other stakeholders and developers, seek to improve and enhance the transport infrastructure serving the South Tees Area. The Council will not support development proposals that may adversely impact on the delivery of the Infrastructure Corridor, and will ensure that all new developments will be required to have access to adequate infrastructure to meet their transport requirements.

The SPD also identifies a list of transport infrastructure schemes that will be supported, subject to confirmation of the need for each project and the avoidance of unacceptable environmental or amenity impacts. The following are of relevance to the proposed development:

- The provision of a four-arm roundabout at South Bank, giving improved access from the A66, via Dockside Road;
- The provision of new collector and local roads, providing access across and between development zones;
- The establishment of new rail connectivity at South Bank Wharf;
- The redevelopment of South Bank Wharf to bring this important river frontage back into beneficial use; and
- The provision of new and enhanced footpath and cycleway network identified within the Transport Strategy.

The SPD states that the presence of the existing passenger railway running through the South Tees Area is a major attribute for development and a key opportunity for improving access to significant employment opportunities by public transport. The existing South Bank railway station is optimally located to serve the South Industrial Zone. The SPD supports enhancements to the South Bank station to meet the anticipated future travel demands of the development.

Also, the SPD specifies that the area wide Transport Strategy for the site will include new and enhanced footpath and cycleway networks enabling ease of movement across the industrial park by non-automated transport modes and development proposals that align with this strategy will be supported.

2.4.2 South Tees Regeneration Master Plan (November 2019)

The STDC Master Plan stated that ease of access to the site by all travel modes will be an essential component of a successful regeneration, also stressing the need for the site to be equipped with adequate, modern infrastructure for efficiently handling freight imports and exports. As the site will result in an increase in number and change in patterns of trips in the area, the Master Plan

stresses that it is vital to ensure effective and enhanced connectivity by road, rail and bus.

With regards to Dorman Point (referred to as the 'Grangetown Prairie' site in the Master Plan), reference is made to the proposed new roundabout access and remediation works which are funded and about to commence.

The Master Plan also discusses freight and passenger rail connectivity to the Teesworks site, referencing the opportunities for improvements at the under-used freight rail infrastructure, as well as the proposed improvements to the South Bank station to address the increase in passenger demand.

The Master Plan also notes that consideration will be given to the impact on the local highway network of the planned major increases in traffic resulting from the STDC development, so that junction capacities are not adversely impacted.

Site-specific Policy and Strategy Compliance

The proposed development is aligned with the site specific policies and the Master Plan for the site, as it will provide improvements to the transport network to allow access to the development by sustainable and active travel modes, including physical measures (e.g. cycle parking and associated facilities, internal walking and cycling network), as well as other measures included in the Transport Strategy for the wider site, currently being developed. Access to the site is proposed via a new roundabout junction on Eston Road, as outlined in the Master Plan, which is funded and about to commence.

This Transport Assessment assesses the impact of the proposed development on the local and Strategic Road Network, to identify the impact of the proposed development on neighbouring junctions, and provides embedded mitigation, in the form of sustainable transport initiatives from the emerging site-wide Transport Strategy.

3 Baseline Conditions

3.1 Site Description and Location

The application site, which is currently vacant, is located within the Teesworks site and makes up part of the area known as the South Industrial Zone and extends to an area of approximately 57.8 hectares. The site's history includes iron and steel industries and was previously occupied by buildings associated with the Cleveland Iron and Steel Works. The site is located north of the A66, approximately 8km to the west of Redcar town centre and 8km to the east of Middlesbrough town centre.

The site is bounded by Tees Dock Road to the east, Bolckow Industrial Estate to the south, Eston Road to the west and the Darlington to Saltburn railway line to the north.

3.2 Sustainable Transport Networks

3.2.1 Walking and Cycling

Walking facilities in the vicinity of the site are currently limited. All roads have footways on at least one side of the carriageway.

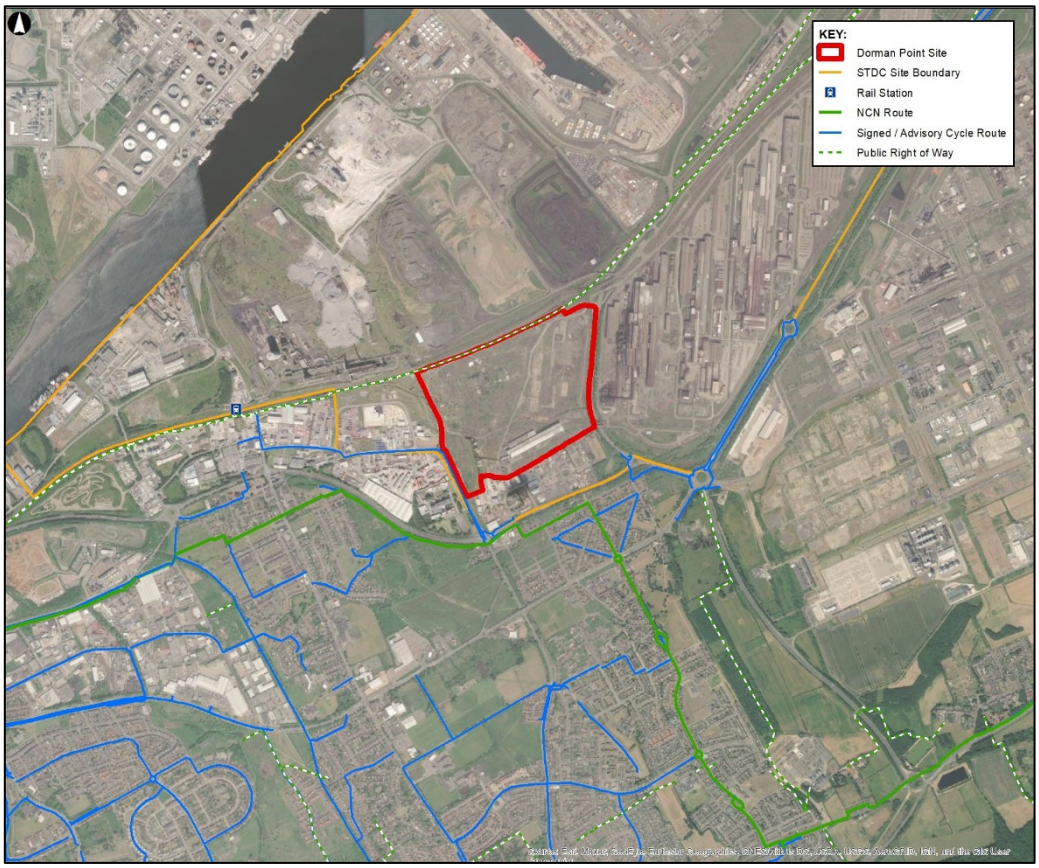
The nearest National Cycle Route (NCR) is NCR1 which runs along Bolckow Road, approximately 400m (linear distance) from the south of the site. NCR1 provides strategic connections between Saltburn, Marske, Redcar and Middlesbrough.

On-road local cycle routes are also provided through Eston, Grangetown and South Bank to the south of the site, (on-road signed routes in some locations and advisory routes through quiet streets in other locations).

Owing to the scale and the historic use of the site, existing access to and from the site to nearby residential areas or local transport connections on foot or by bicycle is limited. There is a Public Right of Way (PRoW) that traverses the site. This forms part of the Teesdale Way which extends from Cumbria to the east coast. Through the site it generally runs parallel to the railway corridor until Coatham Marsh where it travels north/south through the site to the coast.

An overview of active travel provisions in the wider area is shown in **Figure 3**.

Figure 3: Active travel provisions in the vicinity of the site



3.2.2 Public Transport

Bus Services

There are currently no bus services in the immediate vicinity of the site, with the nearest bus stops located in the residential area of Grangetown, approximately 1.2km walking distance to the south of the site. The bus stops are served by bus services 62 and 64/64A and the services are shown in **Table 2**. Additional bus stops are located on Trunk Road the east of the A1053/Trunk Road roundabout.

Table 2: Bus Services

Route No.	Bus Stop	Route	Daytime frequency (minutes) per direction	
			Monday – Saturday	Sunday
62	St George's Road/Broadway	Marske – Redcar – Dormanstown – Grangetown – Middlesbrough	Every 30 minutes	Every hour
64 / 64A	St George's Road/Broadway	Eston – Redcar – Dormanstown – Grangetown - Bankfields – South Bank - Middlesbrough	Every 30 minutes	Every hour
Only key intermediate stops noted* ***Services shown above reflect timetable changes due to travel restrictions during the Covid 19 pandemic* **Sources: Arriva				

Railway Services

South Bank railway station is located approximately 2km to the west of the site. The station is serviced by Northern, which provides hourly services between Bishop Auckland (via Darlington) and Saltburn.

Additional railway services are provided at Redcar Central railway station (approximately 6km linear distance to the east of the site). The station is serviced by Transpennine Express and Northern, which provides hourly services between Manchester Airport, Bishop Auckland (via Darlington) and Saltburn.

3.3 Highway Network

3.3.1 Local Highway Network

The local highway network consists of the following key roads:

- A66, a dual four-lane carriageway in the vicinity of the site, runs in an east-west direction to the south of the site, and connects to the A19 to the west and to the A1053 and Trunk Road to the east. The A66 is a key east-west corridor that links Middlesbrough to Redcar;
- Eston Road, a two-lane single carriageway, runs in a north-south direction to the west of the site.
- Tees Dock Road is a two-lane single carriageway along most of its length, that runs to the east of the site.

3.3.2 Strategic Road Network

The SRN near the site consists of the following roads:

- A1053, a four-lane dual carriageway, runs in a north-south direction and connects to the A66, Tees Dock Road, and Trunk Road, which is the key corridor into Redcar town centre in the north. To the south, the A1053 connects to the A174 and B1380 High Street at the Greystones roundabout; and
- A174, a four-lane dual carriageway to the south of the site, is a key east-west corridor between Middlesbrough and Redcar, that connects to the A19 to the west and to the A1053 to the east.

3.4 Road Safety

Collision data covering the study area has been sourced, for the period 2015 to 2019 inclusive, from the Crashmap website. An overview of the collisions in the study area is provided in **Figure 4** and **Table 3.**

Figure 4: Study Area Collision Map *(Source: https://www.crashmap.co.uk/)*

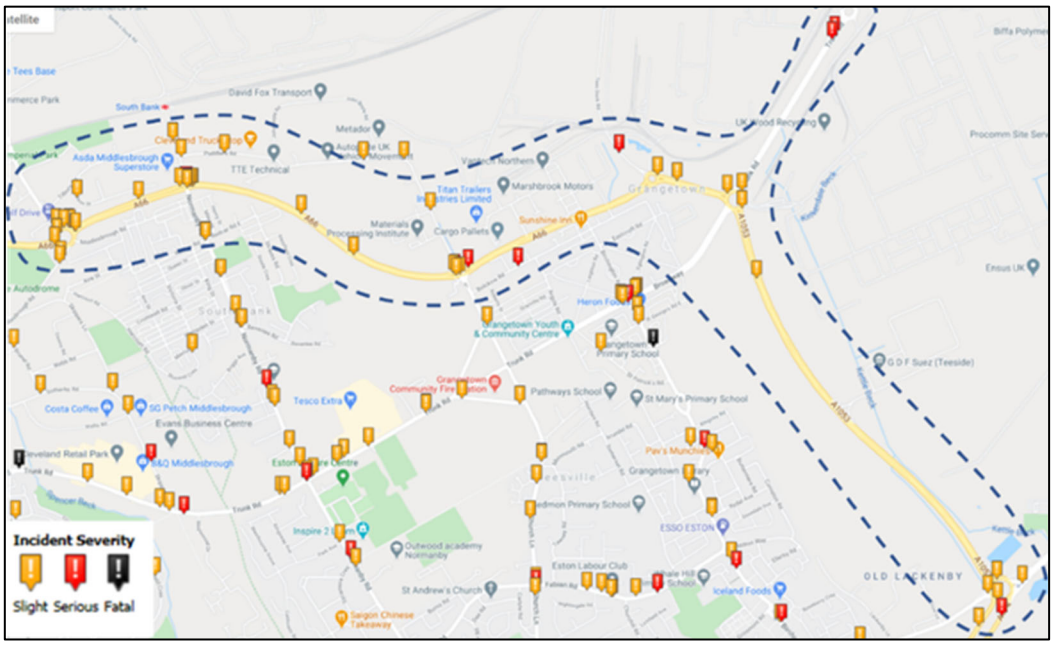


Table 3: Study Area Collision Data (2015-2019)

Severity	2015	2016	2017	2018	2019	Total
Fatal	0	0	0	0	0	0
Serious	4	0	1	1	1	7
Slight	10	9	6	6	7	38
Total	14	9	7	7	8	45

Table 3 shows that 2015 recorded the most collisions within the study area, with a total of 14 collisions, and both 2017 and 2018 recorded the least amount, with 7 collisions recorded each of these years. The most recent year of data recorded, 2019, noted a total of 8 collisions within the study area.

The following sections will provide a high-level analysis of the key junctions within the study area and detail the main collision points that must be considered.

3.4.1 A66 / Eston Road

Five collisions took place between 2015 and 2019 at the A66 / Eston Road junction. Two of these collisions resulted in serious injuries, both of which took place in 2015, and three were slight injuries. Four out of the total five collisions happened in 2015 and one in 2017. All collisions involved two vehicles and one casualty per incident.

At the A66 / Eston Road junction there are two collisions classified as serious, involving pedal cyclists, but there appears to be no common causation factor to these collisions.

3.4.2 A66 / Tees Dock Road / A1053

Two collisions with slight injuries were recorded at the A66 / Tees Dock Road / A1053 roundabout during the study period; one in 2015 and one in 2018. A collision resulting in serious injuries occurred in 2017 on Tees Dock Road, further north of the junction. This collision comprised of two vehicles and one casualty.

3.4.3 A66 / Normanby Road

Nine collisions were recorded at the A66 / Normanby Road junction during the 2015-2019 study period. Two resulted in serious injuries (one in 2018 and one in 2019), with the remaining seven collisions resulting in slight injuries. Three of the collisions took place in 2015, three occurred in 2016, and one happened each year between 2017 and 2019.

There is a trend that the collisions at the A66 / Normanby Road crossroads appear to be related to vehicles making a turning manoeuvre. One of the collisions that took place at the junction between 2015 and 2019 also involved a vulnerable road user (cyclist), resulting in serious injury to the cyclist.

3.4.4 A66 / Middlesbrough Road / Old Station Road

At the A66 / Middlesbrough Road / Old Station Road roundabout, the data indicates that ten collisions resulting in slight injuries were recorded between 2015 and 2019. The majority of these collisions occurred on approach to the junction, and two were located on Middlesbrough Road, away from approaches to the junction. Three collisions happened during 2019, four took place in 2018, and one collision occurred in each year between 2015 and 2017.

All the collisions recorded at this roundabout are categorised as slight and there are no common causation factors, with collisions distributed around the junction and appearing to be minor shunt type collisions. No collisions involving vulnerable road users were noted at the junction during the reviewed time period.

3.4.5 A1053 / A1085 Trunk Road

Three collisions with slight injuries were recorded in the study period at the A1053 / A1085 Trunk Road roundabout. Two of the collisions happened in 2019 and one in 2016. All incidents consisted of two vehicles and one casualty per incident.

3.4.6 A174 / A1053 Greystone Road (Greystones Roundabout)

Six collisions were noted at the A1053 Greystones roundabout between 2015 and 2019. Three collisions occurred in 2016 and two took place in 2015, all of which were slight injuries. Another collision happened in 2015 which was of serious severity. There does not appear to be any common theme between the collisions.

3.4.7 A1085 Trunk Road

Two serious collisions have occurred, between 2015 and 2019, on approach to the A1085 Trunk Road roundabout. One collision happened in 2015 involving two vehicles, resulting in one injury. Another collision happened in 2018, which involved 2 vehicles and resulted in 3 injuries.

3.4.8 Road Safety Summary

Based on the review of the collision data, and an assessment of the key junctions within the study area, three local junctions have been identified where geographic clusters of collisions have occurred during the assessment period:

- A66 / Eston Road signalised junction,
- A66 / Normanby Road signalised crossroads; and
- A66 / Middlesbrough Road / Old Station Road roundabout.

No common causation factors have been identified except at the A66/Normanby Road junction where vehicles turning right was recorded as the vehicle manoeuvre in five of the nine collision records.

4 Development Proposals

4.1 Development Description

It is expected that the proposed outline planning application will be for the development of up to 139,353sqm (gross) of general industry (use class B2) and storage and distribution facilities (use class B8) with up to 10% ancillary office accommodation (use class E), HGV and car parking and associated works.

The site is expected to be fully operational by 2032. When fully operational, the site is forecast to be able to accommodate approximately 1,620 employees.

4.2 Vehicular Site Access

The main vehicular access into the site will be via a new roundabout junction on Eston Road, the works for which have planning permission (application number R/2020/0270/FFM). Two additional access points will be from existing Teesworks internal roads. There is also the opportunity for a fourth access point via the Bessemer Gate entrance within the Bolckow Industrial Estate to the south of the site boundary.

4.3 Pedestrian and Cycling Facilities

A walking and cycling network will be provided across the site and will connect to existing facilities on the site accesses and surrounding area. The internal walking and cycling network will be developed (where possible) alongside the emerging Transport Strategy for the wider Teesworks site and agreed through the reserved matters application for the proposed development or via an appropriately worded planning condition. Associated facilities such as cycle parking, showers and lockers will also be provided within the proposed development, the details of which will be agreed through the reserved matters application.

The Transport Strategy is currently being developed and some of the key outcomes included in the strategy are expected to include the following:

- High quality public transport, walking and cycling routes and connections are prioritised over other transport modes;
- Cycling and walking connections to local residential centres are safer, more attractive, widely used and support local town centre regeneration;
- Transport options enable improved individual health and wellbeing and access to jobs; and
- Transport options will support the transition to zero carbon and contribute to a high-quality environment that will attract future occupiers.

It is expected that the strategy for the wider site will propose a series of measures to be implemented across the Teesworks site in order to achieve these outcomes, which is expected to include, amongst other things, limiting car parking provision, introducing mobility hubs, providing high quality cycling parking and improving

public transport provision. There is an opportunity for future occupiers of the proposed development to sign up to the Transport Strategy to meet sustainability targets (including RCBC's ambition to be carbon neutral by 2030). Furthermore, they will benefit from the measures introduced to enhance the accessibility of the site. This strategy provides the opportunity to help minimise the impact of the proposed development.

4.4 Public Transport Facilities

The proposed development will benefit from improvements to the existing public transport facilities in the wider area and new provisions within the Teesworks site, as part of the emerging Transport Strategy for the wider site.

A dedicated bus service is proposed to connect the local towns of Middlesbrough and Redcar to the development site. The bus service will travel into the site to provide a service that connects directly to the development.

4.5 Car Parking

As an outline planning application, the internal site layout has not yet been developed and therefore the level of car parking provision is expected to be agreed once the detailed design of the scheme is known.

It is envisaged that the emerging Transport Strategy for the area will limit car parking within the site as far as reasonably possible, to meet sustainability targets (including RCBC's ambition to be carbon neutral by 2030). Therefore, this TA does not include a car parking assessment but assumes that car mode share is in line with baseline conditions, with a marginal reduction to take into account the bus service provision that will be in place. However, it is expected that investment will be made in alternative transport provision to support the emerging wider Transport Strategy and further limit private car trips to / from the site.

The emerging Transport Strategy includes aims to prioritise public transport and active travel over other modes, ensure that the site does not feel dominated by cars and other vehicles, and the transport options provided will support the transition to zero carbon and contribute to a high-quality environment that will attract future occupiers. To achieve these outcomes, it is expected that the strategy will propose a series of measures to limit car use to the site, such as providing centralised car parks, providing priority parking for car sharers, providing electric vehicle charging infrastructure, and enforcing car parking restrictions, amongst others.

4.6 Cycle Parking

The development will provide cycle parking spaces in excess of the current Tees Valley standards (*Tees Valley Design Guide and Specification – Residential and Industrial Estates Development)* in accordance with the Transport Strategy that is being developed for the wider Teesworks site. The development will also provide supporting facilities for walking and cycling, such as showers and changing rooms, lockers etc, as mentioned in Section 8.

Details about the cycle parking spaces and associated facilities for the proposed development will be agreed through the reserved matters application.

5 Trip Generation

5.1 Person Trips

The development proposals are for B2/B8 industrial use, with ancillary office use (up to 10%). It has been forecast that when fully operational (2033), the development could accommodate approximately 1,620 employees.

To determine how many trips the employees would generate on a daily basis, we have derived trip rates from the TRICS database. TRICS is a recognised database widely used by transport professionals, which predicts trip rates of developments based on survey information of comparable sites.

It is difficult to find comparable sites given the scale of the proposed development, but four industrial estate type sites were identified in the TRICS database that were of similar scale and predominately B2/B8 use (with 10% office use). However, during the consultation process for the South Bank planning application, Middlesbrough Council indicated that the trip rates that were applied on the TeesAMP development (planning application number 18/0308/FUL) should be applied at the Teesworks site. The TeesAMP trip rates are more applicable to smaller sized industrial sites and therefore could be applicable at Dorman Point.

The trip rates per employee are shown in **Table 4** with further details contained in the TA Scoping Report (see **Appendix B**).

Table 4: Person Trip Rates

	AM Peak (08:00 – 09:00)			PM Peak (17:00 – 18:00)			Daily (7am – 7pm)		
	In	Out	Total	In	Out	Total	In	Out	Total
Trip Rate	0.475	0.245	0.720	0.175	0.425	0.60	3.434	3.435	6.869

No information is provided in the TeesAMP Transport Assessment regarding service vehicle trip rates. Therefore, the proportion of LGV and HGV trips from the South Bank TA analysis has been applied to the data to distinguish service vehicle trips. **Table 5** presents the HGV and LGV proportions extracted from the South Bank TA.

Table 5: LGV and HGV proportions

Trip rates/employee	AM Peak (08:00 – 09:00)		PM Peak (17:00 – 18:00)		Daily (7am – 7pm)	
	In	Out	In	Out	In	Out
LGV %	9%	25%	13%	5%	14%	14%
HGV %	6%	18%	18%	3%	10%	10%

The service and delivery vehicle proportions (light goods vehicles and heavy goods vehicles) have been shown to disaggregate the overall person trip rate and determine how many trips are likely to be made by commuters, versus service

vehicle trips. The trips for each mode, based on 1,620 employees, are shown in **Table 6**.

Table 6: Total Trips

	AM Peak (08:00 – 09:00)			PM Peak (17:00 – 18:00)			Daily (7am – 7pm)		
	In	Out	Total	In	Out	Total	In	Out	Total
Person Trips	770	397	1,166	284	689	972	5,563	5,565	11,128
LGVs	69	99	168	37	34	71	779	779	1,558
HGVs	46	71	118	51	21	72	556	556	1,113
Person Trips (excluding LGVs/HGVs)	654	226	880	196	633	829	4,228	4,229	8,457

The data in **Table 6** shows that LGVs account for approximately 14% of all trips, with HGVs accounting for 10% of daily trips based on the surveys from other industrial estates. Excluding servicing trips, the site is forecast to generate 8,457 two-way commuter trips on a daily basis (and approximately 880 and 830 two-way trips in the AM and PM peak hour respectively).

5.2 Trips by Mode of Transport

Having established a method for calculating the number of trips generated by the proposed development, the person trips (excluding servicing) have been distributed onto transport modes using data from the 2011 UK Census Journey to Work dataset. This data records how people working in this area (Census zone E02002523) travelled to work in 2011 and the results are shown in **Table 7**.

Table 7: 2011 Census Method of Journey to Work (Destination Zone - E02002523)

Mode	2011 UK Census Southern Zone %
Car Driver	69%
Car Passenger	8%
Bus	5%
Bicycle	2%
Walking	13%
Motorcycle	0%
Other	3%

It can be seen that 69% of trips to the South Tees area for the purpose of work were made by car in 2011. It is expected that the emerging Transport Strategy for the site will seek to reduce this mode share significantly. However, these earlier developments coming forward may not benefit from the longer-term strategy improvements proposed up to 2042.

It is however proposed that one of the earlier measures implemented be a dedicated bus service to connect the local towns of Middlesbrough and Redcar to

the development site. The existing bus stops are outside a reasonable walking distance to the centre of the site, so it is proposed that a service be provided that travels into the Dorman Point site. This service will be extended to serve other Teesworks developments as they come forward. If at least 5% of people who would usually travel by car could be encouraged to travel by the bus service, it would remove 44 car trips in the AM peak hour. This forecast seems reasonable and would be realistic given that the bus would operate at least every 15 minutes and therefore be capable of accommodating a much higher number of passengers. It would therefore be expected that in the longer term many more commuters would use the bus service than the conservative forecast estimates.

The provision of a bus service, alongside other travel planning measures, is therefore considered to enable at least a 5% reduction in those travelling to the site by car when these sites are operational.

It is therefore assumed that the maximum baseline car mode share for Dorman Point be 64%. Applying this mode share to the person trip generation (excluding servicing), results in the commuter vehicular trip generation outlined in **Table 8**.

Table 8: Total Vehicular Trip Generation

	AM Peak (08:00 – 09:00)			PM Peak (17:00 – 18:00)			Daily (7am – 7pm)		
	In	Out	Total	In	Out	Total	In	Out	Total
Employee Car Trips	419	145	563	125	405	531	2,706	2,707	5,413
LGVs	69	99	168	37	34	71	779	779	1,558
HGVs	46	71	118	51	21	72	556	556	1,113
Total Vehicular Trips	534	315	849	213	460	674	4,041	4,042	8,083

5.3 Vehicular Trip Distribution and Assignment

The development site could have four vehicular access points when operational. Two of these would connect to the internal Teesworks road network, providing the ability to travel through the site. The main access will be via the recently approved new roundabout junction on Eston Road (application number R/2020/0270/FFM). A further access could potentially to be provided at the south west corner of the site at the Bessemer Gate entrance into the Bolckow Industrial Estate. For the purpose of impact assessment, it is assumed that all development traffic will access the site via the new roundabout junction on Eston Road.

Census data has been used to inform trip distribution at the development access. Travel to work data from the 2011 Census has been downloaded for those travelling to the South Tees area in 2011. In 2011 the site was operating as a steel works and whilst noting that the proposed use could alter the trip attraction of the site, the zone includes the Wilton International Site so it was likely to have a relatively mixed geographical draw in 2011. Origins with 1% of total trips or

more were extracted and the most likely direction of travel to the site identified based on Google Maps directions. The detailed data is attached in **Appendix C** but to summarise, it was concluded that approximately 60% of trips would travel to the site from the east (via routes including A1053, Trunk Road and A174), 30% would be from the west (via the A66 and A19) and 10% would originate from the south (via Church Lane).

Traffic has been distributed on the remainder of the network using the turning proportions in the baseline traffic flow diagrams. The traffic distribution, and resultant morning and evening peak hour vehicular development trips, are shown in **Appendix D**.

6 Sustainable Transport Impact Assessment

6.1 Public Transport

A dedicated bus service will be provided to support the development, providing a service at least every 15 minutes in the peak hour between the site and neighbouring towns of Middlesbrough and Redcar.

It is expected that the emerging Transport Strategy for the South Tees Regeneration Master Plan will bring forward accessibility enhancements to encourage a greater proportion of people to travel to and from the site sustainably. In the longer term, it is therefore expected that the activity generated by the proposed development will have a positive impact on the viability of sustainable transport networks in the vicinity of the site.

6.2 Walking and Cycling

The proposed development will provide a series of physical measures to encourage active travel to / from the site, including an internal network of walking and cycling routes and associated facilities, such as cycle parking, showers and changing facilities. The development will also benefit from walking and cycling measures that will be provided across the wider Teesworks site. The proposed active travel and sustainable transport measures will aim to create a site that is not dominated by vehicles, but a site where trips by sustainable and active travel modes are enabled and encouraged.

7 Highway Impact Assessment

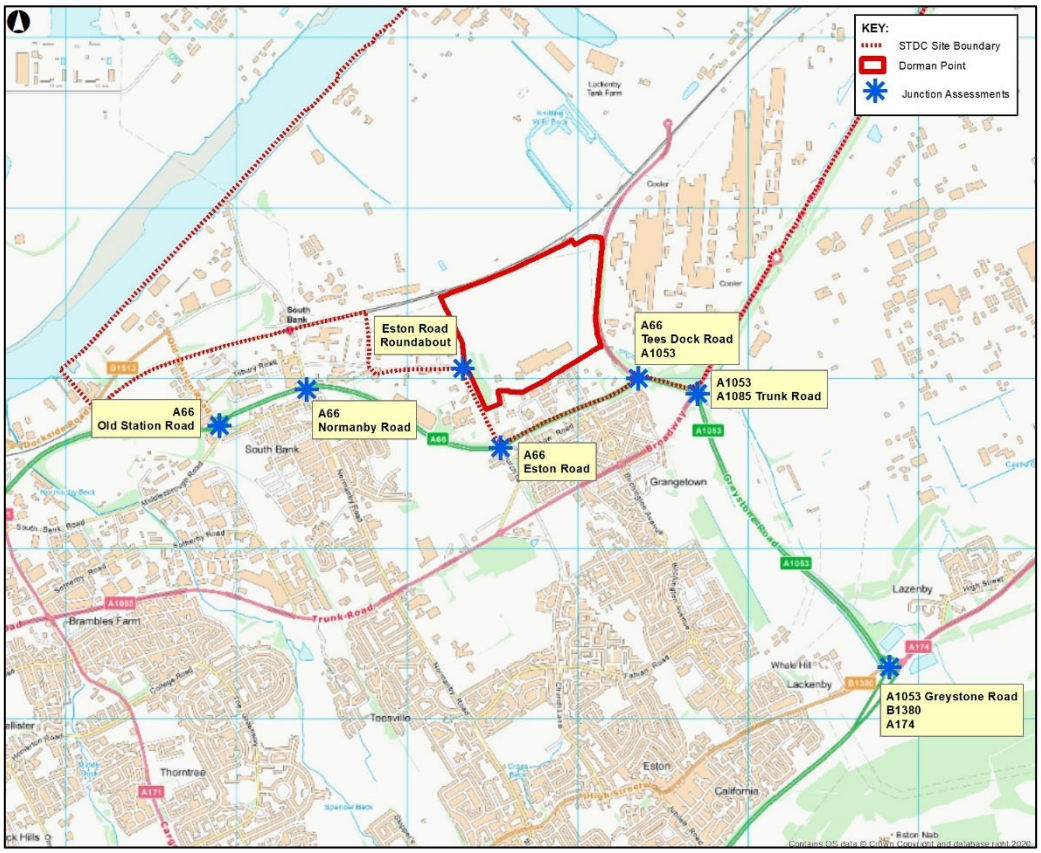
7.1 Assessment Scope

Based on the location of the proposed development and the current conditions at the local and SRN junctions, the impact of the development on the following junctions has been assessed:

1. A66 / Middlesbrough Road / Old Station Road roundabout;
2. A66 / Normanby Road signalised junction;
3. New Eston Road roundabout;
4. A66 / Eston Road signalised junction;
5. A66 / Tees Dock Road / A1053 roundabout;
6. A1053 / A1085 Trunk Road signalised roundabout; and
7. A174 / A1053 Greystone Road roundabout.

The locations of the junctions to be assessed is shown in **Figure 5**.

Figure 5: Locations of assessed junctions



7.2 Methodology and Assessment Scenarios

Due to current circumstances with the Covid-19 pandemic and lockdown measures, it is not possible for traffic surveys to be undertaken to inform the baseline condition assessment. To establish the baseline traffic flows, the following data sources have been utilised:

- Traffic data from HE North Regional Transport Model (NRTM);
- Traffic data from the Tees Valley Combined Authority (TVCA) Tees Valley Cube Model (TVM);
- Department for Transport traffic counts available online;
- WebTRIS (HE) online data;
- Traffic surveys collected on behalf of Capita in 2019 to construct a VISSIM model of the area for RCBC – permission to obtain a copy of these surveys was granted by RCBC, Capita and NETDC Ltd; and
- Survey data publicly available online from other local developments, including the planning application for the York Potash development (application number R/2013/0669/OOM).

Peak hour data from the two traffic models (NRTM and TVM) was input into two separate traffic flow diagrams for the study area. On both diagrams, any observed data was added above the links to enable a comparison to be made and determine which data source provided the most comparable base. The NRTM was found to be a comparable match against the baseline flows, and therefore the NRTM flows were predominantly used to inform the baseline, except for where observed data was available. All data has been adjusted to 2020 and 2033 (for operational year assessment) using NRTM growth.

The traffic flow diagrams are attached in **Appendix E** and the base flows are categorised to indicate which data source was used at each junction.

Based on the above, local junction modelling will be undertaken for the following assessment scenarios for both the AM and PM peak hour:

- 2033 Base;
- 2033 Base + Proposed Development; and
- 2033 Base + all five proposed developments + South Bank development (cumulative assessment).

As requested by HE for the South Bank development, the scope of the traffic assessment will extend to include the A19 corridor. Jacobs has provided a copy of the 2015 New Tees Crossing AIMSUN Model so that the impact of trips from the Teesworks sites on the A19 can be assessed. The impact of each development site, and the cumulative scenarios, will be undertaken. It should also be noted that for the purpose of the assessment, it has been assumed that all freight traffic travels by road.

Given the inability to gather site specific baseline data, it should be noted that preparing the baseline traffic flow forecasts has relied on information provided by

others and whilst all data was checked, Arup and STDC do not accept responsibility for the accuracy of such information. Arup emphasise that any forward-looking projections, forecasts, or estimates have been based upon interpretations or assessments of available information at the time of production.

7.3 Cumulative Impact Assessment

A cumulative assessment has been undertaken to consider the cumulative effects of all five developments on the Teesworks site, plus the South Bank development (application number R/2020/0357/OOM). This cumulative assessment of all recent planning submissions on Teesworks has been undertaken for a future year of 2033. This is known as the Tier 2 cumulative assessment within the ES.

Rather than review and extract traffic flows for the committed developments that have been identified, growth has been extracted from the NRTM. This approach is considered to be reasonable as it is underpinned by the National Trip End Model (NTEM) which informs TEMPro growth, as well as a full variable demand model, accounting for changing economic conditions and competing transport modes. Growth in the NRTM is controlled to NTEM at district level (as per TAG guidance) however individual developments are explicitly accounted for. This means that local trip end growth is calculated in a detailed way.

7.4 Junction Capacity Assessments

This section presents the junction modelling outputs for each assessed junction. The following non-signalised junctions have been developed using the ARCADY module of the Junctions 9 junction modelling software:

- New Eston Road roundabout;
- A66 / Tees Dock Road / A1053 roundabout; and
- A66 / Middlesbrough Road / Old Station Road roundabout.

The remaining junctions have been developed using the LinSig signalised junction modelling software:

- A66 / Eston Road / Church Lane signalised junction;
- A66 / Normanby Road signalised junction;
- A1053 / A1085 Trunk Road signalised roundabout; and
- A174 / A1053 Greystone Road roundabout.

This section summarises the modelling outputs for each junction. The detailed modelling results for each junction are included in **Appendix F**.

7.4.1 New Eston Road Roundabout

Table 9 and **Table 10** below show the ARCADY model results for the new Eston Road roundabout.

Table 9: New Eston Road roundabout – '2033 Base' scenario

Arm	AM peak hour			PM peak hour		
	RFC	Max Queue (PCU)	Delay (s)	RFC	Max Queue (PCU)	Delay (s)
North Link	0	0	0	0	0	0
East Link	0	0	0	0	0	0
Eston Road	0.28	1	4.99	0.23	1	4.69
Middlesbrough Road East	0.16	1	4.31	0.34	1	5.48

Table 10: New Eston Road roundabout – '2033 Base + Development' scenario

Arm	AM peak hour			PM peak hour		
	RFC	Max Queue (PCU)	Delay (s)	RFC	Max Queue (PCU)	Delay (s)
North Link	0.15	1	5.57	0.18	1	5.67
East Link	0.29	1	5.63	0.41	1	7.68
Eston Road	0.78	4	16.24	0.46	1	6.76
Middlesbrough Road East	0.28	1	6.61	0.41	1	6.78

Based on the ARCADY model outputs, the junction is forecast to operate within capacity for both the '2033 Base' and the '2033 Base + Development' scenario. The highest RFC (0.78) is on the Eston Road arm for the '2033 Base + Development' AM peak scenario, which is below its theoretical capacity (RFC=0.78<1).

7.4.2 A66 / Tees Dock Road / A1053 Roundabout

Table 11, **Table 12** and **Table 13** show the junction modelling results for the A66/Tees Dock Road/A1053 roundabout.

Table 11: A66 / Tees Dock Road / A1053 roundabout– '2033 Base' scenario

Arm	AM peak hour			PM peak hour		
	RFC	Max Queue (PCU)	Delay (s)	RFC	Max Queue (PCU)	Delay (s)
A1053 Tees Dock Road	0.91	10	19.48	0.44	1	2.92
A66	0.58	2	4.15	0.93	13	22.18
Tees Dock Road	0.63	3	7.49	0.79	5	19.97

For the '2033 Base' scenario, in the AM peak hour the ARCADY model results indicate that the A1053 Tees Dock Road of the junction is forecast to approach its theoretical capacity (0.85<RFC=0.91<1). In the PM peak hour, the A66 arm is forecast to approach its theoretical capacity (0.85<RFC=0.93<1).

Table 12: A66 / Tees Dock Road / A1053 roundabout – '2033 Base + Development' scenario

Arm	AM peak hour			PM peak hour		
	RFC	Max Queue (PCU)	Delay (s)	RFC	Max Queue (PCU)	Delay (s)
A1053 Tees Dock Road	1.07	93	128.50	0.50	2	3.34
A66	0.68	3	5.35	1.06	88	111.41
Tees Dock Road	0.69	3	9.79	0.89	9	37.89

The ARCADY model outputs indicate that the junction is forecast to exceed its theoretical capacity on the A1053 Tees Dock Road arm (RFC=1.07>1) in the AM peak hour. In the PM peak hour, the A66 is forecast to exceed its theoretical capacity (RFC=1.06>1), whilst Tees Dock Road is expected to be approaching capacity (0.85<RFC=0.89<1).

Mitigation measures are likely to be required to address the future capacity issues on the A66/Tees Dock Road/A1053 roundabout. Any potential mitigation for the junction will need to be considered and designed with the wider Teesworks Master Plan in mind.

The junction modelling for the '2033 Cumulative Assessment' was undertaken on a four-arm layout, as the Lackenby site is proposed to be accessed from a new arm off this roundabout.

Table 13: A66 / Tees Dock Road / A1053 roundabout – '2033 Cumulative Assessment' scenario

Arm	AM peak hour			PM peak hour		
	RFC	Max Queue (PCU)	Delay (s)	RFC	Max Queue (PCU)	Delay (s)
A1053 Tees Dock Road	1.57	909	1523.68	0.86	7	11.91
A66	1.08	97	142.27	1.30	373	581.03
Tees Dock Road	1.11	71	188.86	1.40	277	1082.60
Lackenby access	0.35	1	7.74	0.53	2	13.26

The ARCADY outputs indicate that the junction is forecast to significantly exceed capacity for the '2033 Cumulative Assessment' scenario. The A66 and Tees Dock Road are forecast to operate above capacity in both the AM and PM peak hour (RFC>1), whilst the A1053 Tees Dock Road is expected to exceed capacity in the AM peak hour (RFC>1) but approach capacity in the PM peak hour (0.85<RFC=0.86<1).

Based on the junction modelling outputs, mitigation measures will be required to mitigate the cumulative development impact on the operation of the junction. A detailed optioneering, modelling and design exercise with phased build-out will need to be undertaken.

As part of this TA, indicative mitigation has been tested, which includes widening of all junction entry arms to accommodate three lanes and widening of the roundabout to accommodate three lanes for circulatory traffic. These indicative measures have been assessed using the ARCADY module of the Junctions 9 software and the modelling results for the '2033 Cumulative Assessment' scenario are shown in **Table 14**.

Table 14: A66 / Tees Dock Road / A1053 roundabout – '2033 Cumulative Assessment' scenario (with indicative mitigation)

Arm	AM peak hour			PM peak hour		
	RFC	Max Queue (PCU)	Delay (s)	RFC	Max Queue (PCU)	Delay (s)
A1053 Tees Dock Road	1.08	139	133.26	0.62	2	3.27
A66	0.80	5	7.26	0.88	8	9.99
Tees Dock Road	0.59	2	5.26	0.81	6	14.32
Lackenby access	0.20	1	3.59	0.49	2	11.13

The modelling outputs for the indicative mitigation scheme show a betterment of the junction operation compared to the existing junction.

It should be stressed that a detailed design exercise will need to be undertaken to establish the type and scale of the mitigation required. As with all junctions that are identified as operating above capacity, the development of mitigation should be considered alongside other measures that will be introduced as part of the emerging Transport Strategy for the wider Teesworks site to encourage sustainable and active travel in line with Regional and National policy to reduce carbon emissions from transport.

7.4.3 A66 / Middlesbrough Road / Old Station Road Roundabout

Table 15, **Table 16** and **Table 17** show the junction modelling results for the A66 / Middlesbrough Road / Old Station Road roundabout.

Table 15: A66 / Middlesbrough Road / Old Station Road roundabout – '2033 Base' scenario

Arm	AM peak hour			PM peak hour		
	RFC	Max Queue (PCU)	Delay (s)	RFC	Max Queue (PCU)	Delay (s)
Middlesbrough Road WB	0.19	1	7.22	0.13	1	3.95
Middlesbrough Road NB	0.29	1	6.33	0.35	1	5.06
A66 EB	0.58	2	3.77	0.72	3	5.34
Old Station Road	0.24	1	4.68	0.43	1	8.17
A66 WB	0.92	12	16.97	0.62	2	3.89

The junction modelling results for the '2033 Base' scenario indicate that all arms of the junction are forecast to operate within capacity, with the A66 westbound arm approaching its theoretical capacity in the AM peak hour (0.85<RFC=0.92<1).

Table 16: A66 / Middlesbrough Road / Old Station Road roundabout – '2033 Base + Development' scenario

Arm	AM peak hour			PM peak hour		
	RFC	Max Queue (PCU)	Delay (s)	RFC	Max Queue (PCU)	Delay (s)
Middlesbrough Road WB	0.22	1	8.33	0.14	1	4.31
Middlesbrough Road NB	0.32	1	7.07	0.38	1	5.67
A66 EB	0.65	3	4.58	0.75	4	5.96
Old Station Road	0.26	1	5.25	0.45	1	8.89
A66 WB	0.97	22	31.27	0.67	3	4.55

The junction is forecast to operate within capacity for the '2033 Base + Development' scenario for both the AM and PM peak hour. The A66 westbound arm of the junction is forecast to continue approaching its theoretical capacity in the AM peak hour (0.85<RFC=0.97<1).

Table 17: A66 / Middlesbrough Road / Old Station Road roundabout – '2033 Cumulative Assessment' scenario

Arm	AM peak hour			PM peak hour		
	RFC	Max Queue (PCU)	Delay (s)	RFC	Max Queue (PCU)	Delay (s)
Middlesbrough Road WB	0.38	1	11.67	0.28	1	9.24
Middlesbrough Road NB	0.58	2	12.71	0.67	2	16.81
A66 EB	1.00	39	56.17	0.84	6	9.41
Old Station Road	0.45	1	9.21	1.21	85	303.28
A66 WB	1.10	142	152.76	0.98	26	38.81

The junction is forecast to operate above capacity for the '2033 Cumulative Assessment' scenario. The A66 eastbound arm of the roundabout is forecast to operate at capacity and the A66 westbound arm to exceed capacity in the AM peak hour (RFC=1 and RFC=1.10>1 respectively). In the PM peak hour, Old Station Road is expected to operate above capacity (RFC=1.21>1) whilst the A66 westbound is forecast to approach capacity (0.85<RFC=0.98<1).

A mitigation scheme is likely to be required for the junction to operate efficiently with the addition of traffic associated with the proposed Teesworks sites and the

committed South Bank site. A detailed optioneering, modelling and design exercise with phased build-out will need to be undertaken.

Potential mitigation for the junction could include a partial signalisation scheme for the A66 (eastbound and westbound approaches) and Middlesbrough Road northbound approach, and layout changes such as formalising the Middlesbrough Road South two-lane entry, lengthening the short lane of the Old Station Road entry arm and providing an additional short entry lane on both A66 entry arms of the junction. Such measures could help with balancing out the queues across the arms of the junction. This mitigation has been reviewed and found to have the potential to reduce queuing on the A66 westbound approach in the AM peak hour and on the Old Station Road approach in the PM peak hour for the '2033 Cumulative Assessment' scenario.

7.4.4 A66 / Eston Road Junction

Table 18, **Table 19** and **Table 20** show the LinSig model results for the A66 / Eston Road signalised junction.

Table 18: A66 / Eston Road junction – '2033 Base' scenario

Arm	AM peak hour			PM peak hour		
	DoS (%)	Mean Max Queue (PCU)	Total Delay (PCUHr)	DoS (%)	Mean Max Queue (PCU)	Total Delay (PCUHr)
JUNCTION PRC (%)	-1.0%			4.7%		
Cycle time	110 Seconds			110 Seconds		
Eston Road, Left/ Ahead	10.2%	1	1	29.6%	2	1
Eston Road, Right	31.3%	3	2	76.4%	7	4
A66 WB, Right	63.7%	4	3	40.8%	3	2
A66 WB, Left/ Ahead	89.6%	29	10	42.9%	8	2
A66 WB, Ahead	89.6%	31	11	40.8%	9	3
Eston Rd, Ahead	6.5%	0	0	7.6%	0	0
Church Lane, Ahead/ Left	90.9%	14	8	80.3%	8.	5
Church Lane, Right	13.2%	2	1	9.9%	1	1
A66 EB, Right	62.6%	4	3	65.8%	4	3
A66 EB, Left/ Ahead	58.8%	12	4	85.9%	26	8
A66 EB, Ahead	52.6%	12	4	82.4%	27	8

Junction modelling results indicate that for the '2033 Base' scenario, the junction is forecast to approach its theoretical capacity in the AM peak hour (PRC<0 and DoS<100%) and to operate within theoretical capacity during the PM peak period (PRC>0).

Table 19: A66 / Eston Road junction – '2033 Base + Development' scenario

	AM peak hour			PM peak hour		
	DoS (%)	Mean Max Queue (PCU)	Total Delay (PCUHr)	DoS (%)	Mean Max Queue (PCU)	Total Delay (PCUHr)
JUNCTION PRC (%)	-23.9%			-11.3%		
Cycle time	110 seconds			110 seconds		
Eston Road, Left/ Ahead	43.2%	3	2	79.1%	10	4
Eston Road, Right	67.2%	7	4	97.6%	17	12
A66 WB, Right	110.3%	38	31	97.0%	13	9
A66 WB, Left/ Ahead	111.1%	94	64	49.2%	10	3
A66 WB, Ahead	111.5%	87	69	46.9%	11	3
Eston Rd, Ahead	8.2%	0	0	9.8%	1	1
Church Lane, Ahead/ Left	111.0%	35	29	66.5%	8	4
Church Lane, Right	13.9%	2	1	7.4%	1	1
A66 EB, Right	26.8%	3	2	49.3%	4	2
A66 EB, Left/ Ahead	75.9%	15	6	100.2%	47	25
A66 EB, Ahead	65.2%	15	5.0	96.5%	38	16.6

The modelling outputs identify that the junction is forecast to exceed theoretical capacity in the AM peak hour for the '2033 Base + Development' scenario (A66 westbound and Church Lane ahead/left turning movements anticipated to be over capacity). In the PM peak hour, the junction is forecast to operate at capacity.

Based on the junction modelling outputs, mitigation measures may be required to mitigate the impact of the proposed development on the operation of the junction. A more detailed review of the traffic signal operations is required in the first instance to see if junction operation can be optimised. Any potential mitigation for the junction will need to be considered and designed with the wider Teesworks Master Plan in mind, and aspirations to encourage travel by alternative modes rather than just providing more capacity on the highway network.

Table 20: A66 / Eston Road junction – '2033 Cumulative Assessment' scenario

	AM peak hour			PM peak hour		
	DoS (%)	Mean Max Queue (PCU)	Total Delay (PCUHr)	DoS (%)	Mean Max Queue (PCU)	Total Delay (PCUHr)
JUNCTION PRC (%)	-36.7%			-23.1%		
Cycle time	110 seconds			110 seconds		
Eston Road, Left/ Ahead	47.0%	3	1.1	80.3%	11	3.6
Eston Road, Right	70.9%	8	3.7	108.5%	28	22.5
A66 WB, Right	117.5%	50	42.2	103.0%	17	12.5

	AM peak hour			PM peak hour		
	DoS (%)	Mean Max Queue (PCU)	Total Delay (PCUHr)	DoS (%)	Mean Max Queue (PCU)	Total Delay (PCUHr)
A66 WB, Left/ Ahead	123.0%	181	120.5	80.1%	22	6.7
A66 WB, Ahead	123.1%	148	127.1	78.9%	23	7.1
Eston Rd, Ahead	8.3%	0	0.0	10.3%	1	0.1
Church Lane, Ahead/ Left	117.1%	44	37.2	73.9%	8	4.1
Church Lane, Right	25.1%	3	1.0	11.8%	1	0.5
A66 EB, Right	28.7%	3	1.3	54.1%	4	2.0
A66 EB, Left/ Ahead	101.7%	51	29.3	110.8%	118	78.8
A66 EB, Ahead	95.9%	34	15.5	107.9%	86	60.6

The LinSig outputs indicate that the junction is forecast to operate significantly above capacity for the '2033 Cumulative Assessment' scenario both in the AM and PM peak hour. More specifically in the AM peak, the A66 westbound arm, the Church Lane ahead and left turning movements and the A66 eastbound left and ahead movements are forecast to operate above capacity (DoS>100%). In the PM peak hour, the Eston Road right movements, the A66 westbound right turning movements, and the A66 eastbound left turning and ahead movements are expected to exceed capacity (DoS>100%).

The results indicate a mitigation scheme may be required for the junction to operate efficiently for the '2033 Cumulative Assessment' scenario. A detailed optioneering, modelling and design exercise with phased build-out will need to be undertaken. As noted above, this mitigation exercise needs to consider other measures that will be introduced as part of the emerging Transport Strategy for the wider Teesworks site.

7.4.5 A66 / Normanby Road Junction

Table 21, **Table 22** and **Table 23** show the LinSig model results for the A66 / Normanby Road signalised junction.

Table 21: A66 / Normanby Road junction – '2033 Base' scenario

	AM peak hour			PM peak hour		
	DoS (%)	Mean Max Queue (PCU)	Total Delay (PCUHr)	DoS (%)	Mean Max Queue (PCU)	Total Delay (PCUHr)
JUNCTION PRC (%)	1.1%			9.4%		
Cycle time	102 seconds			102 seconds		
Normanby Rd SB, Right	82.4%	5	4	73.8%	5	3
Normanby Rd SB, Left Ahead	14.2%	1	1	75.5%	8	6
A66 WB, Right	47.1%	3	2	24.9%	3	1

	AM peak hour			PM peak hour		
	DoS (%)	Mean Max Queue (PCU)	Total Delay (PCUHr)	DoS (%)	Mean Max Queue (PCU)	Total Delay (PCUHr)
A66 WB, Left/ Ahead	89.0%	28	10	70.2%	16	5
A66 WB, Ahead	83.3%	25	8	59.1%	13	4
Normanby Rd NB, Ahead/ Left	79.1%	9	6	61.1%	5	4
Normanby Rd NB, Right	15.5%	1	1	79.5%	5	3
A66 WB	52.3%	23	1	36.1%	11	1
A66 EB, Right	88.5%	8	6	79.5%	9	5
A66 EB, Left/ Ahead	48.2%	10	3	80.6%	20	7
A66 EB, Ahead	50.3%	11	3	82.4%	23	8

The modelling outputs for the '2033 Base' scenario outline that this junction will operate within theoretical capacity during both AM and PM peak hours (PRC>0).

Table 22: A66 / Normanby Road junction – '2033 Base + Development' scenario

	AM peak hour			PM peak hour		
	DoS (%)	Mean Max Queue (PCU)	Total Delay (PCUHr)	DoS (%)	Mean Max Queue (PCU)	Total Delay (PCUHr)
JUNCTION PRC (%)	-7.6%			2.2%		
Cycle time	102 seconds			102 seconds		
Normanby Rd SB, Right	88.9%	6	5	70.9%	5	3
Normanby Rd SB, Left Ahead	16.5%	2	1	77.0%	9	6
A66 WB, Right	47.1%	3	2	26.4%	3	1
A66 WB, Left/ Ahead	96.8%	37	16	78.2%	19	7
A66 WB, Ahead	92.0%	32	12	67.5%	16	5
Normanby Rd NB, Ahead/ Left	75.6%	9	6	57.4%	5	4
Normanby Rd NB, Right	17.4%	2	1	86.0%	6	4
A66 WB	56.5%	27	1	40.3%	13	1
A66 EB, Right	88.5%	8	6	84.5%	10	6
A66 EB, Left/ Ahead	58.6%	13	4	86.4%	23	9
A66 EB, Ahead	60.6%	14	4	88.0%	26	10

The modelling outputs identify that for the '2033 Base + Development' scenario the junction is forecast to experience capacity issues in the AM peak hour (PRC<0 and DoS<100% for all approaches). The junction is forecast to operate within capacity for the PM peak hour (PRC>0).

Table 23: A66 / Normanby Road junction – '2033 Cumulative Assessment' scenario

	AM peak hour			PM peak hour		
	DoS (%)	Mean Max Queue (PCU)	Total Delay (PCUHr)	DoS (%)	Mean Max Queue (PCU)	Total Delay (PCUHr)
JUNCTION PRC (%)	-18.1%			-16.3%		
Cycle time	102 seconds			102 seconds		
Normanby Rd SB, Right	96.4%	8	5.8	78.5%	6	3.3
Normanby Rd SB, Left Ahead	16.5%	2	0.9	80.2%	10	5.9
A66 WB, Right	54.8%	3	1.7	32.1%	3	1.2
A66 WB, Left/ Ahead	106.3%	73	49.8	104.2%	59	37.9
A66 WB, Ahead	104.5%	69	44.0	99.4%	43.4	22.0
Normanby Rd NB, Ahead/ Left	78.6%	10	5.6	61.1%	5	3.6
Normanby Rd NB, Right	24.8%	2	0.9	104.6%	10	8.4
A66 WB	61.9%	31	1.3	58.4%	28	1.1
A66 EB, Right	100.1%	12	8.7	99.7%	16	11.5
A66 EB, Left/ Ahead	82.0%	22	6.9	98.8%	39	19.5
A66 EB, Ahead	83.6%	25	7.7	100.2%	46	24.1

The junction is forecast to exceed its theoretical capacity for the '2033 Cumulative Assessment' scenario in both the AM and PM peak hour (AM peak hour: A66 westbound left turning and ahead movements, and A66 eastbound right turning movements over capacity. PM peak hour: A66 westbound left turning and ahead movements, Normanby Road northbound right turning movements and A66 eastbound ahead movements over capacity).

A mitigation scheme will be required for the junction to operate efficiently for the '2033 Cumulative Assessment' scenario. A detailed optioneering, modelling and design exercise with phased build-out will need to be undertaken.

7.4.6 A1053 / A1085 Trunk Road Roundabout

Table 24, **Table 25** and **Table 26** show the LinSig model results for the A1053 / A1085 Trunk Road signalised roundabout.

Table 24: A1053 / A1085 Trunk Road roundabout – '2033 Base' scenario

	AM peak hour			PM peak hour		
	DoS (%)	Mean Max Queue (PCU)	Total Delay (PCUHr)	DoS (%)	Mean Max Queue (PCU)	Total Delay (PCUHr)
JUNCTION PRC (%)	20.6%			11.0%		
Cycle time	60 seconds			60 seconds		
A1085 Trunk Road NB, Left/ Ahead	28.7%	1	1	29.9%	2	1
A1085 Trunk Road NB, Ahead	37.1%	2	1	25.8%	1	1
A1053 Tees Dock Road, Left	32.1%	4	1	58.3%	8	2
A1053 Tees Dock Road, Ahead	51.3%	7	2	80.5%	15	5
A1085 Trunk Road SB, Left/ Ahead	25.1%	2	1	36.8%	3	2
A1085 Trunk Road SB, Ahead	74.2%	11	4	72.5%	8	4
A1053 Greystone Road, Ahead/ Left	73.4%	11	4	29.4%	3	1
A1053 Greystone Road, Ahead	74.6%	11	4	32.9%	4	2
Wilton site access, Ahead/ Left	9.7%	1	1	12.4%	1	1
Wilton site access, Ahead	31.5%	1	1	55.2%	2	1

The modelling outputs identify that the junction is forecast to operate within its theoretical capacity for the '2033 Base' scenario in both the AM and PM peak hour (PRC>0).

Table 25: A1053 / A1085 Trunk Road roundabout – '2033 Base + Development' scenario

	AM peak hour			PM peak hour		
	DoS (%)	Mean Max Queue (PCU)	Total Delay (PCUHr)	DoS (%)	Mean Max Queue (PCU)	Total Delay (PCUHr)
JUNCTION PRC (%)	7.6%			-1.4%		
Cycle time	60 seconds			60 seconds		
A1085 Trunk Road NB, Left/ Ahead	36.7%	1	1	35.7%	2	1
A1085 Trunk Road NB, Ahead	54.9%	2	1	28.8%	1	1
A1053 Tees Dock Road, Left	40.2%	5	2	65.4%	10	3
A1053 Tees Dock Road, Ahead	60.2%	9	3	90.1%	22	7
A1085 Trunk Road SB, Left/ Ahead	23.6%	2	1	35.1%	3	2
A1085 Trunk Road SB, Ahead	82.2%	14	5	80.7%	10	5

	AM peak hour			PM peak hour		
	DoS (%)	Mean Max Queue (PCU)	Total Delay (PCUHr)	DoS (%)	Mean Max Queue (PCU)	Total Delay (PCUHr)
A1053 Greystone Road, Ahead/ Left	83.0%	14	6	36.3%	4	2
A1053 Greystone Road, Ahead	83.6%	14	6	39.8%	4	2
Wilton site access, Ahead/ Left	15.0%	1	1	15.3%	1	1
Wilton site access, Ahead	49.2%	2	1	68.7%	3	2

For the '2033 Base + Development' scenario, the junction is forecast to operate within capacity during the AM peak hour (PRC>0), however will approach theoretical capacity during the PM peak hour (PRC<0 and DoS<100% on all approaches).

Table 26: A1053 / A1085 Trunk Road roundabout – '2033 Cumulative Assessment' scenario

	AM peak hour			PM peak hour		
	DoS (%)	Mean Max Queue (PCU)	Total Delay (PCUHr)	DoS (%)	Mean Max Queue (PCU)	Total Delay (PCUHr)
JUNCTION PRC (%)	-57.7%			-49.8%		
Cycle time	60 seconds			60 seconds		
A1085 Trunk Road NB, Left/ Ahead	59.0%	3	1.3	60.4%	3	1.2
A1085 Trunk Road NB, Ahead	141.9%	75	62.4	43.5%	2	0.7
A1053 Tees Dock Road, Left	94.9%	24	10.9	106.8%	69	53.1
A1053 Tees Dock Road, Ahead	75.0%	12	3.9	133.3%	235	218.3
A1085 Trunk Road SB, Left/ Ahead	49.0%	4	1.8	109.5%	62	53.4
A1085 Trunk Road SB, Ahead	138.7%	207	194.9	134.8%	159	150.5
A1053 Greystone Road, Ahead/ Left	141.9%	211	201.2	57.2%	6	2.3
A1053 Greystone Road, Ahead	136.3%	212	200.3	59.0%	6	2.6
Wilton site access, Ahead/ Left	23.8%	1	0.3	26.4%	1	0.3
Wilton site access, Ahead	89.8%	5	3.6	130.2%	23	18.5

The junction is expected to operate significantly above its theoretical capacity for the '2033 Cumulative Assessment' scenario in both the AM and PM peak hour (AM peak hour: A1085 Trunk Road northbound and southbound ahead movements and A1053 Greystone Road over capacity. PM peak hour: A1053

Tees Dock Road, A1085 Trunk Road southbound and Wilton access road ahead movements over capacity).

A mitigation scheme may be required for the junction to operate efficiently for the '2033 Cumulative Assessment' scenario. Possible mitigation for the junction could be to extend the short/pocket/flared lanes on approach to the roundabout. A detailed optioneering, modelling and design exercise with phased build-out will need to be undertaken.

7.4.7 A174 / A1053 Greystone Road Roundabout

Table 27, **Table 28** and **Table 29** show the LinSig model results for the A174 / A1053 Greystone Road signalised junction.

Table 27: A174 / A1053 Greystone Road roundabout – '2033 Base' scenario

	AM peak hour			PM peak hour		
	DoS (%)	Mean Max Queue (PCU)	Total Delay (PCUHr)	DoS (%)	Mean Max Queue (PCU)	Total Delay (PCUHr)
JUNCTION PRC (%)	-5.0%			-19.6%		
Cycle time	90 seconds			90 seconds		
High Street, Left/ Ahead	74.8%	5	2.2	32.6%	3	0.5
A1053 Greystone Road, Left	53.6%	6	1.9	125.3%	106	91.7
A1053 Greystone Road, Ahead	46.4%	5	1.7	64.4%	8	2.7
A174 SB, Ahead	66.1%	1	1.0	64.5%	1	0.9
A174 SB, Ahead	70.8%	11	5.3	33.1%	4	2.4
A174 NB, Left/ Ahead	65.3%	13	3.6	78.0%	15	5.5
A174 NB, Ahead	81.0%	13	6.2	103.9%	76	142.0

The junction modelling results outline that the A174 / A1053 Greystone Road roundabout is predicted to approach theoretical capacity within the AM peak hour (PRC=<0 and DoS<100% on all approaches). However, the junction is forecast to operate above capacity during the PM peak hour (A1053 Greystone Road left turning movements and A174 northbound ahead movements over capacity).

We understand that an improvement scheme has been developed by HE for the Greystones Roundabout junction, to address capacity issues currently experienced at the junction. This scheme has not been included in this modelling exercise.

Table 28: A174 / A1053 Greystone Road roundabout – '2033 Base + Development' scenario

	AM peak hour			PM peak hour		
	DoS (%)	Mean Max Queue (PCU)	Total Delay (PCUHr)	DoS (%)	Mean Max Queue (PCU)	Total Delay (PCUHr)
JUNCTION PRC (%)	-4.7%			-58.9%		
Cycle time	90 seconds			90 seconds		
High Street, Left/ Ahead	82.2%	6	4	33.6%	3	1
A1053 Greystone Road, Left	65.0%	8	3	141.8%	178	143
A1053 Greystone Road, Ahead	59.0%	7	3	67.4%	9	4
A174 SB, Ahead	66.1%	1	1	64.5%	1	1
A174 SB, Ahead	75.9%	12	6	70.0%	8	5
A174 NB, Left/ Ahead	72.2%	16	5	78.0%	15	6
A174 NB, Ahead	83.1%	14	7	143.0%	233	214

The modelling outputs identify that the junction is forecast to continue approaching its theoretical capacity for the '2033 Base + Development' AM peak hour scenario. In the PM peak hour, the junction is expected to operate above capacity (A1053 Greystone Road left turning movements and A174 northbound ahead movements operating above capacity).

Mitigation measures to address the traffic impacts associated with the proposed development are likely to be required for this junction. We understand that an improvement scheme has been developed by HE to address capacity issues currently experienced at the junction.

Table 29: A174 / A1053 Greystone Road roundabout – '2033 Cumulative Assessment' scenario

	AM peak hour			PM peak hour		
	DoS (%)	Mean Max Queue (PCU)	Total Delay (PCUHr)	DoS (%)	Mean Max Queue (PCU)	Total Delay (PCUHr)
JUNCTION PRC (%)	-37.1%			-111.9%		
Cycle time	90 seconds			90 seconds		
High Street, Left/ Ahead	122.9%	51	40.0	25.9%	2	0.5
A1053 Greystone Road, Left	76.6%	12	4.1	190.7%	431	366.8
A1053 Greystone Road, Ahead	44.3%	5	2.4	59.6%	7	2.4
A174 SB, Ahead	66.1%	1	1.0	62.6%	1	0.8
A174 SB, Ahead	123.4%	213	188.8	164.9%	125	130.2
A174 NB, Left/ Ahead	106.4%	58	42.2	157.8%	166	155.6
A174 NB, Ahead	106.2%	73	55.6	189.6%	345	330.7

The junction is forecast to operate significantly above capacity for the '2033 Cumulative Assessment' scenario in both the AM and PM peak hour (AM peak hour: High Street, A174 southbound ahead movements and A174 northbound all movements expected to operate above capacity. PM peak hour: A1053 Greystone Road left turning movements, A174 southbound ahead movements and A174 northbound all movements expected to operate above capacity).

As stated above, it is understood that HE is looking at an improvement scheme to assess capacity. The need or otherwise for additional mitigation measures will be discussed with HE during the determination of this outline planning application.

7.4.8 Junction Assessment Summary

The **new Eston Road roundabout** is forecast to operate well within capacity with the addition of the proposed development traffic.

The **A66 / Tees Dock Road junction** is forecast to approach capacity for the '2033 Base' scenario and exceed capacity with the addition of the proposed development. For the '2033 Cumulative Assessment' scenario, the junction becomes a four-arm roundabout to provide access to the Lakenby site and is forecast to operate significantly above capacity. As part of the junction upgrade to accommodate the fourth arm, additional measures are expected to be delivered to mitigate the development and cumulative development impact on the operation of the junction. Indicative mitigation measures, such as widening the roundabout to accommodate three lane entries and circulatory, have been tested and show a betterment in the operation of the junction. A detailed optioneering, modelling and design exercise with phased build-out will need to be undertaken.

The **A66 / Middlesbrough Road / Old Station Road junction** is forecast to approach capacity for the '2033 Base' scenario, continue to approach capacity

with the addition of the proposed development traffic and exceed capacity for the '2033 Cumulative Assessment' scenario. A mitigation scheme is expected to be required to mitigate the cumulative development impact on the junction. Potential mitigation for the junction could include a partial signalisation scheme and layout changes; however, a detailed optioneering, modelling and design exercise with phased build-out will need to be undertaken.

The **A66 / Eston Road junction** approaches capacity for the '2033 Base' scenario, is forecast to exceed capacity with the addition of the proposed development and to operate significantly above capacity for the '2033 Cumulative Assessment' scenario. A review of the traffic signal operation will need to be undertaken to ascertain if there are improvements that could be made with the existing infrastructure. Mitigation measures may still be required but should take account of other measures that will be introduced as part of the emerging Transport Strategy for the wider Teesworks site to encourage sustainable and active travel in line with Regional and National policy to reduce carbon emissions from transport.

The **A66 / Normanby Road junction** is expected to operate within capacity for the '2033 Base' scenario and approach capacity with the addition of the proposed development. The junction is expected to exceed capacity for the '2033 Cumulative Assessment' scenario. The operation of the signals will be reviewed but a detailed optioneering, modelling and design exercise with phased build-out may need to be undertaken for the junction.

The **A1053 / A1085 Trunk Road junction** is expected to operate within capacity for the '2033 Base' scenario, approach capacity in the PM peak hour with the addition of the proposed development and operate significantly above its theoretical capacity for the '2033 Cumulative Assessment' scenario. Possible mitigation for the junction could be to extend the short/pocket/flared lanes on approach to the roundabout. As with the other junctions operating over capacity, a detailed optioneering, modelling and design exercise with phased build-out will need to be undertaken to ascertain if changes to the highway infrastructure are required following the introduction of other transport measures.

The **A174 / A1053 Greystone Road roundabout** is forecast to be approaching capacity for both the '2033 Base' and the '2033 Base + Development' AM peak hour scenarios, and to exceed capacity for both PM peak hour scenarios. The junction is forecast to operate significantly above capacity for the '2033 Cumulative Assessment' scenario in both the AM and PM peak hour. We understand that a HE scheme has been developed to improve the current operation of the junction. An updated modelling exercise will need to be undertaken to assess whether the cumulative development impact can be accommodated at the improved junction, based on the HE scheme.

7.5 Strategic Road Network Impact Assessment

Jacobs have developed a microsimulation model of the A19 and A66 to support their work for the New Tees Crossing scheme (2015 New Tees Crossing AIMSUN Model). Since this is a calibrated and validated model, Jacobs have provided Arup with a copy of the model so that an impact of development trips on

the A19 could be assessed. The New Tees Crossing, which would provide additional capacity on the A19 corridor, could be operational by 2027. However, as a worst-case scenario, the assessment for this development has been undertaken on the 2027 base model, i.e. without the New Tees Crossing in place.

The model reports journey times with and without the development traffic added. The specific routes where journey time results have been extracted from the model for this assessment are shown **Appendix G**.

The results include a 30-minute warm up and 30-minute cool down period for both the AM and PM peak hour, to ensure that a robust assessment for the impact of the Teesworks sites on the strategic road network has been undertaken. Traffic flows for the warm-up and cool-down period have been estimated using the TRICS trip rate profiles for the South Bank development and are shown in **Table 30** and **Table 31**.

Table 30: AM Peak Period Traffic Profile

	% of AM peak hour traffic
07:00-08:00	94%
09:00-10:00	82%

Table 31: PM Peak Period Traffic Profile

	% of PM peak hour traffic
16:00-17:00	94%
18:00-19:00	63%

The change in journey times on the A19 in the AM peak period is shown in **Table 32** for the AM peak period and in **Table 33** for the PM peak period.

Table 32: AM Peak Journey Times from AIMSUN Model - Dorman Point scenario

Time Period	Route	Do Minimum	With Development	Difference
08:00 – 08:15	A19 North - A66 EB	01:53	01:59	00:06
	A19 South - A66 EB	02:36	02:48	00:12
08:15 – 08:30	A19 North - A66 EB	02:30	02:38	00:08
	A19 South - A66 EB	04:23	05:03	00:40
08:30 – 08:45	A19 North - A66 EB	01:59	02:24	00:25
	A19 South - A66 EB	05:04	06:24	01:20
08:45 – 09:00	A19 North - A66 EB	01:34	02:10	00:35
	A19 South - A66 EB	04:11	07:10	02:59
08:00 – 09:00 Average	*A19 North - A66 EB*	*01:59*	*02:18*	*00:19*
	A19 South - A66 EB	*04:04*	*05:21*	*01:18*

The results of the AM peak hour assessment show that the greatest change in journey time is in the 08:45-09:00 period, when the journey time for those

travelling on the A19 South to the A66 eastbound is forecast to increase by 2 minutes and 59 seconds. Across the morning peak hour, the average change in journey time on this section is 1 minute and 18 seconds with the addition of development traffic.

Table 33: PM Peak Journey Times from AIMSUN Model – Dorman point scenario

Time Period	Route	Do Minimum	With Development	Difference
17:00 – 17:15	A66 WB - A19 North	02:36	02:35	-00:01
	A66 WB - A19 South	01:14	01:13	-00:01
17:15 – 17:30	A66 WB - A19 North	02:52	02:51	-00:01
	A66 WB - A19 South	01:14	01:14	00:00
17:30 – 17:45	A66 WB - A19 North	02:12	02:08	-00:04
	A66 WB - A19 South	01:12	01:12	00:00
17:45 – 18:00	A66 WB - A19 North	01:19	01:18	-00:01
	A66 WB - A19 South	01:20	01:17	-00:03
17:00 – 18:00 Average	*A19 North - A66 EB*	*02:15*	*02:13*	*-00:02*
	A19 South - A66 EB	*01:15*	*01:14*	*-00:01*

Due to existing congestion at Newport Road Interchange, it is difficult to assess the impact of the proposed development on the journey times on the A19. This congestion restricts traffic flow on the A66 mainline, and therefore reduces the number of vehicles that can progress towards the A19. Unlike the AM peak, where journey times increase as more traffic is added to the model, the PM 'with development' scenario journey times are similar to those in the base scenario due to this area of congestion restricting onward traffic through the network.

Table 34 and **Table 35** show the change in journey times on the A19 as a result of the cumulative impact of traffic associated with the Teesworks and South Bank sites (in addition to the Dorman Point site traffic), in the AM and PM peak hour respectively, in the AM and PM peak hour respectively.

Table 34: AM Peak Journey Times from AIMSUN Model – Cumulative Assessment scenario

Time Period	Route	Do Minimum	With Cumulative Development	Difference
08:00 – 08:15	A19 North - A66 EB	01:53	02:34	00:41
	A19 South - A66 EB	02:36	04:27	01:51
08:15 – 08:30	A19 North - A66 EB	02:30	04:47	02:17
	A19 South - A66 EB	04:23	08:33	04:10
08:30 – 08:45	A19 North - A66 EB	01:59	06:28	04:29
	A19 South - A66 EB	05:04	10:18	05:13
08:45 – 09:00	A19 North - A66 EB	01:34	06:23	04:49
	A19 South - A66 EB	04:11	10:40	06:29

Time Period	Route	Do Minimum	With Cumulative Development	Difference
08:00 – 09:00 Average	*A19 North - A66 EB*	*01:59*	*05:03*	*03:04*
	A19 South - A66 EB	*04:04*	*08:29*	*04:26*

The AM peak hour results for the Cumulative Assessment scenario show that the greatest change in journey time is in the 08:45-09:00 period when the journey time for those travelling on the A19 South to the A66 eastbound is forecast to increase by 6 minutes and 29 seconds. Across the morning peak hour, the average change in journey time on this section is 4 minutes and 26 seconds with the addition of the five Teesworks sites and South Bank site traffic.

Table 35: PM Peak Journey Times from AIMSUN Model – Cumulative Assessment scenario

Time Period	Route	Do Minimum	With Cumulative Development	Difference
17:00 – 17:15	A66 WB - A19 North	02:36	02:29	-00:07
	A66 WB - A19 South	01:14	01:14	00:00
17:15 – 17:30	A66 WB - A19 North	02:52	02:18	-00:34
	A66 WB - A19 South	01:14	01:12	-00:02
17:30 – 17:45	A66 WB - A19 North	02:12	01:31	-00:41
	A66 WB - A19 South	01:12	01:11	-00:01
17:45 – 18:00	A66 WB - A19 North	01:19	01:16	-00:03
	A66 WB - A19 South	01:20	01:12	-00:08
17:00 – 18:00 Average	*A19 North - A66 EB*	*02:15*	*01:53*	*-00:22*
	A19 South - A66 EB	*01:15*	*01:12*	*-00:03*

As for the individual development assessment, the PM peak cannot be adequately assessed due to the existing congestion at Newport Road Interchange, and therefore the resultant journey times are similar to the base.

It should be noted that once the New Tees Crossing is open, traffic conditions will improve on the A19. Vehicles however will still need to use the A66, across Newport Road Interchange, to access the A19 from the east. Therefore, further testing could be undertaken in the Aimsun model, with the New Tees Crossing in place, to understand the betterment gained from the re-routing of development traffic as a result of the new crossing.

7.6 Additional Mitigation

The junction modelling has identified that three junctions are forecast to exceed capacity with the proposed development, and three junctions are expected to approach capacity with the addition of the proposed development traffic. It is also expected that the cumulative impact of the Teesworks and South Bank sites will be significant on all assessed junctions. Section 7.4 provided indicative

suggestions for potential mitigation measures for the assessed junctions, noting that a detailed optioneering, modelling and design exercise with phased build-out will need to be undertaken. However, it should also be noted that sustainable and active travel measures should be implemented, in alignment with the developing Transport Strategy for the site (where possible), to effectively mitigate the impact of the Teesworks sites on the surrounding highway network. STDC and Arup will engage with HE throughout the determination of the outline planning application to discuss these options further.

The Transport Strategy for the wider Teesworks site, currently in development, will set out the vision for the wider site to become an exemplar, world class industrial park that is renowned as a destination for manufacturing excellence. To achieve the vision, the emerging Transport Strategy has agreed eight outcomes with the Transport Steering Group that the Teesworks site should aim to deliver where possible. The outcomes are:

- A range of high-quality transport options, which are all inclusive, accessible, fast, frequent, convenient, affordable, reliable, safe and resilient;
- High quality public transport, walking and cycling routes and connections are prioritised over other transport modes;
- The site should not be dominated by cars and other vehicles or severed from local areas by transport infrastructure;
- Transport connections with local, inter-regional, national and international transport networks for people and goods are seamless and will attract developers / investors to the site;
- Cycling and walking connections to local residential centres are safer, more attractive, widely used and support local town centre regeneration;
- Transport options enable improved individual health and wellbeing and access to jobs;
- Transport options will support the transition to zero carbon and contribute to a high-quality environment that will attract future occupiers; and
- Transport infrastructure can adapt to market demand, new transport technology and market disruptors, attracting developers / investors to the site.

The emerging strategy will develop a delivery plan of interventions to meet the outcomes, which is expected to include, amongst other things, measures such as limiting car parking provision, introducing mobility hubs, providing high quality cycle parking and improving public transport provision. It is expected that the Teesworks sites would also consolidate freight movements; at this stage no consideration has been made of the potential to discount trips due to consolidating servicing and delivery trips. Similarly, there is potential for the quayside to be developed providing the opportunity for freight movement by sea. This would reduce freight movements in and out of the site via the highway network. However, for the purpose of the assessment, it has been assumed that all freight traffic travels by road. As above, discussions will take place with HE to understand the opportunities the emerging Transport Strategy brings to this development site.

8 Travel Plan Framework

A Transport Strategy is currently being developed for the wider Teesworks site, which will include a series of outcomes and measures as agreed with the South Tees Transport Steering Group.

It is expected that a Teesworks site-wide Travel Plan will be implemented based on the core principles outlined in this framework and to meet with the objectives of the emerging Transport Strategy. The site-wide Travel Plan could also be hosted online. An online Interactive Travel Plan would provide interactive maps with sustainable transport routing and timetable information, active travel routes and walking times etc. Such a Travel Plan would make sustainable and active travel information easy to use and update, whilst helping promote the Travel Plan objectives and vision.

This framework identifies a list of measures for the proposed development that could be applied in advance of wider strategy initiatives coming forward, and also outlines how the site will be incorporated into the wider Master Plan in due course.

Details about the Travel Plan management and monitoring processes will be identified as part of the emerging Transport Strategy.

8.1 Travel Plan Measures

8.1.1 Facilitating Public Transport Use

This framework proposes a list of measures to help promote the use of sustainable transport for trips to / from the site including:

- Providing a dedicated bus service for the Teesworks site. This is imperative to establish sustainable travel patterns and ensure the site is fully accessible to those who want to work at Teesworks. Given the size of the site, the majority of end destinations are currently outside a desirable walking distance from a public transport connection. By providing a dedicated service, it will be possible for the route to travel into the site and stop close to building entrances. When initially introduced, it is expected that the service will provide a connection every 15 minutes to/from Middlesbrough and Redcar; from these central locations it will be possible to connect to the wider bus and rail network. In the longer term, it is hoped that the service will become commercially viable and/or one of the existing public bus services will be diverted through the site.
- Briefing staff on sustainable transport provisions to / from the site and providing information in employee starter packs. Personalised help and support will also be provided to individuals requiring further help with travel. Information on the internal public transport provisions within the wider Teesworks site will also be provided, when the Transport Strategy for the wider site is adopted;

- Displaying up to date public transport information, including timetables, maps, fare information and available ticket deals for buses and train services within staff common areas, as well as on the occupier's website; and
- Exploring the opportunities for corporate public transport ticketing, by liaising with transport operators.

8.1.2 Facilitating Walking and Cycling

This section provides a list of physical and promotional measures to enable and encourage walking and cycling to / from the proposed development.

- Providing secure, well located cycle parking spaces on the site in exceedance of local cycle parking requirements. The occupiers will also be encouraged to provide supporting facilities for walking and cycling, such as shower and changing facilities, safe storage / lockers for bicycle gear / shoes / umbrellas etc. The potential for providing pool bikes / cycle hire facilities / cycle hubs across the site will also be explored as part of the emerging Transport Strategy for the wider site;
- Ensuring footway and cycleway connections are provided to connect the development both to other Teesworks developments but also to the external network;
- Briefing staff on walking / cycling opportunities to travel to / from the site and providing information on provisions within the site as well as in the wider area in employee starter packs. Personalised help and support will also be provided to individuals requiring further help with travel;
- Providing information on walking and cycling routes in the vicinity as well as within the site, and on the health benefits of walking and cycling, on noticeboards in staff common areas, as well as on the occupier's website;
- Encouraging those who walk to join a "Walking Buddy" scheme so employees can walk together rather than alone;
- Developing partnerships with local cycle shops to organise Bike Doctor events for the occupier, for employees to bring bicycles in for servicing and minor repairs;
- Enabling efficient cycle purchase by participating in the Cycle to Work scheme;
- Promoting National Travel Awareness Days including Walk to Work Week, World Environment Day, European Mobility Week etc; and
- Working with RCBC and TVCA to promote their travel awareness initiatives and brands such as 'Let's Go Tees Valley', alongside initiatives run by other stakeholders such as Sustrans.

8.1.3 Reducing Car Dependency

In addition to the measures to encourage travel by sustainable modes, it is important that a series of measures to reduce dependency on the private car is also implemented at the proposed development:

- Providing an appropriate number of car parking spaces for the proposed development, in agreement with the wider Transport Strategy, which is currently being developed. The details on car parking provision for the proposed development will be agreed through a reserved matters application;
- Developing and enforcing a car parking management strategy/plan, which is expected to be conditioned, to allow adequate parking for those who need it, whilst encouraging the use of sustainable transport;
- Promoting opportunities for car sharing to employees (e.g. publicising car sharing websites such as liftshare.com) and the benefits of car sharing on building noticeboards and the occupier's website. It should also be ensured that employees are provided with a guaranteed lift home in the event of an emergency;
- Providing dedicated car parking spaces for car sharers;
- Liaising with neighbouring businesses to promote car sharing; and
- Providing information on noticeboards and on the official occupier's website on car club opportunities (or similar) provided at the wider Teleworks site, as and when these come forward.

8.1.4 Managing Delivery and Servicing Trips

- Consolidating servicing, where possible, will be encouraged across the wider Teesworks site. More information on managing servicing and delivery trips to the site will be provided within the emerging Transport Strategy.
- There is potential for the quayside to be developed providing the opportunity for freight movement by sea. This would reduce freight movements in and out of the site via the highway network.

8.1.5 Implementation Timescales

The measures outlined in this section will be implemented as follows:

- **Physical measures**: implemented during construction at the same time as the proposed development, in time for opening;
- **Promotional measures**: implemented prior to occupation during the marketing of the development and staff interviews/induction, and on a continuous basis with specific initiatives on at least an annual frequency; and
- **Other site-wide measures**: This section has referred to some potential measures that will be developed to promote active and sustainable transport and manage vehicular trips, as part of the emerging wider site Transport

Strategy. These measures, among others, will be implemented when the site wide Transport Strategy gets adopted.

8.2 Travel Plan Management, Production and Monitoring

A site-wide Travel Plan Coordinator(s) will be appointed to develop a marketing strategy for the site-wide Travel Plan, ensure and oversee its implementation, as well as monitor and review its effectiveness. More details on the role of the Coordinator(s) will be included within the emerging Transport Strategy and the site-wide Travel Plan. The TP Coordinator(s) will also be responsible for the implementation of the initial Travel Plan measures that have been developed for the proposed development.

If the Travel Plan is hosted online, it would have clear benefits compared to a traditional Travel Plan, such as the following, among others:

- The User Interface can display data in an engaging format and link to other online client resources, making the Travel Plan information easy to use and helping maintain the momentum of the Travel Plan;
- Clear and customisable graphics can provide and combine sustainable and active travel information, recommended routes, walking and journey times, making the information easy to find, customise and use;
- Maintenance of the Interface can be undertaken remotely and therefore the information can be updated more easily than static plans or noticeboards;
- The Interface can provide links to online feedback or travel surveys and present results; and
- Can help incorporate and promote current and future technologies, such as micro mobility services, MaaS platforms etc.

Regular monitoring of the site-wide Travel Plan will be undertaken to review its targets and the effectiveness of its measures, and it will be updated accordingly.

9 Summary and Conclusions

Arup has been commissioned by the South Tees Development Corporation to develop a Transport Assessment in support of a planning application for the development of industrial (B2/B8) land-use at the Dorman Point site on Teesworks.

9.1 Summary of Assessment

The key findings of the Transport Assessment are summarised below:

- Current walking and cycling provisions in the vicinity of the site are limited. All matters are reserved at this stage of planning application, however the layout of the proposed development will provide an internal network of walking and cycling routes, along with cycle parking spaces and associated facilities. The development will also benefit from additional measures to encourage active travel to/from the site, as part of the Transport Strategy for the wider Teesworks site, which is currently in development;
- There are no bus services in the immediate vicinity of the site. It is proposed that a dedicated bus service be provided for the Teesworks site. By providing a dedicated service, it will be possible for the route to travel into the site and stop close to building entrances. Such a service is expected to provide a connection every 15 minutes to/from Middlesbrough and Redcar, when initially introduced. In the longer term, it is hoped that the service will become commercially viable and/or one of the existing public bus services will be diverted through the site. It is therefore expected that the activity generated by the proposed development will have a positive impact on the viability of future sustainable transport networks in the vicinity of the site;
- The A66 / Tees Dock Road / A1053 roundabout, the A66 / Eston Road junction and the A174 / A1053 Greystone Road roundabout are forecast to approach capacity for the '2033 Base' scenario. This is exacerbated by the addition of the proposed development traffic, with the junctions forecast to operate above capacity. The A66 / Old Station Road, A66 / Normanby Road and A1053 / A1085 Trunk Road junctions are forecast to approach capacity with the addition of the proposed development and exceed capacity with the addition of the other Teesworks and South Bank sites;
- It is forecast that the cumulative impact of the five Teesworks sites, plus South Bank development, will have a significant adverse effect on the operation of the junctions on the local highway network. A detailed optioneering, modelling and design exercise, with phased build-out, will need to be undertaken to determine when mitigation measures are required;
- However, the design and implementation of any mitigation scheme for the junctions must take into account active and sustainable infrastructure measures which should be implemented to reduce vehicle trips and ensure that the forecasts of a worst case assessment are not realised. This is in alignment with the developing Transport Strategy for the wider Teesworks site. These measures will help to mitigate, to some extent, the impact of the development

on the highway network. The emerging Transport Strategy measures will aim to promote sustainable transport and active travel patterns to/from the site, and substantially reduce the commuter car mode share. This should therefore reduce the volume of traffic generated by the proposed development; and

- It is expected that a site-wide Travel Plan will be developed for the Teesworks site based on the emerging Transport Strategy. However, if the Dorman Point is developed in advance of the Transport Strategy being adopted, this Transport Assessment identifies a list of initial measures and a Framework for a Travel Plan that could be applied in advance of the wider strategy coming forward, also outlining how the development will be incorporated into the wider Master Plan in due course.

9.2 Conclusions

To conclude, the proposed development is in compliance with local, regional and national policy as it contributes towards the regeneration of the Teesworks site and brings back into use former industrial land-use.

The development is one of several phases of the Master Plan which will be incorporated into the emerging Transport Strategy for the wider Teesworks site (where possible), which will continue to work with stakeholders to minimise the cumulative impact of Teesworks on the highway network. At the outset, the Dorman Point development is committed to providing a bus service to ensure there is an alternative travel choice to the car, for those who live too far away to walk or cycle to the site. The proposed development will also develop a Travel Plan based upon the proposed Framework and/or will be incorporated into an interactive site wide Travel Plan (whichever comes first).

To account for the bus service, the highway impact assessment has assumed only a minor reduction in car mode share and is based on traffic increasing in the forecast future year of 2033. No discount in trip generation has been made to account for trips generated by previous uses, or the likelihood of some efficiencies being achieved in vehicular trips, particularly future goods and delivery trips which are expected to be subject to some extent of consolidation.

This robust assessment approach has identified locations on the highway network where additional capacity is anticipated to be required, and the assessment has indicated what amendments could be implemented to provide that additional capacity. However, the requirement to provide the additional highway capacity needs to be considered alongside the development of the wider site and the implementation of the emerging Transport Strategy, and the impact of national and local government policy initiatives to decarbonise the transport network.

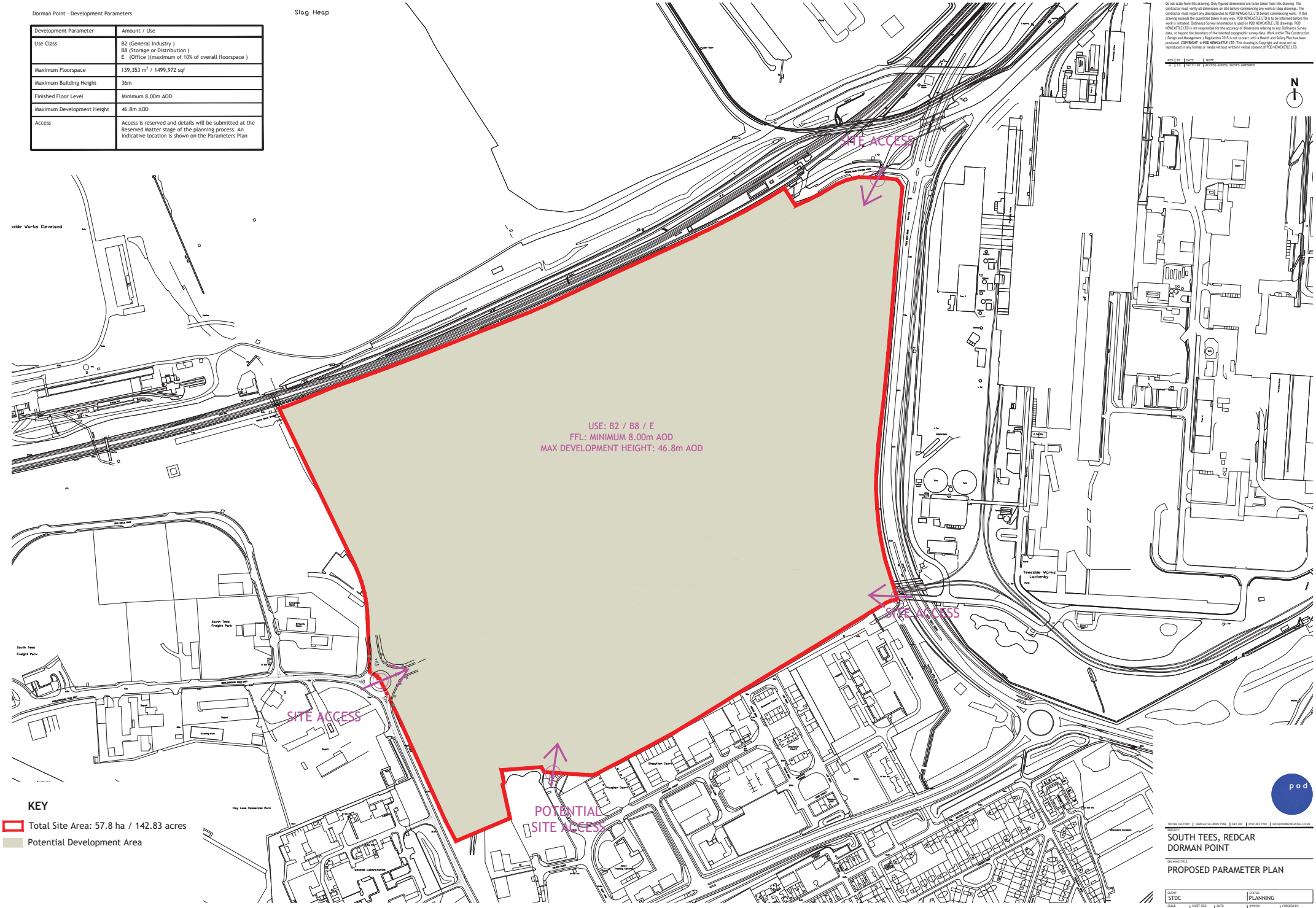
On review, the assessment concludes that subject to agreeing and providing any highway mitigation considered to be essential, there would be no transport related reasons why this development should not be granted planning consent and its commitment to providing sustainable travel choices should have a long-term positive impact on the regeneration of the former industrial site and local area.

Appendix A

Indicative Site Plan

Dorman Point - Development Parameters

Development Parameter	Amount / Use
Use Class	B2 (General Industry) B8 (Storage or Distribution) E (Office)(maximum of 10% of overall floorspace)
Maximum Floorspace	139,353 m² / 1499,972 sqf
Maximum Building Height	36m
Finished Floor Level	Minimum 8.00m AOD
Maximum Development Height	46.8m AOD
Access	Access is reserved and details will be submitted at the Reserved Matter stage of the planning process. An indicative location is shown on the Parameters Plan



REV	BY	DATE	NOTE
A	LC	19/11/20	ACCESS ADDED, NOTES AMENDED

N

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PROJECT:
SOUTH TEES, REDCAR
DORMAN POINT

DRAWING TITLE:
PROPOSED PARAMETER PLAN

CLIENT:	STATUS:
STDC	PLANNING

SCALE:	SHEET SIZE:	DATE:	DRWN BY:	CHECKED BY:
1:2500	A1	11:20	LC	MEC

PROJECT NO:	DRAWING NO:	REVISION:
1401-TM	DP-SD-10.01	A

Appendix B

TA Scoping Report and Consultation Responses

B1 Scoping Report

South Tees Development Corporation

Teesworks

Transport Assessments - Scoping Report

001

Issue | 26 November 2020

Job number 602669-41

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Contents

1 Introduction

1.1 Purpose of the Scoping Report

Arup has been commissioned by the South Tees Development Corporation (STDC) to develop a Transport Assessment (TA) and Framework Travel Plan in support of five separate outline planning applications for development on the South Tees Development Corporation (STDC) site, known as 'Teesworks'.

An outline planning application for each of the five sites will be submitted separately and there will be five TA's produced. However, rather than producing five Scoping Reports, this document provides details of all five sites and outlines the key principles of the assessments.

Arup will also undertake the traffic and transportation assessment of the Environmental Impact Assessment.

The purpose of this scoping report is to agree the methodology and main parameters of the assessment with Redcar and Cleveland Borough Council (RCBC), the local planning and highway authority, and Highways England (HE). A copy will also be sent to the neighbouring highway authority, Middlesbrough Council (MC).

Decision points throughout the document are provided in a text box

1.2 Development Sites

The five development sites are as follows:

Dorman Point

The development site is located in the south-western part of the Teesworks area and the proposed maximum floorspace is just under 140,000sqm. It is largely free of active use, although the former Torpedo Ladle Workshop is present in the southern part of the site. It is proposed that the site will provide general industrial (B2) use and storage and distribution facilities (B8), with ancillary office accommodation. The development is forecast to employ approximately 1,620 people when operational.

Lackenby

The development site is located in the southern part of the Teesworks area and lies between Dorman Point and the British Steel area. It provides just under 93,000sqm of floorspace and is currently occupied by buildings and structures associated with the former steelmaking facilities. It is proposed that the site will provide general industrial (B2) use and storage and distribution facilities (B8), with ancillary office accommodation. The development is forecast to employ approximately 1,080 people when operational.

The Foundry

The development site, providing a maximum floorspace of 464,515sqm, is located in the northern part of the Teesworks area and is largely vacant industrial land, sparsely occupied by building and structures associated with the former steel making complex. The development proposals for the site are that it will provide general industrial (B2) use and storage and distribution facilities (B8), with ancillary office accommodation. It is forecast that the site could employ approximately 5,401 people when operational.

Long Acres

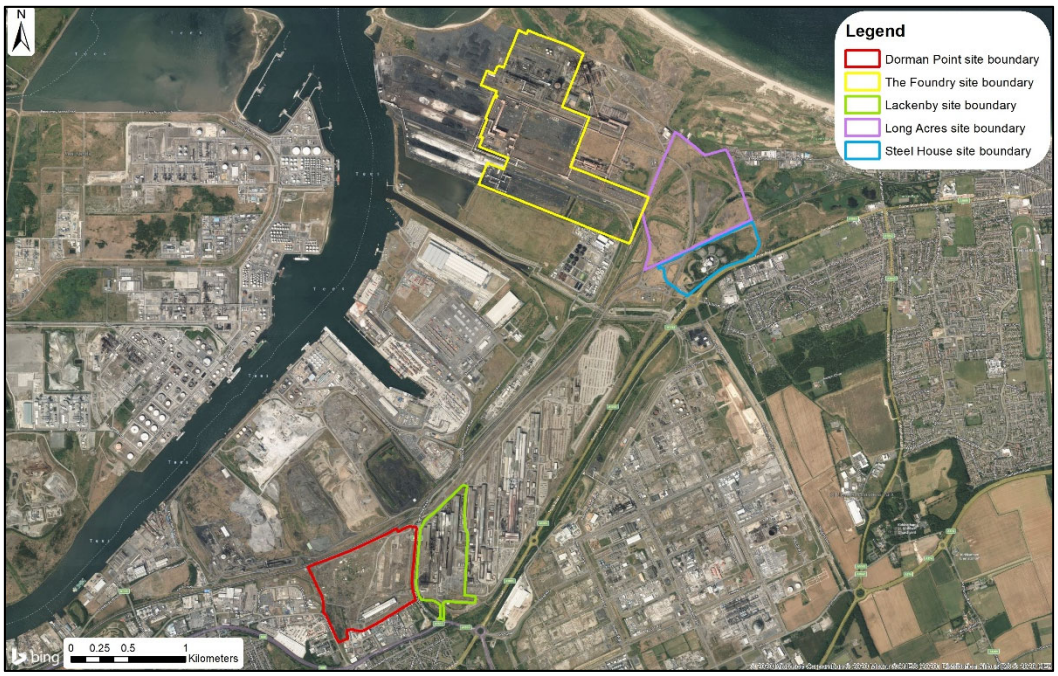
The development site is located between Steel House to the south and the Foundry to the north and provides just under 186,000sqm of floorspace. It is proposed that the site will provide general industrial (B2) use and storage and distribution facilities (B8), with ancillary office accommodation. The development is forecast to employ approximately 2,161 people when operational.

Steel House

The development site is bound to the south by the A1085 Trunk Road and is currently occupied by the Steel House office complex. It is proposed that the floor area, of around 16,000sqm, provides office and incubator space (use class E). It is forecast that the site could employ approximately 1,128 people when operational.

The location of the five sites is shown in **Figure 1**. The construction of the development sites will be phased, and all are expected to be operational by 2033.

Figure 1 Site Locations



2 Planning Policy Review

2.1 Literature Review

The TA for each of the five sites will address the relevant transport related policy documents as follows:

- National Planning Policy Framework (NPPF) 2019;
- Tees Valley Combined Authority Strategic Transport Plan 2020 - 2030;
- Redcar and Cleveland Local Plan 2018;
- Redcar and Cleveland Local Transport Plan 2011-2021;
- South Tees Regeneration Masterplan 2019; and
- South Tees Area Supplementary Planning Document (SPD) 2018.

It is proposed that the development considers relevant transport policies from the policy and guidance documents listed above. RCBC to advise if any other documents should be considered.

3 Baseline Conditions

The scope of each TA will include a full audit of available transport modes following the methodology outlined in this section.

3.1 Site Description and Location

This section of each TA will provide a high-level description of the characteristics of the site and the surrounding area.

3.2 Sustainable Transport Networks

A desktop audit of existing facilities and routes will be provided in this section of the TA. Information such as bus and rail routes, destinations and example journey times will be provided. For scheduled services, information such as frequencies and service times will be included.

3.3 Highway Network

This section of each TA will provide an overview of the main local roads and Strategic Road Network connecting the site to the wider area.

Due to current circumstances with the Covid 19 pandemic and lockdown measures, it is not possible for traffic surveys to be undertaken to inform the baseline condition assessment. To establish the baseline traffic flows, the following data sources have been utilised:

- Traffic data from HE North Regional Transport Model (NRTM);
- Traffic data from the Tees Valley Combined Authority (TVCA) Tees Valley Cube Model (TVM);
- Department for Transport traffic counts available online;
- WebTRIS (HE) online data;
- Traffic surveys collected on behalf of Capita in 2019 to construct a VISSIM model of the area for RCBC – permission to obtain a copy of these surveys was granted by RCBC, Capita and NETDC Ltd; and
- Survey data publicly available online from other local developments, including the planning application for the York Potash development (application number R/2013/0669/OOM).

Peak hour data from the two traffic models (NRTM and TVM) was input into two separate traffic flow diagrams for the study area. On both diagrams, any observed data was added above the links to enable a comparison to be made and determine which data source provided the most comparable base. The NRTM was found to be a comparable match against the baseline flows, and therefore the NRTM flows were predominantly used to inform the baseline, except for where observed data was available. All data has been adjusted to 2020 and 2033 (for operational year assessment) using NRTM growth.

The methodology described above was also used on application number R/2020/0357/OOM for development on the South Industrial Zone of the Teesworks site (referred to as 'South Bank').

3.4 Road Safety Analysis

To inform road safety considerations associated with the development proposals, a high-level review of five years' worth of accident data on the roads within the vicinity of each site will be undertaken.

Should any common factors pertaining to road traffic accidents be identified, suitable mitigation features may be considered as part of the development proposal.

This section seeks agreement that:

- The scope of the transport networks audit is acceptable;
- The methodology for establishing baseline traffic flows is acceptable; and
- The scope of the accident appraisal is adequate.

4 Development Proposals

This section of each TA will provide an overview of the proposed development, including details about site accesses and proposed transport provisions for the site.

4.1 Vehicular Access

The TA for each development site will provide details about the site access arrangements. It is anticipated at this stage that the development sites will be accessed as follows:

Dorman Point

The parameter plan shows four indicative access points into the Dorman Point site:

- One via a new roundabout junction on Eston Road, the works for which have planning permission (application number R/2020/0270/FFM);
- One at the north east corner of the site where an existing Teesworks internal road enters the site;
- One at the south east corner where an existing Teesworks internal road enters the site; and
- One potentially to be provided at the south west corner of the site at the Bessemer Gate entrance into the Bolckow Industrial Estate.

For the purpose of the assessment, the main vehicular access will be the new roundabout junction on Eston Road with all trips generated by the site using the roundabout to access the wider highway network.

Lackenby

It is proposed that the main vehicular access into the Lackenby site will be via a new fourth arm provided on the A66/Tees Dock Road roundabout into the site. All development trips will be assigned to this main access for the purpose of junction impact assessments. Access is expected to also be permitted via the internal Teesworks road network that connects to Dorman Point.

Long Acres, Foundary and Steel House

It is proposed that these sites access the public highway network via the Trunk Road Roundabout (also known as Steel House Roundabout).

4.2 Walking and Cycling Facilities

The TA for each of the five sites will provide information about the proposed walking and cycling facilities for each development and how these connect to the external network.

4.3 Public Transport Facilities

Details of existing public transport connections will be provided in each of the TA's.

4.4 Cycle Parking

High quality cycle parking is expected to be provided, in excess of the usual standards, in support of a more sustainable travel policy for the site.

4.5 Car Parking

As all five applications will be in outline, the internal site layouts have not yet been developed, and therefore the level of car parking provision is unknown. A transport strategy for the wider Teesworks site is currently in development but will limit car parking within the site to meet sustainability targets (including RCBC's ambition to be carbon neutral by 2030). It is subsequently anticipated that the internal layout, when developed, will support the strategy and limit car parking as far as reasonably possible.

This section seeks agreement on the transport proposals for the proposed development.

5 Trip Generation

5.1 Person Trips

The approach to trip generation will follow the same methodology as that agreed for the South Bank development (planning application number R/2020/0357/OOM). The methodology applies trip rates from the TRICS database based on employee numbers. TRICS is a recognised database widely used by transport professionals which predicts trip rates of developments based on survey information of comparable sites.

The industrial trip rates used in the South Bank assessment are shown in **Table 1**.

Table 1: Industrial Trip Rates

Trip rates/employee	AM Peak (08:00 – 09:00)			PM Peak (17:00 – 18:00)			Daily (7am – 7pm)		
	In	Out	Total	In	Out	Total	In	Out	Total
Person Trips	0.322	0.089	0.411	0.078	0.314	0.392	2.134	2.121	4.255
LGVs	0.029	0.022	0.051	0.01	0.016	0.026	0.294	0.287	0.581
HGVs	0.19	0.16	0.035	0.014	0.01	0.024	0.218	0.208	0.426

These were identified and agreed as comparable trip rates to apply to large scale industrial sites and will therefore be applied at Long Acres and the Foundry. However, during the consultation process for the South Bank planning application, Middlesbrough Council indicated that the trip rates that were applied on the TeesAMP development (planning application number 18/0308/FUL) should be applied at the Teesworks site. The TeesAMP trip rates are more applicable to smaller sized industrial sites and therefore could be applicable at both Dorman Point and Lackenby. These trip rates are shown in **Table 2** and will be applied at Dorman Point and Lackenby.

Table 2: TeesAMP Industrial Person Trip Rates

Trip rates/employee	AM Peak (08:00 – 09:00)			PM Peak (17:00 – 18:00)			Daily (7am – 7pm)		
	In	Out	Total	In	Out	Total	In	Out	Total
Trip Rates	0.475	0.245	0.720	0.175	0.425	0.60	3.434	3.435	6.869

The Steel House site is proposed for office type use (use class E) and therefore office trip rates have been obtained from TRICS and these are shown in **Table 3**.

Table 3: Office Trip Rates

Trip rates/employee	AM Peak (08:00 – 09:00)			PM Peak (17:00 – 18:00)			Daily (7am – 7pm)		
	In	Out	Total	In	Out	Total	In	Out	Total
Person Trips	0.317	0.023	0.340	0.025	0.317	0.342	1.370	1.311	2.681
LGVs	0.003	0.002	0.005	0	0.001	0.001	0.029	0.029	0.058
HGVs	0.001	0.001	0.002	0	0	0	0.002	0.002	0.004

The trip rate for service and delivery vehicle trips (light goods vehicles and heavy goods vehicles) has been shown to disaggregate the overall person trip rate and determine how many trips are likely to be made by commuters, versus service vehicle trips. No information is provided in the TeesAMP Transport Assessment regarding service vehicle trip rates. It is useful to distinguish service trips, particularly HGVs, to assist assessments into noise and air quality. Therefore, the proportion of LGV and HGV trips from the TRICS analysis will be applied to the trip rates from the TeesAmp assessment to distinguish service vehicle trips.

The resultant person trips for each site, excluding LGVs and HGVs, is summarised in **Table 4**.

Table 4: Person Trips by Site

Trip rates/employee	AM Peak (08:00 – 09:00)			PM Peak (17:00 – 18:00)			Daily (7am – 7pm)		
	In	Out	Total	In	Out	Total	In	Out	Total
Dorman Point	654	226	921	196	633	846	4,228	4,229	8,457
Lackenby	436	151	614	130	422	564	2,819	2,819	5,638
The Foundry	1,480	275	1,755	292	1,555	1,847	8,760	8,782	17,542
Long Acres	592	110	702	117	622	739	3,505	3,514	7,019
Steel House	353	23	376	28	356	385	1,510	1,444	2,954

All sites were previously occupied. However, as the development sites are currently vacant, it is proposed that the trip generation does not take into account previous or permitted uses and therefore the overall trip generation will not be discounted; all trips will be added to the network as new trips.

5.2 Trips by Mode

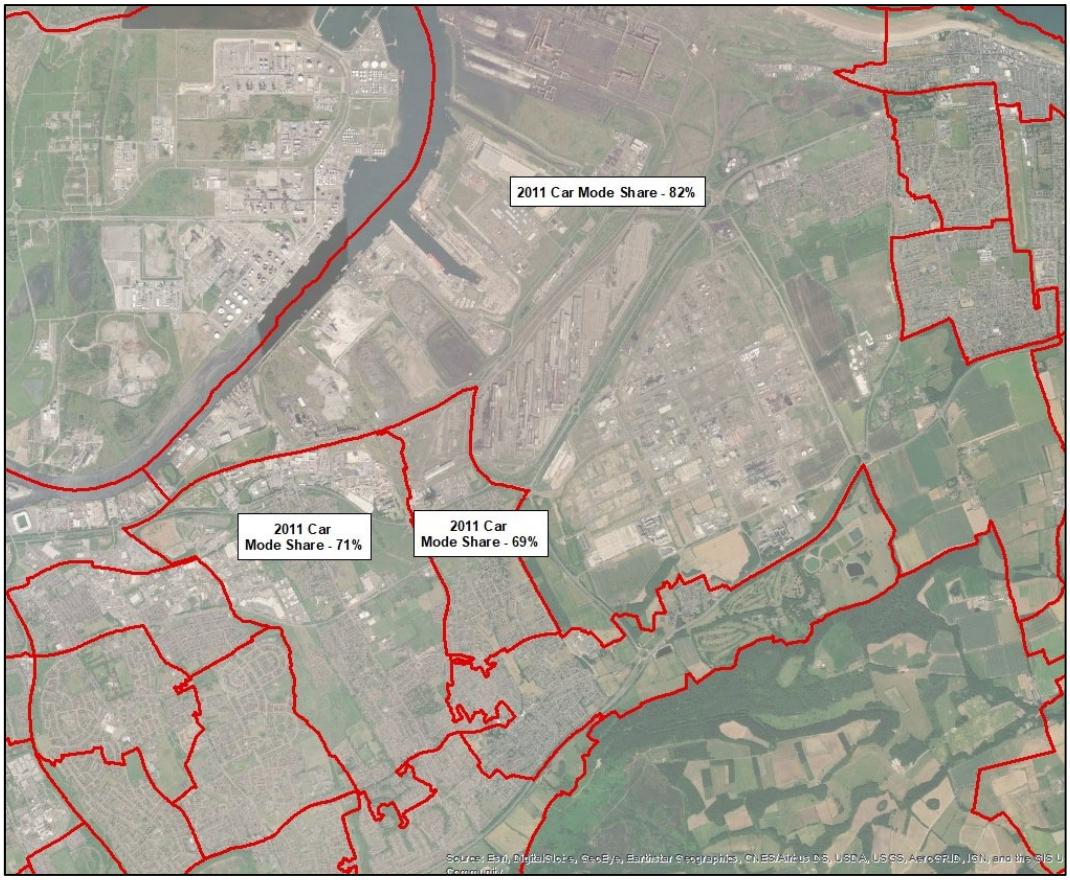
Having established a method for calculating the number of trips, the mode of transport for commuters has been informed by reviewing data from the 2011 UK Census Journey to Work dataset. The Teesworks area is split across two travel to work areas, Census zone E02002517 to the north and E02002523 to the south. Data regarding how people working in these areas travelled to work in 2011 is shown in **Table 5**.

Table 5 2011 Census Method of Journey to Work

Mode	2011 UK Census Northern Zone %	2011 UK Census Southern Zone %
Car Driver	82%	69%
Car Passenger	8%	8%
Bus	3%	5%
Bicycle	3%	2%
Walking	3%	13%
Motorcycle	1%	0%
Taxi	0%	2%

It can be seen that car mode share in 2011 varied between 82% and 69% and the areas this applies to is shown in **Figure 2**. The Dorman Point and Lackenby sites are located in the area where car mode share, in 2011, was 69% and the other sites are located to the north where travel to work, by car, was the higher 82% in 2011.

Figure 2 2011 Census Data – Car Mode Share



The transport strategy for the site will seek to reduce car mode share significantly. However, these earlier developments coming forward may not benefit from the longer-term strategy improvements proposed up to 2042.

It is proposed that measures will be implemented to support sustainable accessibility to the site, including a dedicated bus service that will connect the

local towns of Middlesbrough and Redcar to the development sites. The bus service, funded initially by the Teesworks development, will travel into the site to provide a service that connects directly to each of the five development sites. The provision of a bus service, alongside other travel planning measures, is considered to enable at least a 5% reduction in those travelling to the site by car when these sites are operational. It is therefore assumed that the maximum car mode share for Dorman Point and Lackenby be 64%, with the other sites having a car mode share of 77%. **Table 6** shows how the base and adjusted car mode share equates to commuter car trips in the AM peak hour for each site.

Table 6 Car Trips

	Base Car Mode Share			Adjusted Mode Share (-5%)		
Site	AM In	AM Out	Total	AM In	AM Out	Total
Dorman Point	451	156	635	419 (-33)	145 (-11)	590 (-46)
Lackenby	301	104	424	279 (-22)	97 (-8)	393 (-31)
The Foundry	1,214	226	1,439	1,138 (-76)	212 (-14)	1,350 (-88)
Long Acres	485	90	576	455 (-30)	85 (-5)	540 (-35)
Steel House	289	19	308	272 (-18)	17 (-2)	289 (-19)
Total	2,741	595	3,382	2,562 (-178)	555 (-40)	3,164 (-218)

It can be seen from **Table 6** that the travel planning measures must aim to remove around 200 trips from private cars in the morning peak hour onto more sustainable modes to achieve a 5% car mode share reduction.

5.3 Trip Distribution

Feedback received on the South Bank planning application (application number R/2020/0357/OOM) from HE indicated that consideration should be given to journey to work data from the UK Census (which indicates the origin and destination trips for commuters), as well as existing turning proportions on the highway network, to assign development traffic to the highway network.

For all five sites the trip distribution at the main access will be informed by Census data. It is proposed to distribute traffic on the remainder of the highway network using the turning proportions in the baseline traffic flow diagrams.

Traffic will be distributed as far west to the A19 corridor, south to the A174 corridor and east to the Trunk Road / Kirkleatham Lane junction. The site is bound by the River Tees to the north.

5.4 Cumulative Assessment and Future Growth

A cumulative assessment will be undertaken to consider the cumulative effects of all five developments, plus the South Bank development. This cumulative assessment of all STDC sites will be undertaken for a future year of 2033. Rather than review and extract traffic flows for the committed developments that have been identified, it is proposed to extract growth from Highways England's North Regional Transport Model (NRTM). This approach is considered to be

reasonable as it is underpinned by the National Trip End Model (NTEM) which informs TEMPro growth, as well as a full variable demand model, accounting for changing economic conditions and competing transport modes. Growth in the NRTM is controlled to NTEM at district level (as per TAG guidance) however individual developments are explicitly accounted for. This means that local trip end growth is calculated in a detailed way.

This scoping report seeks agreement on:

- The employee trip rate approach which applies large industrial site trip rates to the Long Acres and Foundry sites, and the TeesAMP trip rates to the Dorman Point and Lackenby sites. Office trip rates will be applied to the Steel House development;
- Applying 2011 Census mode share proportions to determine trips by mode, but reducing car mode by 5% to account for trips transferred onto the proposed bus service and other sustainable travel initiatives. This results in the assumed car mode share at Dorman Point and Lackenby of 64% and 77% at the other three sites;
- The approach to vehicular trip distribution; and
- The approach to use NRTM forecasts to growth traffic to 2033 which will be used to both assess the impact of each development in 2033, but also to assess the cumulative impact of all five sites being operational by 2033. The cumulative assessment will also include trips from the South Bank development.

6 Development Impact Assessment

6.1 Scope of Highway Impact Assessment

6.1.1 Local Junction Assessments

A number of junctions have been identified on the surrounding network where the development trips could have an impact. **Table 7** lists the junctions that will be assessed for each development.

Table 7 Junctions Impact Assessments

Site	Type	Dorman Point	Lackenby	Foundry	Long Acres	Steel House
A66/Old Station Road roundabout	ARCADY	X	X			
A66/Eston Road	LINSIG	X	X			
A66/Normanby Road	LINSIG	X	X			
A66/Tees Dock Road roundabout	ARCADY	X	X			
A66/Trunk Road/A1053 Greystones Road	LINSIG	X	X	X	X	X
Eston Road roundabout	ARCADY	X	X			
Greystones roundabout	LINSIG	X	X	X	X	X
Steel House roundabout	ARCADY			X	X	X
Trunk Road/Kirkleatham Lane	LINSIG			X	X	X

The junction assessments will be undertaken for the following scenarios for both the AM and PM peak hour:

- 2033 Base;
- 2033 Base + 1 development site (x5);
- 2033 Base + all five developments + South Bank development (cumulative assessment).

6.1.2 Strategic Highway Assessment

As requested by HE for the South Bank development, the scope of the traffic assessment will extend to include the A19 corridor. Jacobs has provided a copy of the 2015 New Tees Crossing AIMSUN Model so that the impact of trips from

the Teesworks sites on the A19 can be assessed. The impact of each development site, and the cumulative scenarios, will be undertaken.

6.2 Environmental Impact Assessment

A traffic and transportation assessment will be included in the Environmental Statement (ES) for each development. The Environmental Impact Assessment (EIA) will be carried out in accordance with the EIA Regulations and guidance contained in relevant publications including:

- Environmental Impact Assessment: A Guide to Procedures (Department of the Environment, Transport and the Regions (DETR), 2000); and
- Guidelines for Environmental Impact Assessment (Institute of Environmental Management & Assessment (IEMA), 2004).

In accordance with the IEMA Guidelines, it is proposed that the following conditions on the transport network within the study area be assessed during the operational phase (2033 with development) for each site:

- Severance (change in traffic flows);
- Driver and bus user delay (derived from the junction assessments);
- Pedestrian and cyclist amenity (change in traffic flows on local routes used by pedestrians and cyclists); and
- Accidents and safety (following a review of existing conditions, a judgement will be made as to whether the proposed development will result in any changes to highway safety).

Construction details are not yet finalised and as such, construction traffic will not be included in the scope of the traffic and transportation assessment of the EIA. A framework Construction Environmental Management Plan (CEMP) will be prepared and will form part of the embedded mitigation of the development. The CEMP will identify that a Construction Traffic Management Plan (CTMP) will be implemented either at site level or for each development phase. The CTMP will identify any necessary mitigation to minimise the impact of construction traffic on the transport networks.

This section of the scoping report seeks agreement on:

- The scope of the junction impact assessments for the TA's;
- The junction assessment scenarios; and
- The scope of the EIA assessment.

7 Travel Plan

7.1 Overview

All of the proposed developments are located within the Teesworks site and subsequently will be encompassed into the Transport Strategy and benefit from the measures that will be delivered to serve the wider site. The Transport Strategy is still under development but is expected to include ambitious targets to reduce car use and recommend measures that significantly improve the accessibility of the site by public transport, walking and cycling.

However, as these sites will be developed in advance of the strategy being adopted, a Travel Plan Framework for each site will be outlined in the TA, detailing measures that will be applied in advance of the wider strategy coming forward, but also outlining how the site will be incorporated into the wider masterplan in due course.

7.2 Bus Service

A key recommendation arising from the Transport Strategy is the need to provide a bus service that travels within the site. The scale of the site means that the location of the public bus stops are well outside the generally accepted 400m walking distance between a bus stop and a destination.

It is therefore anticipated that the TA's will recommend that to provide an attractive alternative to private car travel to the site, a bus service will be required. Further details of this will be provided in the Travel Plan Framework.

RCBC to confirm that this application can be incorporated into the wider STDC Transport Strategy and that a Travel Plan Framework, which outlines the measures that occupiers could introduce prior to more wide-ranging measures coming forward, will be sufficient to support each planning application.

8 Conclusions and Next Steps

This Scoping Report has considered the potential impact of five proposed development sites on the Teesworks site. It has outlined what is proposed to be covered by the Transport Assessment and Environmental Statement that will be submitted as part of the planning application for each of the proposed developments.

Arup would be grateful if RCBC, MC and HE could respond in writing to confirm that the methodology proposed in this report is acceptable. Should there be any significant issues with regards to the scope, an online meeting is requested at the earliest convenience.

B2 Highways England Feedback

South Tees Development Corporation: Teesworks – Response to "Transport Assessments – Scoping Report"

PREPARED FOR:	Chris Bell / Sunny Ali (Highways England)
PREPARED BY:	Gavin Nicholson (CH2M)
DATE:	14th December 2020
PROJECT NUMBER:	679066.AA.20.18.12
SITE/ DOCUMENT REF:	DevTV0062/TM001
REVIEWED / APPROVED BY:	Jonathan Parsons (CH2M)

Introduction

CH2M has been commissioned by Highways England to provide a review of the document titled "South Tees Development Corporation: Teesworks, Transport Assessments – Scoping Report" prepared by Arup on behalf of the South Tees Development Corporation and dated 26th November 2020 [the Scoping Report].

The single Scoping Report seeks to set the scope for five separate Transport Assessments [TAs] which will support the five outline planning applications for development within the South Tees Development Corporation [STDC] site.

The STDC site is located on the south bank of the River Tees, between Redcar town centre to the east and Middlesbrough town centre to the west. The site location, indicating each of the five sites that will require a TA, is shown in Figure 1, extracted from the Scoping Report.

The consultation with Highways England at this stage of the process should be welcomed as early engagement enables the assessment to be aligned to Highways England's requirements. A summary and conclusion are provided at the end of this Technical Memorandum [TM].

Figure 1 – Location of application sites

(Extract from the Scoping Report)

According to the Scoping Report, it is expected that the proposed outline planning applications will be for the level of development identified in Table 1.

Table 1 – Application sites information

Application site	Floorspace (sqm)	Land Use	Approximate operational jobs
Dorman Point	140,000	B2 / B8 with ancillary office	1,620
Lackenby	93,000	B2 / B8 with ancillary office	1,080
The Foundry	464,515	B2 / B8 with ancillary office	5,401
Long Acres	186,000	B2 / B8 with ancillary office	2,161
Steel House	16,000	Office and incubator space (use class E)	1,128
Total	**899,515**	**-**	**11,390**

All of the development sites are expected to be operational by 2033.

Background

For background, it is important to note that Highways England has recently been consulted on an application for an initial element of development within the STDC site – the Southern Industrial Zone. This development (located north of the Dorna Point site (indicated by the red boundary in Figure 1 above) was for a plot of approximately 418,000sqm of B2 / B8 floorspace with ancillary office development, expecting to accommodate 3,870 employees. Highways England were able to accept the development following a period of dialogue and provision of appropriate assessment at the SRN.

Technical Memorandum structure

This TM:

- Firstly, considers the technical elements of the Scoping Note in order to enable a response to be made to that; and
- Then considers the fit of these development aspirations with the wider strategy for the site (Local Plan policy, SPD, Masterplan) to ensure that the sites are being brought forward in a manner that fits this wider context.

Scoping Report review

This TM mirrors the structure of the Scoping Report and specifically aims to focus on the elements of the Scoping Report that are of interest to Highways England and seeks to provide a response to all the decision points identified by Arup.

Baseline conditions

Highway network

The Scoping Report sets out that the TAs will provide an overview of the local road and the SRN connecting the site to the wider area. It is identified that due to current (Covid-19) conditions, it is not possible for traffic surveys to be undertaken to inform the baseline assessment. This situation is recognised by CH2M.

As with the Southern Industrial Zone scoping, the elements of the SRN that are required to be assessed should be informed by the trip assignment analysis and with a view to the absolute level of impact (noting that percentage impacts will not be considered as an indicator). Information in relation to the full assignment of trips should be presented early in the process (prior to completion of the TAs), in order for agreement to the study area to be reached and to inform other elements of the TAs. Highways England consider that the starting point to identifying the need for assessment is based on an impact exceeding 30 two-way trips at a junction on the SRN.

Upon definition of the study area (based on the impact analysis), CH2M recommend that a fully defined approach of reflecting typical traffic conditions is established including sourcing all available traffic data (traffic count companies and Highways England).

With regard to growth and future operational scenarios, CH2M recommend that scenarios mirroring those ultimately agreed as part of the Southern Industrial Zone assessment would be reasonable.

Road safety analysis

The Scoping Report proposes that a high-level review of five years' worth of accident data within the vicinity of the site is to be undertaken.

This approach is accepted but the review will also need to cover any SRN geography that is needed to be included in the study area.

Development proposals

Vehicular access points

The Scoping Report identifies that each TA will provide details about the site access arrangements. While these access points will all be located on the local road network and subject to local highway authority review, information should be available to ensure that Highways England can be satisfied that:

- The trip distribution and assignment analyses pay appropriate cognisance to the access points and the routes which vehicles would traverse the networks; and
- Any operational consequences at the local road network that have the potential to cause subsequent operational issues at the SRN are fully detailed.

Car parking

It is identified that, given the five applications will be in outline form, the level of parking provision is unknown at this stage. While the scale of parking is generally a matter for the local highway authority to satisfy itself with, the level of parking has the potential to influence the trip generation and the sustainability credentials of the site, Highways England will need to be subject to consultation on the reserved matters applications that seek to define the level of parking.

Trip generation

Person trips

The Scoping Report identifies that the trip rates are based on:

- For the large scale industrial sites (Long Acres and the Foundry) the application of the trip rates used in the South Industrial Zone assessment;
- For the smaller sized industrial sites (Dorman Point and Lackenby), the application of trip rates from the TeesAMP development (application ref 18/0308/FUL); and
- For the office based site (Steel House), office trip rates from TRICS have been used.

CH2M has undertaken a review of this information and make the following comments (on the basis that the planning application will be specific in relation to the scale and mix of development proposed):

- Long Acres and the Foundry

  It can be confirmed that the trip rates utilised are those agreed as part of the Southern Industrial Zone assessment and these can therefore be accepted.

- Dorman Point and Lackenby

  The use of the TeesAMP trip rates for these elements of the development are accepted.

- Steel House

  The TRICS assessment and parameters used have not been provided to enable validation of the office trip rates and these should be provided to enable these to be agreed.

Trips by mode

Journey to Work data has been used to infer the proportion of highway trips based on Census zones E02002517 and E02002523 for the northern and southern parts of the site respectively. This is considered a reasonable approach by CH2M.

It is identified that it is proposed that measures will be implemented to support sustainable accessibility to the site. On the basis of these measures, it is identified in the Scoping Report that this will enable at least a 5% reduction in travel to the site by car and therefore it is assumed that the number of car trips could be reduced by 5%.

The Scoping Reports does not suggest whether the base car mode share trips or the adjusted (-5%) car trips will be utilised within the operational assessments in the TAs. Should it be proposed that the latter, there will be a requirement for:

1) Clarification in relation to how the measures being proposed transpire into the defined 5% reduction – how has the 5% reduction been quantified;

2) A detailed commitment to the identified initiatives, secured through appropriate planning conditions requiring measures to be in place prior to occupation; and

3) Potential need for consideration of fallback positions within the Travel Plan in the event that the sustainable measure targets have not been achieved.

Vehicular trip distribution

The Scoping Report proposes that vehicular trip distribution is to be based on (i) at the site access, journey to work distribution trips from the Census data and (ii) existing turning proportions on the highway network.

As discussed through the Southern Industrial Zone application, the use of existing turning proportions to distribute development traffic is not considered acceptable. CH2M therefore recommends that the trip distribution analysis is founded on Census data and that the analysis be provided in spreadsheet form to enable checking and validation.

While initial extents of the trip distribution analysis are provided, noting that Highways England consider that the starting point to identifying the need for assessment is based on an impact exceeding 30 two-way trips at a junction, the trip distribution analysis should extend to cover all potential elements fitting this criteria.

Cumulative Assessment and Future Growth

The Scoping Report identifies that a cumulative assessment of all five proposed developments alongside the Southern Industrial Zone will be undertaken. This assessment is welcomed by CH2M.

With a view to consideration of other committed developments and other background growth calculations, CH2M consider that the forecasts utilised as part of the ultimately agreed analysis for the Southern Industrial Zone is utilised rather than create a variant set of analyses that require further development, checking and validation.

The provision of the information in spreadsheet form (including all component elements) will enable a review to be undertaken.

Development Impact Assessment

Scope of Highway Impact Assessment

With regards to the SRN, it is identified in the Scoping Report that elements of the network that will be assessed will mirror those ultimately assessed as part of the agreed Southern Industrial Zone assessments. As identified above, the study area will need to be agreed on the basis of the trip assignments determined from the earlier elements of the analysis.

At this time, it is not possible to validate the areas of the network that require assessment (Highways England consider that the starting point to identifying the need for assessment is based on an impact exceeding 30 two-way trips at a junction) and these should be clarified prior to the undertaking of any operational assessment.

In addition, the assessment of a 2033 future year assessment is welcomed by CH2M, although it will need to be ensured that validated base models are utilised in assessments.

Environmental Impact Assessment

Given the scale of development, there is the potential that there could be significant construction impacts. It may be necessary for the Construction Traffic Management Plan [CTMP] to be conditioned until a clear view on construction impacts (construction trip impacts and potential abnormal loads) is known.

Travel Plan

The Scoping Report outlines that a Travel Plan framework for each site will be prepared. Whilst it would have been welcomed for the transport strategy for the wider STDC site to have set the strategic sustainable transport framework for the site, in terms of the Travel Plans, as discussed earlier, it will need to be considered that:

1) Clarification in relation to how the measures being proposed transpire into the defined 5% reduction – how has the 5% reduction been quantified;
2) A detailed commitment to the identified initiatives, secured through appropriate planning conditions requiring measures to be in place prior to occupation; and
3) Potential need for consideration of fallback positions within the Travel Plan in the event that the sustainable measure targets have not been achieved.

CH2M would welcome these points being considered as the assessment moves forward.

Fit of sites with wider strategies

The site forms parts of the wider STDC site. Whilst reference to the STDC Transport Strategy is made, it is fully recognised that these sites are coming forward in advance of the Transport Strategy having been completed:

- The Scoping Report acknowledges:
  - Within section 4.5 (relating to car parking) that *"A transport strategy for the wider Teesworks site is currently in development but will limit car parking within the site to meet sustainability targets) … It is subsequently anticipated that the internal layout, when developed, will support the strategy and limit car parking as far as reasonably possible."*
  - Within section 5.2 (relating to trips by mode) that *"The transport strategy for the site will seek to reduce car mode share significantly. However, these earlier developments coming forward may not benefit from the longer-term strategy improvements proposed up to 2042."*
- As part of discussions relating to the Southern Industrial Zone site, Arup identified *"The transport strategy for the wider STDC site will be looking at a longer-term horizon in terms of future year assessments. The impact of the wider STDC site up to a final year scenario, expected to be circa 2040, will be assessed by undertaking strategic modelling of the surrounding highway network."*

Bringing such a scale of site forward in advance of a fully defined Transport Strategy is considered by CH2M to be somewhat of a concern to Highways England as this restricts the ability to bring them forward in a strategically-planned manner.

Rewinding a little back to the Local Plan, the Supplementary Planning Document [SPD], the site Masterplan and the Transport Strategy, the following summary is provided with a view to the current position:

Redcar and Cleveland Local Plan (Adopted May 2018)

Local Plan provisions

In relation to development:

- Policy LS4 (South Tees Spatial Strategy) (which includes the STDC) identifies that Redcar and Cleveland Council [the Council] will:
  - (p) "support improvements to the strategic and local road network to support economic growth"

  - Para 3.27 identifies that a Master Plan is being prepared and this will help guide development of this area, including infrastructure improvements.

- Policy ED6 (Promoting Economic Growth) identifies that:
  - Land and buildings within existing industrial estates and business parks, as shown on the policies map, will continue to be developed and safeguarded for employment uses."
  - Specialist uses, such as heavy processing industries and port logistics, will be focussed in the following areas, with 405 hectares of additional land available over the plan period. In these areas proposals falling within Use Classes B1, B2, B8 and suitable employment related sui-generis uses will be supported.
    - ED6.2 Land at South Tees 184 hectares.
    - ED6.4 South Tees Industrial Estates and Business Parks 3.5 hectares

In relation to Infrastructure:

- Para 1.112 identifies that the Council will work with organisations to ensure the infrastructure is delivered when required.
- Para 1.113 identifies the Tees Valley Strategic Infrastructure Plan as setting out the current barriers to growth and priorities for improving infrastructure across Tees Valley.
- Para 1.114 identifies that there are plans to deliver improvements to rail and road infrastructure.
- Para 1.124 identifies that it is important to ensure that the borough's road infrastructure will have the capacity to cope with the expected increase in traffic levels over the life of the Local Plan.
- Para 1.125 states that "Improving transport links will require continued, proactive joint working with …the Highways Agency … with the overall aim of establishing a high quality, safe, secure and reliable network …"

In relation to Transport:

- Para 9.7 identifies the key objectives of the transport strategy component of the Local Plan, including - improve access and connectivity to and from Teesport and the surrounding South Tees area
- Policy TA1 (Transport and New Development) identifies:
  - The Council and its partners will ensure that the transport requirements of new development, commensurate to the scale and type of development, are taken into account…
- Para 9.8 recognises the borough has particular congestion hotspots at the SRN including the A19, A174 and A66 and that new infrastructure may be needed to tackle these congested areas.
- Para 9.17 indicates that the Council follows the requirements of the Guidance on Transport Assessment as the standards for when TS, TA and TPs are required.
- Policy TA2 (Improving Accessibility Within and Beyond the Borough) identifies that the Council will work together with …. Developers and transport providers. This will include:
  - (f) working with Highways England to improve capacity to the A66, A1053 and A174, particularly Greystones roundabout.
  - (k) working with the Tees Valley Combined Authority and Highways England to deliver capacity improvements to the Strategic Road Network including across the sub-region including improvements to the A19, A1085 and A689 to improve access to key development sites, all providing indirect benefits to Redcar and Cleveland;

  - (m) supporting proposals being prepared by Tees Valley Combined Authority and Highways England to deliver improvements to the A66 and A174 road links to the A19 and beyond to the A1/A1(M), providing appropriate access to the strategic highway network from South Tees, to reduce bottlenecks and maintain highway capacity;
  - Where necessary, developers may be required to fund transport improvement schemes through Section 106 agreements where infrastructure provision and capacity would be affected or could constrain new development.

- Para 9.25 states that Redcar and Cleveland benefits from good highways provision catering for heavy vehicles and industrial uses. Linkages between the South Tees, Greater Eston and Redcar and the strategic highway network on the A66, A174 and A19 make the area highly accessible and attractive to industry, business and commuters. It is imperative that this operational benefit over other areas, where capacity is more limited, is not detrimentally affected by any development proposals. It will be essential that improvements and enhancements to the borough's infrastructure continue in order to facilitate local economic development and growth. The Council will continue to work strategically with its neighbouring local authorities and the LEP to maximise on funding opportunities via the Government. The Local Plan is being developed in parallel with the sub-regional Strategic Economic Plan and the Local Growth Fund and is ensuring consistency of objectives. We will also work proactively with the private sector to secure developer contributions to ensure the highway network advantage is maintained and enhanced wherever possible.

The development principles establish that:

- Policy SD4 (General Development Principles) identifies that in assessing suitability, development will be permitted where it:
  - a) meets the requirements of the locational policy and accords with other Local Plan policies and designations
  - g) will have access to adequate infrastructure … to serve the development
  - p) provide suitable and safe vehicular access
- Policy SD5 (Developer Contributions) identifies that the Council may secure developer contributions in order to fund necessary infrastructure.

Highways England position

The joint position statement between Highways England and the Council noted that the development in the Local Plan is unlikely to have a significant impact on the SRN and the package of measures proposed are acceptable to both Highways England and the Council in ensuring that the SRN can support the growth aspirations identified in the Local Plan.

The proposed schemes are promoted through the Local Plan in Policy TA3 and the supporting Infrastructure Delivery Plan, specifically identifying improvements to the A19, A1053, A66 and A174; while recognising that further work is required to specifically identify the phasing of the improvements and the quantum of development that can be accommodated on the SRN prior to the improvements being required.

It was noted that applications for development will be managed on an individual basis.

South Tees Area Supplementary Planning Document [SPD] (Adopted May 2018)

During the consultation on the SPD, Highways England noted general support, but that it should be delivered in accordance with Local Plan Policy TA2 and the Infrastructure Delivery Plan and that there

was a need to ensure that the implications at the SRN are understood and addressed in line with the package of SRN improvements detailed within the Local Plan and Tees Valley AAP.

In summary, the SPD:

- Seeks to guide and inform future planning applications in the area and used as a material consideration in determining planning applications.
- Identifies requirements and provides a broad strategy to deliver supporting infrastructure.
- Commits to the development of a Transport Strategy.
- Seeks the creation of up to 20,000 new jobs.
- Contributions relevant to the nature and scale of the development may be sought, including … in order to fund necessary infrastructure … required as a consequence of development and in accordance with Local Plan policy SD5.
- Seek to improve and enhance the transport infrastructure serving the South Tees Area, as supported by Local Plan Policy LS4.
- All new development proposals shall be in accordance with Local Plan Policies SD4 and TA1 and will be required to have access to adequate infrastructure to meet their transport requirements.
- Other highways infrastructure proposals will be delivered in line with emerging development priorities and funding availability and will be identified through the Transport Strategy for the Area.
- The Council, working in partnership with the STDC, the Tees Valley Combined Authority and other infrastructure providers will actively seek public sector funding to support infrastructure development in line with the SPD. Necessary off-site infrastructure contributions would be sought through Section 106 planning obligations or through the use of 'Grampian' planning conditions. Obligations could include physical works or contributions towards highway measures to mitigate the transport impacts of the development.
- It is intended that the SPD will be reviewed with a view to the preparation of the technical supporting documents (including the transport strategy).

South Tees Regeneration Master Plan (November 2019)

The South Tees Regeneration Masterplan identifies:

- The Tees Valley's key road transport assets include the strategic growth corridor of the A19, the A1(M), linking North and South, and the A66, providing Trans-Pennine East to West connectivity. Few areas of the UK are better served by road services.
- Centrally placed within the Tees Valley, the STDC area has excellent road transport connections. The A66 East-West route commences at the STDC boundary, and the nearby A174 Parkway provides direct access to the A19. Both the A66 and A19 provide direct connectivity to the A1(M) North-South route, which in turn affords access to the M62 strategic Trans-Pennine road corridor.
- To support the proposed major development of South Tees, coupled with the ambitions of TVCA in it's delivery of the Strategic Economic Plan, there will be a need to improve the area's transport connectivity.
- Notwithstanding the STDC's excellent transport connections, there are some wider connectivity barriers, including significant pressure points on the A19 and on the road network accessing the A1(M) and A19.
- The future redevelopment of the STDC area for industrial use will need to consider and address Transport infrastructure requirements.

- Consideration will be given to the impact on the local highway network of the planned major increases in development traffic that will ensue as the proposals for the regeneration programme begin to be realised, so that junction capacities are not adversely impacted and that the current favourable position the South Tees area benefits from is not compromised. The requirements for Transport Appraisals to assess transport impacts, particularly highways, will be given due attention as the development proposals begin to be fleshed-out.
- Next steps: STDC will continue to develop key thematic delivery strategies, as discussed within the South Tees Area SPD, including Transport.

Transport Strategy

Highways England has engaged in the process of the transport strategy development with the last dialogue in April 2020. A Phase 1 Report was produced outlining modelling to be undertaken in Phase 2, but Phase 2 has not been forthcoming to date.

As part of work in reviewing the STDC South Industrial Zone application, it was identified that the next Steering Group meeting would be being arranged in due course.

As part of the initial review of that application scoping, CH2M identified *"The South Tees Regeneration Master Plan states that "consideration will be given to the impact on the local highway network of the planned major increases in development traffic that will ensue as the proposals for the regeneration programme begin to be realised, so that junction capacities are not adversely impacted and the current favourable position the South Tees area benefits from is not compromised. The requirements for Transport Appraisals to assess transport impacts, particularly highways, will be given due attention as the development proposals begin to be fleshed-out".* With this in mind, CH2M recommend that a view of the full site impacts is provided, either in the Scoping Report itself or alongside it, so that a view can be gained.

Wider Strategies - considerations

The Scoping Report acknowledges:

- Within section 4.5 (relating to car parking) that *"A transport strategy for the wider Teesworks site is currently in development but will limit car parking within the site to meet sustainability targets) … It is subsequently anticipated that the internal layout, when developed, will support the strategy and limit car parking as far as reasonably possible."*
- Within section 5.2 (relating to trips by mode) that *"The transport strategy for the site will seek to reduce car mode share significantly. However, these earlier developments coming forward may not benefit from the longer-term strategy improvements proposed up to 2042."*

As part of discussions relating to the Southern Industrial Zone site, Arup identified *"The transport strategy for the wider STDC site will be looking at a longer-term horizon in terms of future year assessments. The impact of the wider STDC site up to a final year scenario, expected to be circa 2040, will be assessed by undertaking strategic modelling of the surrounding highway network."*

With a view to this, the following comments are made:

- The requirement for consideration of the impact on infrastructure, and the need to work with Highways England in relation to the SRN, is clear throughout the documents.
- The very fact that there is a location-specific SPD, a Masterplan, and a requirement for a Transport Strategy, highlights the need for a strategic approach to this site. It is disappointing that this is not flowing through the work undertaken. Dealing with the sites on an application by application basis may lead to a point whereby later applications on the site / other developments in the area may need infrastructure measures to enable them, due to these developments having consumed the available capacity. Similarly, the competitive advantage that the area has with regard to the

strategic connectivity may be diminished if the impacts are not considered in a more strategic manner.

- The SPD has committed to the production of the Transport Strategy, but this is still forthcoming. Priorities and funding availability for highways infrastructure is suggested as being identified through the Transport Strategy.
- The SPD points towards the creation of 20,000 jobs. The five applications under current consideration, along with the Southern Industrial Zone application, amount to an estimated 15,260 jobs. This is a significant (over 75%) proportion of the sites' aspirations that are coming forward in the absence of any form of strategic approach to transport.
- The SPD identifies that it would be reviewed 12-18 months post adoption to take account of the various technical documents including the Transport Strategy. Having been adopted in mid-2018 this review being informed by the Transport Strategy (amongst others) would have been expected to have happened by now.
- The Masterplan identifies that there is a need to improve the area's transport connectivity to support the proposed major development in South Tees.

Summary and Conclusion

The following table lists all the items that were highlighted in the Scoping Report as decision points and Highways England's response.

Table 2 – Scoping Report Decision Points

Scoping Report Section	Decision point (as defined in Scoping Report)	Highways England response	Suggested Action
2. Planning Policy Review	Documents proposed for planning review	Acceptable	No action
3. Baseline Conditions	Scope of transport networks	Comments made	Definition of the study area, based on the SRN criteria, should be provided early in the process to provide clarity of network to be assessed. At this point the establishment of the baseline position at the SRN should be confirmed. Growth and future operational scenarios should match that considered during the review of the Southern Industrial Zone.
	Methodology for establishing baseline traffic flows	Comments made	At the point of having established the study area, the baseline position at the SRN should be confirmed. Growth and future operational scenarios should match that considered during the review of the Southern Industrial Zone.

Scoping Report Section	Decision point (as defined in Scoping Report)	Highways England response	Suggested Action
	Scope of the accident appraisal	Comments made	Needs to cover extents of SRN geography.
4. Development Proposals	Transport Proposals	Comments made	Access points will need to be considered in as far as they influence definition of SRN impacts.
5. Trip Generation	Trip rates	Comments made	Information supporting the derivation of the office trip rates is required in order to verify their use.
	Mode share proportions	Comments made	The use of Census data is supported. Further information in relation to a proposed 5% reduction would be required in order for this to be accepted.
	Proposed trip distribution	Comments made	Census data distribution is accepted, but assessment using existing turning proportions is not accepted. The analysis should extend as far as is required to ensure appropriate consideration of the SRN.
	Approach to growth forecast	Comments made	The approach should mirror that ultimately used in the Southern Industrial Zone assessment.
6. Development Impact Assessment	Scope of highways impact assessment	Comments made	The starting point for identifying the need of assessment at the SRN is based on an impact exceeding 30 two way trips at a junction
	Junction assessment scenarios	Acceptable	
	Scope of the EIA	Acceptable	The CTMP will need to be conditioned until a clear view on construction impacts is known.

In the wider sense, an update on the Transport Strategy and how the intentions of the wider policies are being secured needs to be questioned. While Highways England need to respond to these planning applications on their own merits, the strategies were put in a place for a reason and without them, a significant proportion of this large employment site is likely to come forward in a manner that is not consistent with the ambitions of the wider strategies.

Finally, with regard the applications currently subject to review, CH2M would promote that these are progressed through proactive collaboration between the parties. While noting that all development applications have time pressures with a view to gaining approval, the discussions allied with the Southern Industrial Zone application involved significant pressure to get things resolved. These timescales did not seem to fit with (i) the scale of development being proposed or (ii) the lack of initial

appetite to give appropriate consideration to the SRN. This should be avoided as part of these applications, which themselves are of a significant nature.

B3 Redcar & Cleveland Borough Council Feedback

From:
To:
Subject: [External] RE: TA Scoping Report for Teesworks
Date: 30 November 2020 14:54:27

Thanks for sharing the draft scoping report.
Collective thoughts from Tony & myself are below.
Please do get in touch if anything needed.
Thanks

Comments so far.

- The Local Transport Plan has been partially replaced by the Tees Valley Strategic Transport Plan and will be fully replaced when the Local Implementation Plan is adopted in 2021.
- Focus should also include how pedestrians, cyclists and public transport users will access each site upon first occupation (we recommend footway & cycleway links on both sides of each internal road from 3m shared surfaces on minor roads up to 2m+2m segregated facilities on the major links). But connectivity may not be along the same alignments as general road access & will connect directly to adjacent residential areas &
- early (temporary) internal connectivity between sites before the masterplan infrastructure is in place needs to be resolved before first occupation. The operation of financially viable and attractive bus services for users will be difficult if the sites are effectively served by a series of dead end roads from the A66 or A1085.
- Dorman Point site – access direct to Tees Dock Road should also be considered for this site. Possibly via the Grangetown Station Road corridor?
- Re-opening of Redcar British Steel Railway Station should be programmed at first occupation of Foundry, Long Acres & Steel House sites.
- Charging point infrastructure for electric vehicles needs to be integral to each car park/or distributed through each site. Solar farms using building roofs should be considered.
- Hydrogen filling stations will be initially provided at Eston Road and Teesport by TVCA, but more hydrogen infrastructure may be required.
- A Teesworks wide travel plan should be developed based on the evidence contained in the Transport Study & best practice. This should establish core principles/actions that developers will be required to sign up to with additional measures introduced as required by each business. Appointing a Travel Plan Co-ordinator for the Teesworks site with a delivery budget before first occupation would be preferable.

Transport Strategy Manager
Redcar & Cleveland Borough Council
Redcar & Cleveland House
Kirkleatham Street
Redcar
TS10 1RT

Appendix C

2011 Census Journey to Work Data

C1 Journey to Work Data

C1.1 Introduction

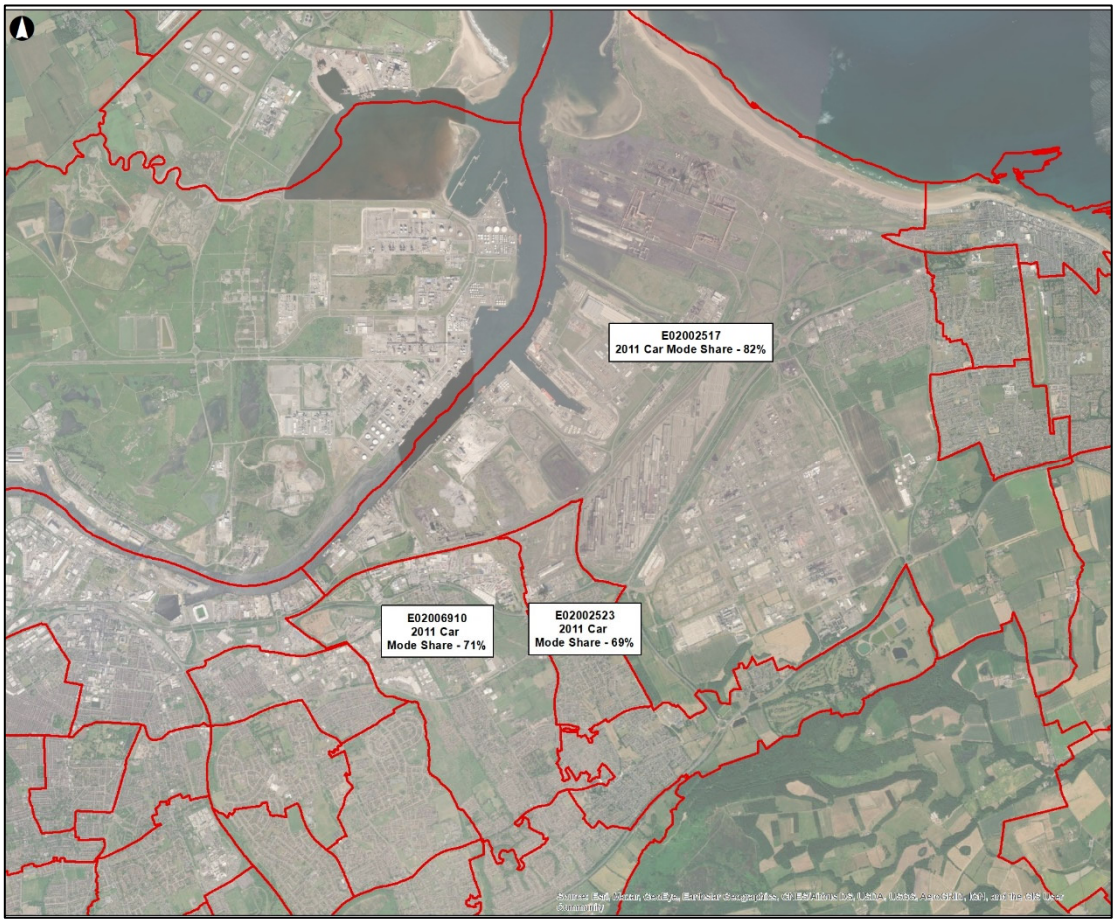
This section provides further details about the 2011 UK Census journey to work data. The data has been used to inform the distribution of development traffic on the highway network.

C1.2 Methodology

Travel to work data from the 2011 Census has been downloaded for those travelling to the area where the site is located (primarily Census Middle Layer Super Output Area (MSOA) E02002517). The travel to work area, and neighbouring areas, is shown in Figure C1. Some of the STDC site falls within the neighbouring MSOA of E02002523.

In 2011 the site was operating as a steel works and whilst noting that the proposed use could alter the trip attraction of the site, the MSOA includes the Wilton International Site and therefore in 2011 it was probable that the area had a relatively wide distribution of employee home locations.

Figure C1: Census Boundaries



Origins with 1% of total trips or more to the study area in 2011 were extracted from the Census data and the most likely main route to/from the site access identified based on directions given in Google Maps. This data is presented in Table C1. The assignment of this traffic on the network is shown in Appendix D.

Table C1: Travel to Work Origins and Assigned Routes

Destination	Origin	Origin Description*	Assigned Route	All Trips	% of Trips
E02002517	E02002518	Redcar Lane / Coast	A66/Trunk Road	557	7%
E02002517	E02002520	Marske	A174 east	540	7%
E02002517	E02002517	Same as Site	NA	349	4%
E02002517	E02002519	South central Redcar	A66/Trunk Road	319	4%
E02002517	E02002515	Redcar town centre	A66/Trunk Road	311	4%
E02002517	E02006910	South Bank	A66/Normanby Road	301	4%
E02002517	E02002525	Lazenby/Lackenby	A174/High Street	289	4%
E02002517	E02002516	North central Redcar	A66/Trunk Road	273	3%
E02002517	E02002526	Skelton	A174 east	253	3%
E02002517	E02002557	Eaglescliffe	A66/Durham Lane	194	2%
E02002517	E02002534	East Guisborough	A174 east	186	2%
E02002517	E02002523	Grangetown	A66/Church Lane	177	2%
E02002517	E02002524	Brotton	A174 east	176	2%
E02002517	E02002529	Eston	A174/High Street	172	2%
E02002517	E02006811	Nunthorpe	A174/A171	171	2%
E02002517	E02002514	Hemlington	A174/A1032/ B1365	159	2%
E02002517	E02002533	Pinchinthorpe	A174/A171	150	2%
E02002517	E02006812	Ormesby	A174/A171	147	2%
E02002517	E02002521	Saltburn	A174 east	142	2%
E02002517	E02002532	West Guisborough	A174/A171	130	2%
E02002517	E02002530	Lingdale/Easington	A174 east	123	2%
E02002517	E02002556	Ingleby Barwick	A174/A19	109	1%
E02002517	E02002502	Cargo Fleet Lane area	A174/A171	98	1%

Destination	Origin	Origin Description*	Assigned Route	All Trips	% of Trips
E02002517	E02002504	Linthorpe	A66/Borough Road	95	1%
E02002517	E02005750	Stokesley	A174/A171	95	1%
E02002517	E02002512	Marton	A174/A172	94	1%
E02002517	E02002558	Yarm	A174/A19	94	1%
E02002517	E02002527	Loftus/Skinningrove	A174 east	90	1%
E02002517	E02002513	Stainton	A19/A174	89	1%
E02002517	E02002501	Grove Hill	A66/Borough Road	83	1%
E02002517	E02002555	Eaglescliffe	A66/Durham Lane	81	1%
E02002517	E02005751	Hutton Rudby	A66/A19	78	1%
E02002517	E02002500	Linthorpe	A66/Borough Road	72	1%
E02002517	E02002496	Central Middlesbrough	A66/Borough Road	69	1%
E02002517	E02002507	Acklam	A174/A1032/ B1365	68	1%
E02002517	E02002498	Central Middlesbrough	A66/Borough Road	64	1%
E02002517	E02002508	Acklam	A174/A1032/ B1365	63	1%
E02002517	E02002499	Berwick Hills	A66/A171	62	1%
E02002517	E02002509	Easterside	A174/A172	62	1%
E02002517	E02002505	Berwick Hills	A66/A171	60	1%
E02002517	E02002497	North Ormesby	A66/Cargo Fleet Lane	58	1%
E02002517	E02002535	Wolviston	A19/A66	57	1%
E02002517	E02002539	West Stockton	A66/Yarm Back Lane	55	1%
E02002517	E02002553	Thornaby	A174/A19	54	1%
E02002517	E02002503	Whinney Banks	A66/A1032	53	1%
E02002517	E02002510	Acklam	A174/A1032/ B1365	53	1%
E02002517	E02002552	Thornaby	A174/A19	52	1%
E02002517	E02002549	West Stockton	A66/A19	49	1%
E02002517	E02002540	Norton	A19/A66	46	1%
E02002517	E02002541	Norton	A19/A66	44	1%
E02002517	E02006909	Hartlepool	A19/A66	44	1%

Destination	Origin	Origin Description*	Assigned Route	All Trips	% of Trips
E02002517	E02002544	Stockton central	A66/A135	43	1%
E02002517	E02002548	Stockton central	A66/A135	43	1%

** 'Origin Description' identified based on nearest residential area / known location. Some zones have the same description as they cover the same broad area.*

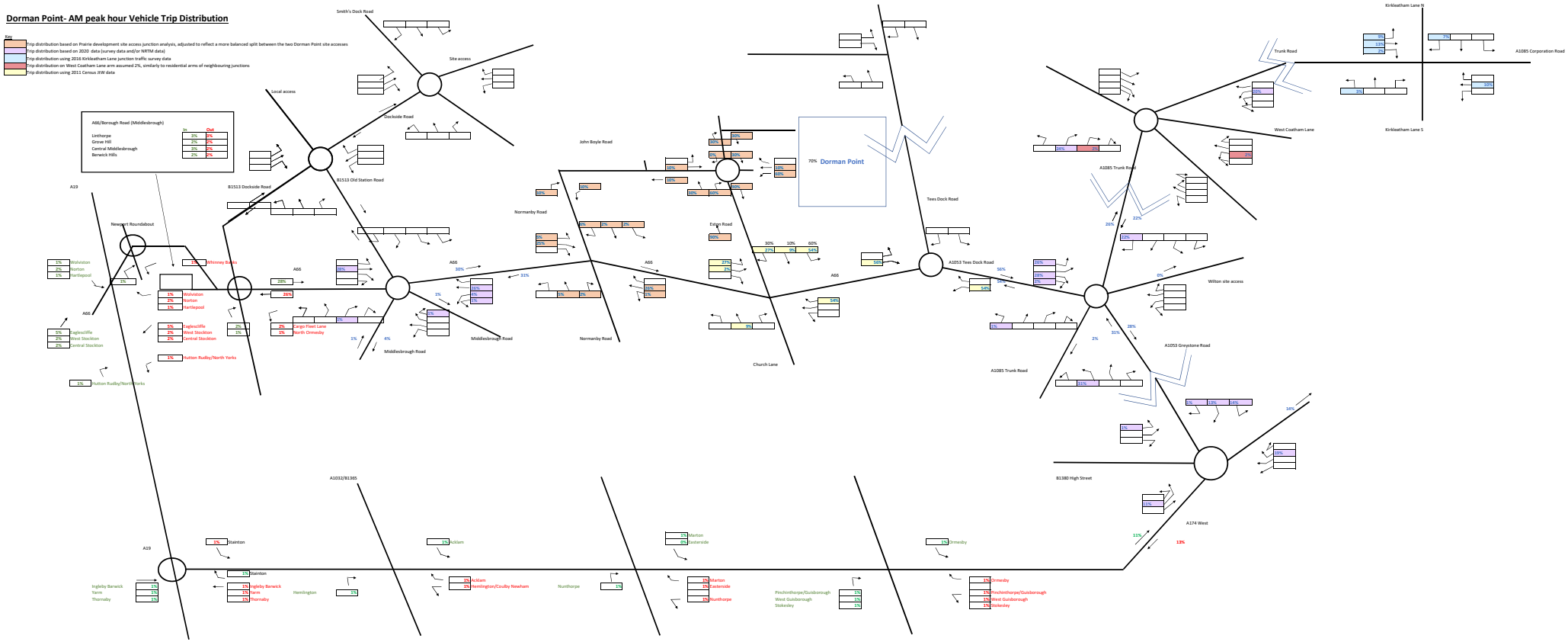
Appendix D

Proposed Development Trip Distribution and Assignment

Dorman Point- AM peak hour Vehicle Trip Distribution

Key

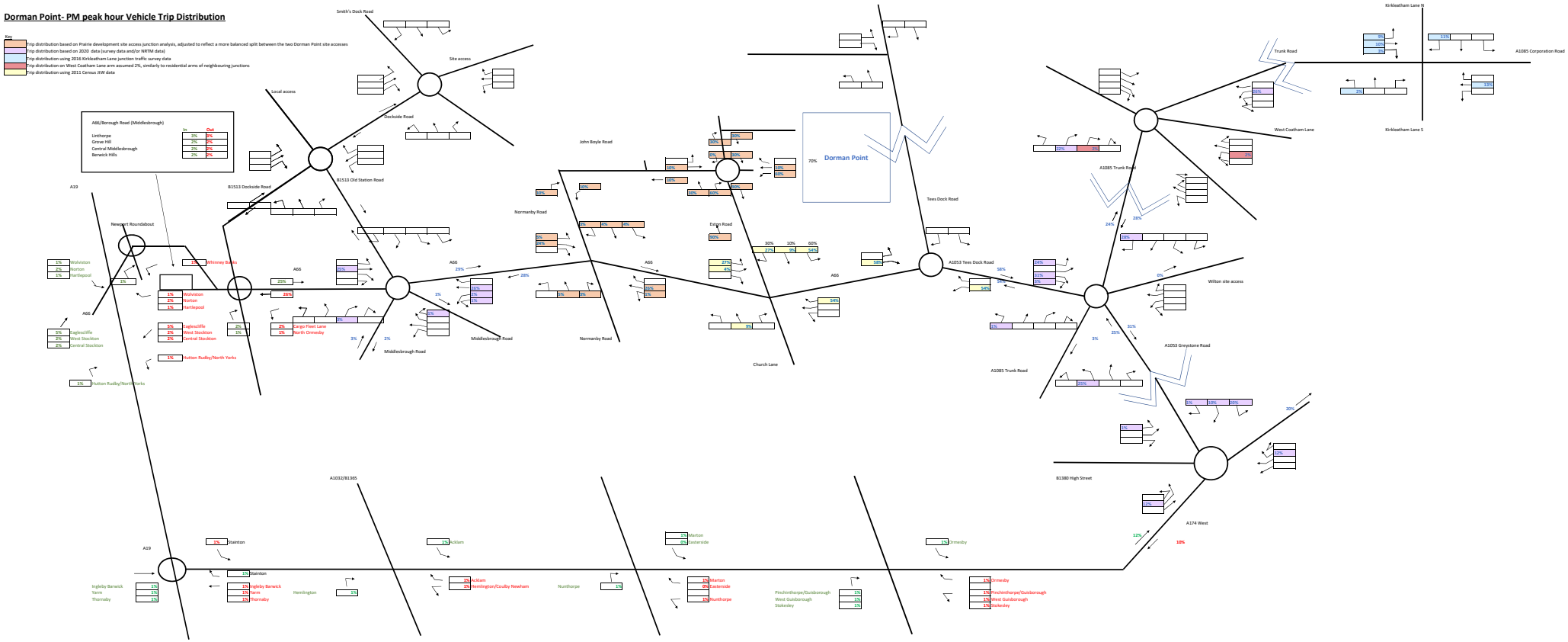
- Trip distribution based on Prairie development site access junction analysis, adjusted to reflect a more balanced split between the two Dorman Point site accesses
- Trip distribution based on 2020 data (survey data and/or NRTM data)
- Trip distribution using 2016 Kirkleatham Lane junction traffic survey data
- Trip distribution on West Coatham Lane arm assumed 2%, similarly to residential arms of neighbouring junctions
- Trip distribution using 2011 Census JtW data



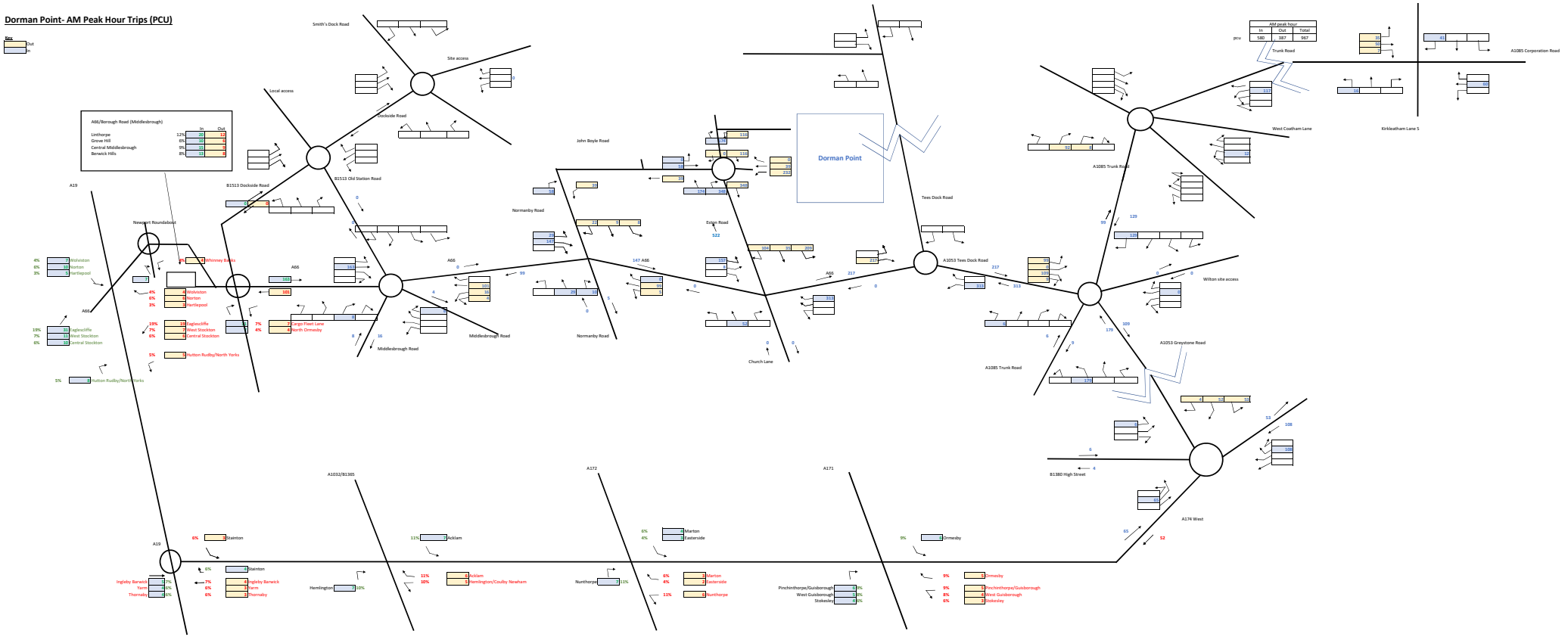
Dorman Point- PM peak hour Vehicle Trip Distribution

Key

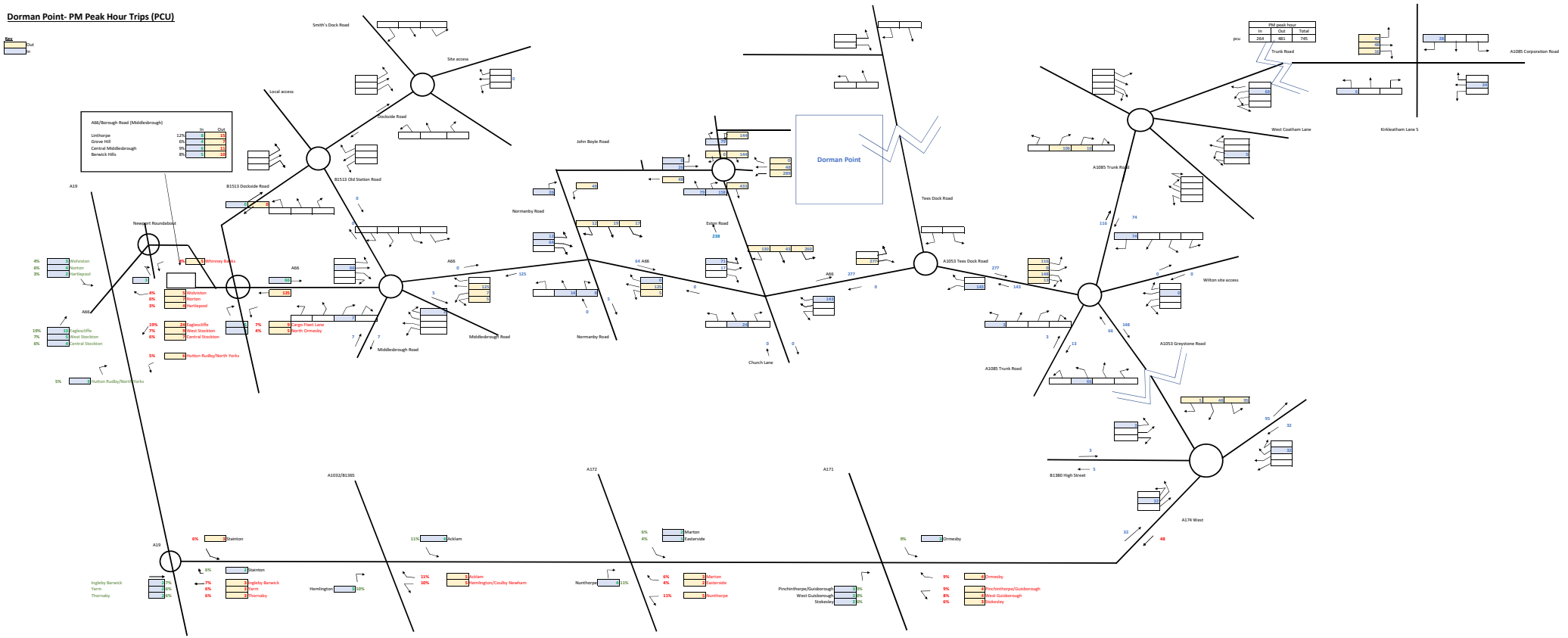
- Trip distribution based on Prairie development site access junction analysis, adjusted to reflect a more balanced split between the two Dorman Point site accesses
- Trip distribution based on 2020 data (survey data and/or NRTM data)
- Trip distribution using 2016 Kirkleatham Lane junction traffic survey data
- Trip distribution on West Coatham Lane arm assumed 2%, similarly to residential arms of neighbouring junctions
- Trip distribution using 2011 Census JtW data



Dorman Point- AM Peak Hour Trips (PCU)



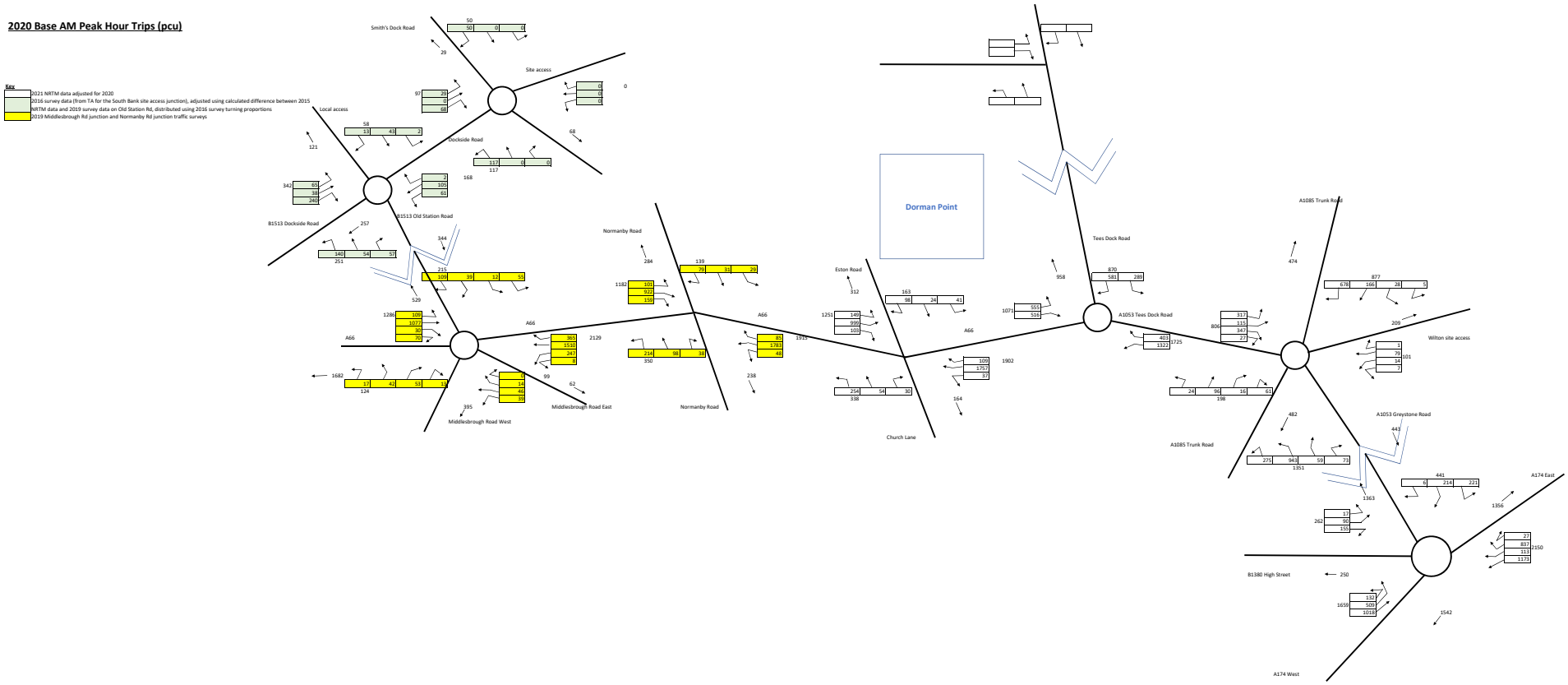
Dorman Point- PM Peak Hour Trips (PCU)



Appendix E

Traffic Flow Diagrams

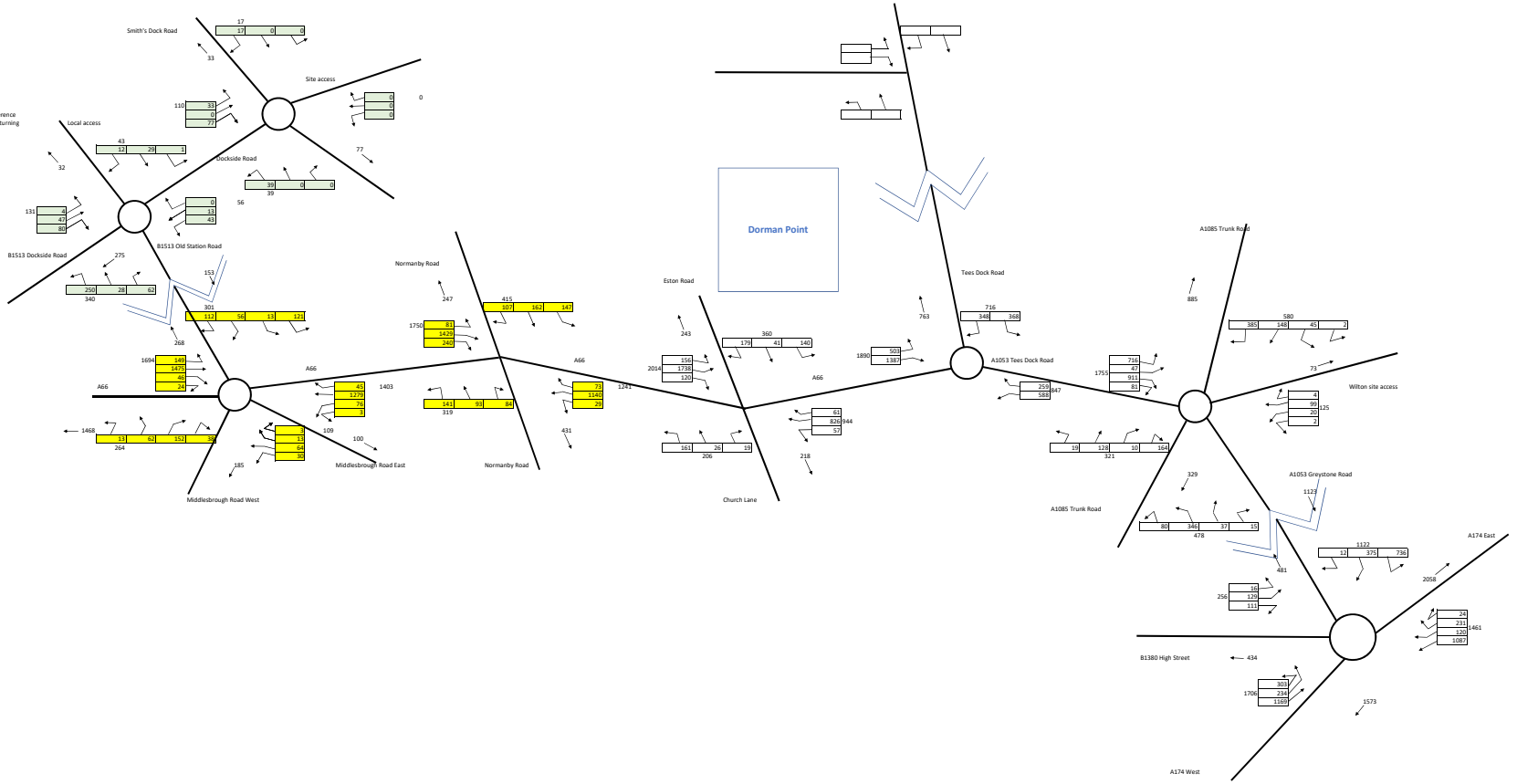
2020 Base AM Peak Hour Trips (pcu)



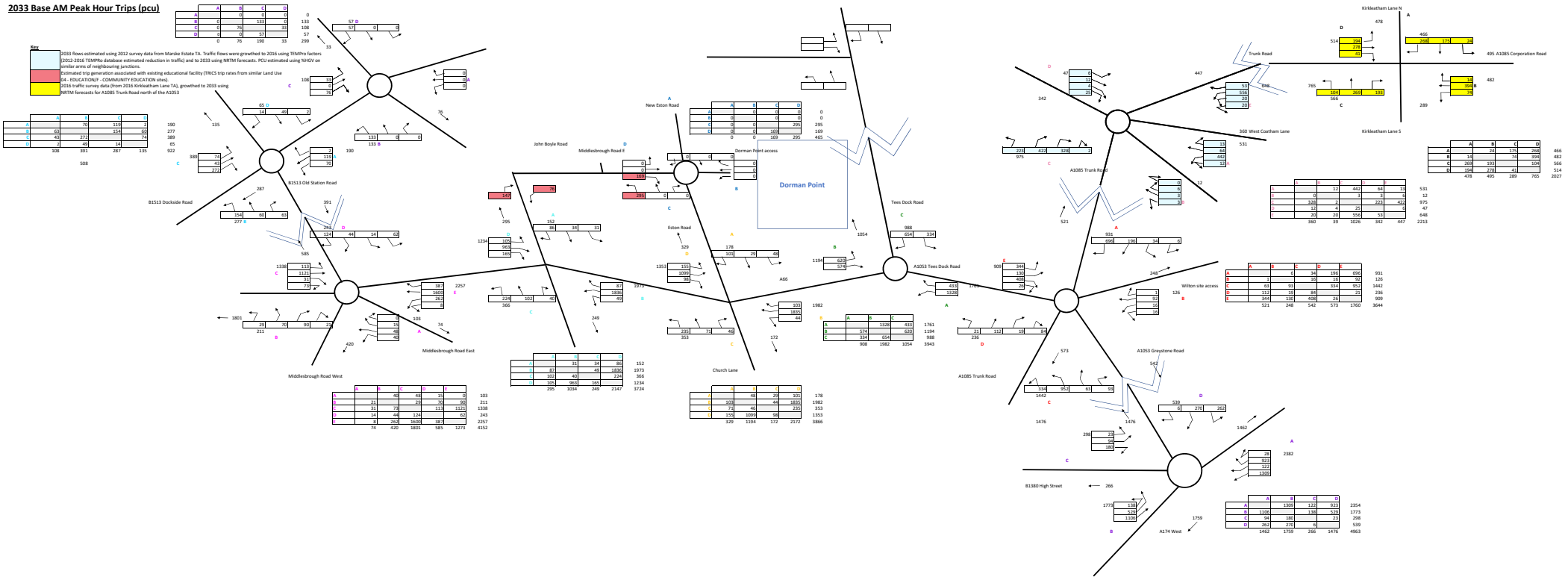
2020 Base PM Peak Hour Trips (pcu)

Key

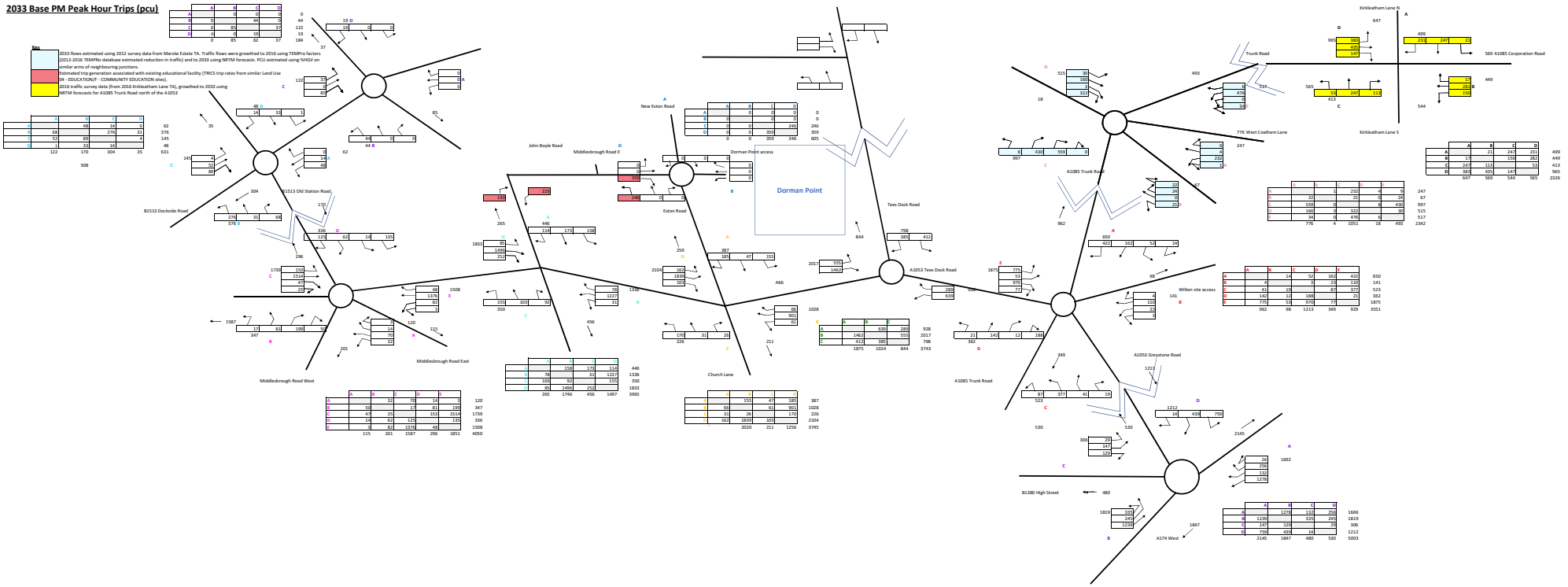
- 2021 NRTM data adjusted for 2020
- 2016 survey data (from TA for the South Bank site access junction), adjusted using calculated difference between 2015 NRTM data and 2019 survey data on Old Station Rd, distributed using 2016 survey turning
- 2019 Middlesbrough Rd junction and Normanby Rd junction traffic surveys



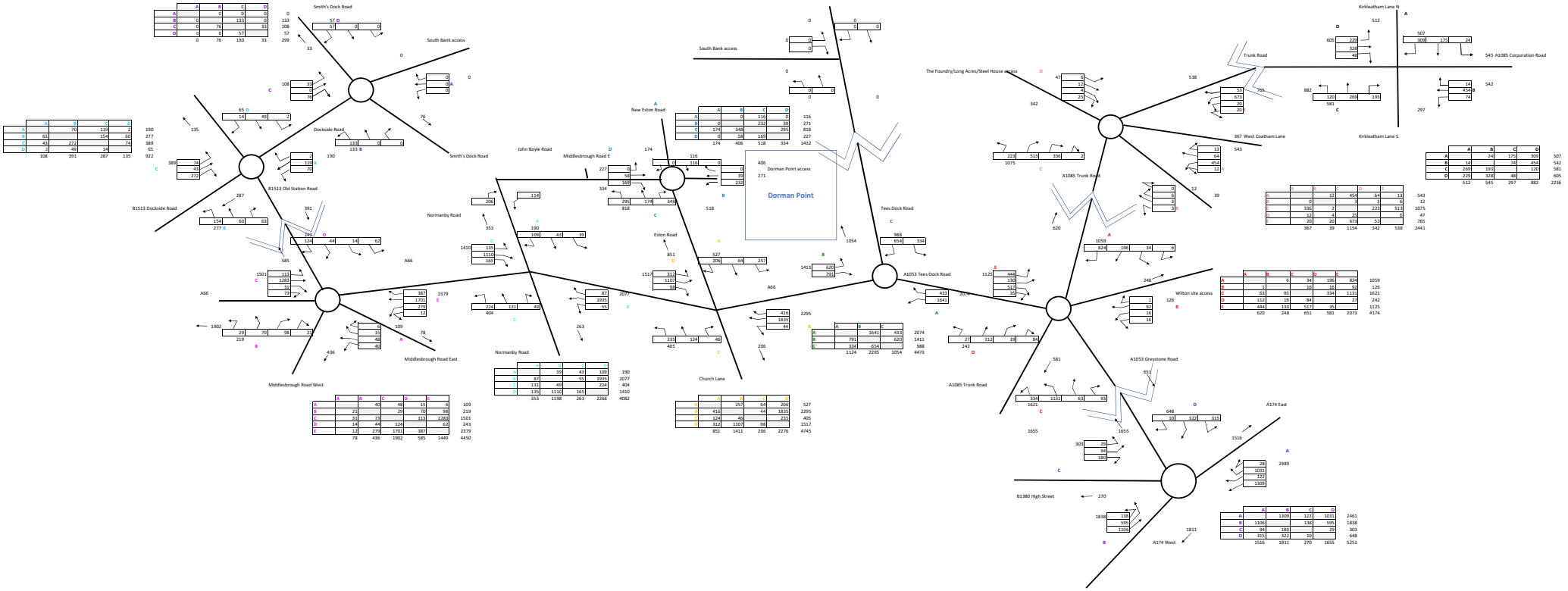
2033 Base AM Peak Hour Trips (pcu)



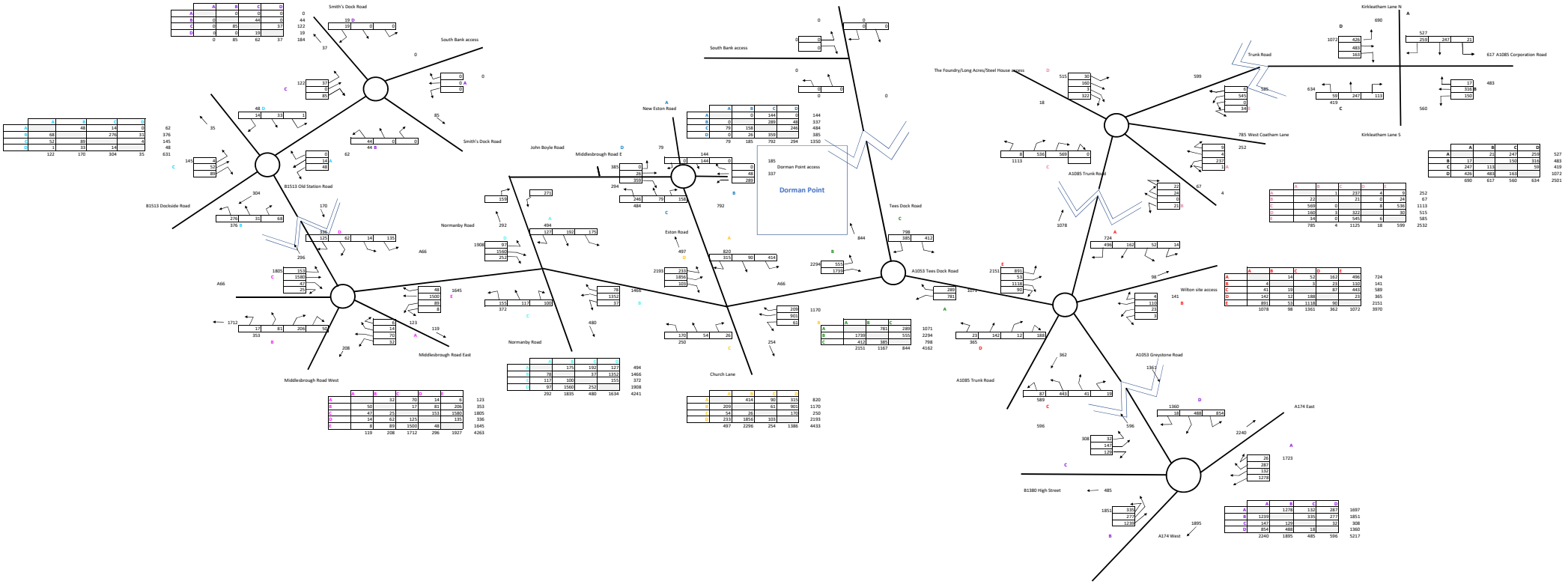
2033 Base PM Peak Hour Trips (pcu)



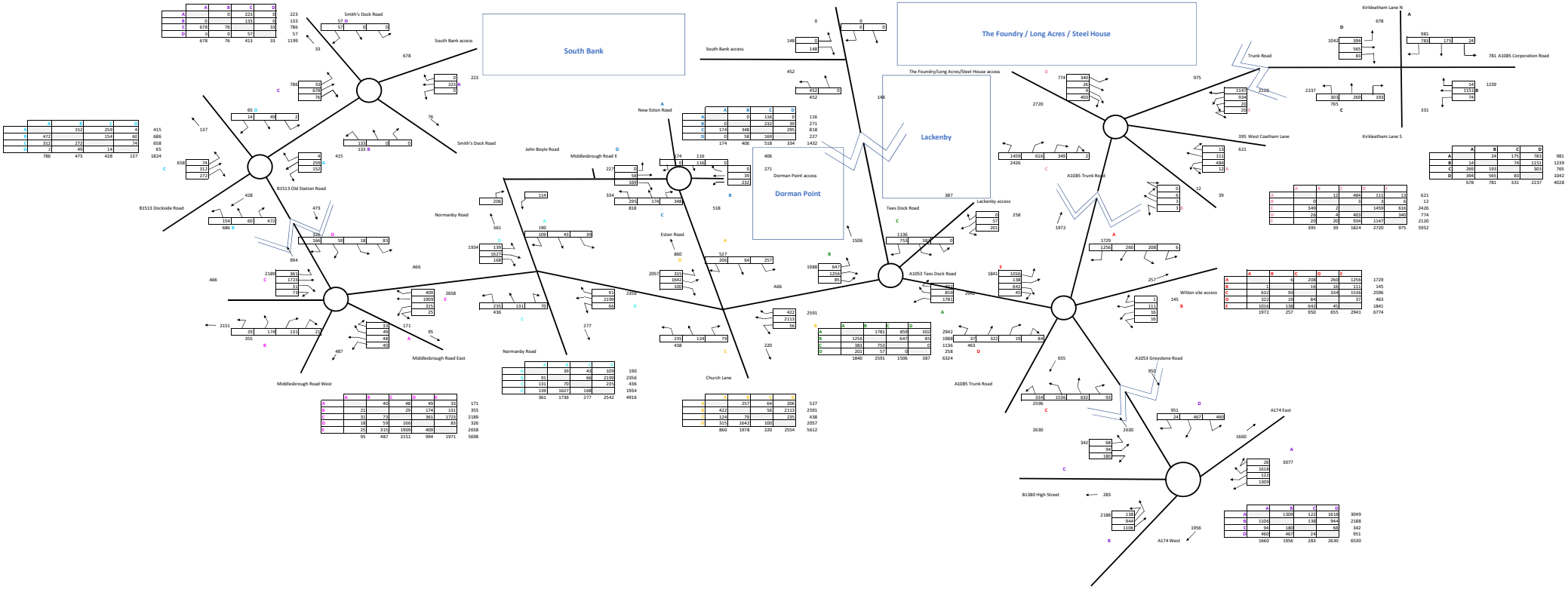
2033 Base + Dorman Point- AM Peak Hour Trips (PCU)



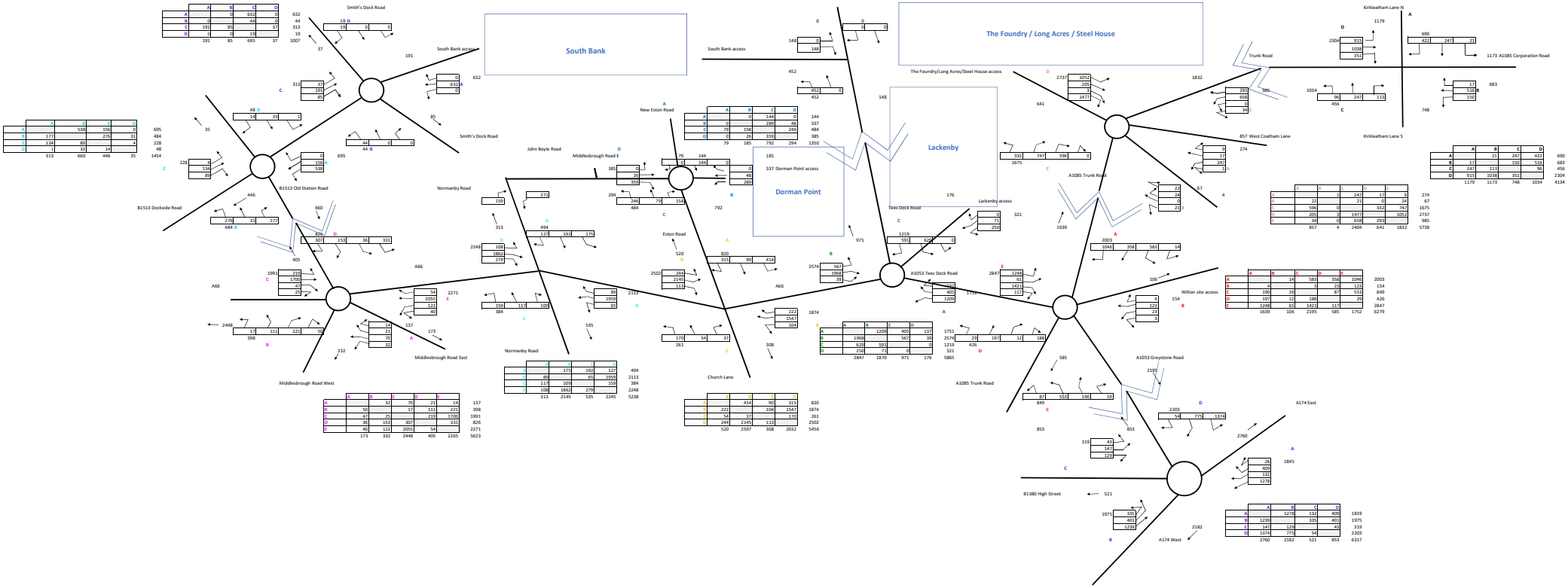
2033 Base + Dorman Point- PM Peak Hour Trips (PCU)



2033 Cumulative Assessment - AM Peak Hour Trips (PCU)



2033 Cumulative Assessment - PM Peak Hour Trips (PCU)



Appendix F

Junction Model Outputs

Junctions 9

ARCADY 9 - Roundabout Module

Filename: New Eston Road roundabout.j9
Report generation date: 04/12/2020 16:44:12

Summary of junction performance

	AM				PM			
	Queue (PCU)	Delay (s)	RFC	LOS	Queue (PCU)	Delay (s)	RFC	LOS
	2033 Base							
Arm A	0.0	0.00	0.00	A	0.0	0.00	0.00	A
Arm B	0.0	0.00	0.00	A	0.0	0.00	0.00	A
Arm C	0.4	4.99	0.28	A	0.4	4.69	0.23	A
Arm D	0.2	4.31	0.16	A	0.6	5.48	0.34	A
	2033 Base + Dorman Point							
Arm A	0.2	5.57	0.15	A	0.2	5.67	0.18	A
Arm B	0.5	5.63	0.29	A	0.8	7.68	0.41	A
Arm C	3.9	16.24	0.78	C	1.0	6.76	0.46	A
Arm D	0.5	6.61	0.28	A	0.8	6.78	0.41	A

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

File summary

File Description

Title	STDC - Prairie Site Roundabout
Location	
Site number	
Date	19/08/2020
Version	
Status	Proposed
Identifier	
Client	

Jobnumber	
Enumerator	WSATKINS\FEAR3096
Description	

Units

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

Analysis Options

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

Analysis Set Details

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

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)	Run automatically
D4	2033 Base + Dorman Point	PM	ONE HOUR	16:45	18:15	15	✓

2033 Base + Dorman Point, PM

Data Errors and Warnings

No errors or warnings

Junction Network

Junctions

Junction	Name	Junction type	Use circulating lanes	Arm order	Junction Delay (s)	Junction LOS
1	untitled	Standard Roundabout		A, B, C, D	6.88	A

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

Arms

Arms

Arm	Name	Description
A	North Link	
B	East Link	
C	Eston Road	
D	Middlesbrough Road East	

Roundabout Geometry

Arm	V - Approach road half-width (m)	E - Entry width (m)	l' - Effective flare length (m)	R - Entry radius (m)	D - Inscribed circle diameter (m)	PHI - Conflict (entry) angle (deg)	Exit only

A	4.00	4.00	0.0	20.0	50.0	32.6	
B	4.00	4.00	0.0	20.0	50.0	36.4	
C	3.65	4.00	8.5	20.0	50.0	35.6	
D	3.65	4.00	5.5	20.0	50.0	35.6	

Slope / Intercept / Capacity

Roundabout Slope and Intercept used in model

Arm	Final slope	Final intercept (PCU/hr)
A	0.512	1201
B	0.505	1185
C	0.504	1176
D	0.503	1171

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

Traffic Demand

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

Demand overview (Traffic)

Arm	Linked arm	Profile type	Use O-D data	Average Demand (PCU/hr)	Scaling Factor (%)
A		ONE HOUR	✓	144	100.000
B		ONE HOUR	✓	337	100.000
C		ONE HOUR	✓	483	100.000
D		ONE HOUR	✓	385	100.000

Origin-Destination Data

Demand (PCU/hr)

		To			
		A	**B**	**C**	**D**
From	**A**	0	0	144	0
	B	0	0	289	48
	C	79	158	0	246
	D	0	26	359	0

Vehicle Mix

Heavy Vehicle Percentages

		To			
		A	**B**	**C**	**D**
From	**A**	0	0	16	0
	B	0	0	14	14
	C	16	16	0	16
	D	0	16	16	0

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS	Average Demand (PCU/hr)	Total Junction Arrivals (PCU)
A	0.18	5.67	0.2	A	132	198
B	0.41	7.68	0.8	A	309	464
C	0.46	6.76	1.0	A	443	665
D	0.41	6.78	0.8	A	353	530

Main Results for each time segment

16:45 - 17:00

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
A	108	27	406	993	0.109	108	59	0.0	0.1	4.713	A
B	254	63	377	995	0.255	252	138	0.0	0.4	5.513	A
C	364	91	36	1158	0.314	362	593	0.0	0.5	5.228	A
D	290	72	177	1082	0.268	288	220	0.0	0.4	5.252	A

17:00 - 17:15

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
A	129	32	487	952	0.136	129	71	0.1	0.2	5.075	A
B	303	76	452	957	0.317	302	165	0.4	0.5	6.262	A
C	434	109	43	1155	0.376	434	711	0.5	0.7	5.786	A
D	346	87	213	1064	0.325	346	264	0.4	0.6	5.810	A

17:15 - 17:30

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
A	159	40	597	896	0.177	158	87	0.2	0.2	5.660	A
B	371	93	553	906	0.409	370	202	0.5	0.8	7.641	A
C	532	133	53	1150	0.463	531	870	0.7	1.0	6.732	A
D	424	106	260	1040	0.408	423	323	0.6	0.8	6.759	A

17:30 - 17:45

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
A	159	40	598	895	0.177	159	87	0.2	0.2	5.667	A
B	371	93	554	906	0.410	371	203	0.8	0.8	7.676	A
C	532	133	53	1150	0.463	532	872	1.0	1.0	6.757	A
D	424	106	261	1040	0.408	424	324	0.8	0.8	6.780	A

17:45 - 18:00

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
A	129	32	489	951	0.136	130	71	0.2	0.2	5.089	A
B	303	76	453	956	0.317	304	166	0.8	0.5	6.300	A
C	434	109	43	1155	0.376	435	714	1.0	0.7	5.815	A
D	346	87	214	1063	0.325	347	265	0.8	0.6	5.838	A

18:00 - 18:15

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
A	108	27	410	992	0.109	109	60	0.2	0.1	4.731	A
B	254	63	379	994	0.255	254	139	0.5	0.4	5.554	A
C	364	91	36	1158	0.314	364	597	0.7	0.5	5.264	A
D	290	72	179	1081	0.268	290	222	0.6	0.4	5.285	A

Junctions 9

ARCADY 9 - Roundabout Module

Filename: A66_Tees Dock Road Roundabout.j9
Report generation date: 08/12/2020 12:31:17

Summary of junction performance

	AM peak				PM peak			
	Queue (PCU)	Delay (s)	RFC	LOS	Queue (PCU)	Delay (s)	RFC	LOS
	2033 Base							
Arm 1	9.9	19.48	0.91	C	0.8	2.92	0.44	A
Arm 2	1.5	4.15	0.58	A	12.9	22.18	0.93	C
Arm 3	2.2	7.49	0.63	A	4.7	19.97	0.79	C
	2033 Base+Dorman Point							
Arm 1	92.4	128.50	1.07	F	1.1	3.34	0.50	A
Arm 2	2.3	5.35	0.68	A	88.0	111.41	1.06	F
Arm 3	2.9	9.79	0.69	A	8.6	37.89	0.89	E

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

File summary

File Description

Title	A66/Tees Dock Road roundabout
Location	
Site number	
Date	04/12/2020
Version	
Status	
Identifier	
Client	
Jobnumber	
Enumerator	
Description	

Units

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

Analysis Options

Calculate Queue Percentiles	Calculate residual capacity	RFC Threshold	Average Delay threshold (s)	Queue threshold (PCU)
		0.85	36.00	20.00

Demand Set Summary

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)
D1	2033 Base	AM peak	ONE HOUR	07:45	09:15	15
D2	2033 Base	PM peak	ONE HOUR	16:45	18:15	15
D3	2033 Base+Dorman Point	AM peak	ONE HOUR	07:45	09:15	15
D4	2033 Base+Dorman Point	PM peak	ONE HOUR	16:45	18:15	15

Analysis Set Details

ID	Network flow scaling factor (%)
A1	100.000

2033 Base, AM peak

Data Errors and Warnings

No errors or warnings

Junction Network

Junctions

Junction	Name	Junction type	Use circulating lanes	Arm order	Junction Delay (s)	Junction LOS
1	A66 / Tees Dock	Standard Roundabout		1, 2, 3	11.83	B

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

Arms

Arms

Arm	Name	Description
1	Tees Dock Road WB	
2	A66 EB	
3	Tees Dock Road SB	

Roundabout Geometry

Arm	V - Approach road half-width (m)	E - Entry width (m)	l' - Effective flare length (m)	R - Entry radius (m)	D - Inscribed circle diameter (m)	PHI - Conflict (entry) angle (deg)	Exit only
1	7.30	9.80	12.4	38.5	60.0	40.0	
2	7.10	8.80	19.3	30.0	60.0	28.0	
3	4.70	7.84	30.0	33.0	60.0	38.0	

Slope / Intercept / Capacity

Roundabout Slope and Intercept used in model

Arm	Final slope	Final intercept (PCU/hr)
1	0.717	2642
2	0.721	2612
3	0.627	2119

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

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)
D1	2033 Base	AM peak	ONE HOUR	07:45	09:15	15

Vehicle mix source	PCU Factor for a HV (PCU)
HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Use O-D data	Average Demand (PCU/hr)	Scaling Factor (%)
1		✓	1761	100.000
2		✓	1194	100.000
3		✓	988	100.000

Origin-Destination Data

Demand (PCU/hr)

		To		
		1	2	3
From	1	0	1328	433
	2	574	0	620
	3	334	654	0

Vehicle Mix

Heavy Vehicle Percentages

		To		
		1	2	3
From	1	0	7	7
	2	10	0	10
	3	32	32	0

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS
1	0.91	19.48	9.9	C
2	0.58	4.15	1.5	A
3	0.63	7.49	2.2	A

Main Results for each time segment

07:45 - 08:00

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	1326	490	2291	0.579	1320	1.5	3.944	A
2	899	325	2378	0.378	896	0.7	2.667	A
3	744	431	1848	0.402	740	0.9	4.275	A

08:00 - 08:15

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	1583	587	2221	0.713	1579	2.6	5.949	A
2	1073	388	2333	0.460	1072	0.9	3.139	A
3	888	516	1795	0.495	887	1.3	5.219	A

08:15 - 08:30

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	1939	718	2128	0.911	1913	9.1	16.293	C
2	1315	470	2273	0.578	1312	1.5	4.108	A
3	1088	631	1723	0.631	1084	2.2	7.398	A

08:30 - 08:45

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	1939	720	2126	0.912	1936	9.9	19.478	C
2	1315	476	2269	0.579	1315	1.5	4.148	A
3	1088	632	1722	0.632	1088	2.2	7.486	A

08:45 - 09:00

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	1583	590	2219	0.713	1612	2.7	6.634	A
2	1073	396	2327	0.461	1076	0.9	3.170	A
3	888	517	1794	0.495	892	1.3	5.289	A

09:00 - 09:15

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	1326	493	2288	0.579	1331	1.5	4.044	A
2	899	327	2376	0.378	900	0.7	2.683	A
3	744	433	1847	0.403	745	0.9	4.319	A

2033 Base, PM peak

Data Errors and Warnings

No errors or warnings

Junction Network

Junctions

Junction	Name	Junction type	Use circulating lanes	Arm order	Junction Delay (s)	Junction LOS
1	A66 / Tees Dock	Standard Roundabout		1, 2, 3	16.94	C

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)
D2	2033 Base	PM peak	ONE HOUR	16:45	18:15	15

Vehicle mix source	PCU Factor for a HV (PCU)
HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Use O-D data	Average Demand (PCU/hr)	Scaling Factor (%)
1		✓	928	100.000
2		✓	2017	100.000
3		✓	797	100.000

Origin-Destination Data

Demand (PCU/hr)

		To		
		1	2	3
From	1	0	639	289
	2	1462	0	555
	3	412	385	0

Vehicle Mix

Heavy Vehicle Percentages

		To		
		1	2	3
From	1	0	7	7
	2	10	0	10
	3	32	32	0

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS
1	0.44	2.92	0.8	A
2	0.93	22.18	12.9	C

3	0.79	19.97	4.7	C

Main Results for each time segment

16:45 - 17:00

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	699	288	2436	0.287	697	0.4	2.213	A
2	1519	217	2456	0.618	1511	1.8	4.162	A
3	600	1096	1431	0.419	596	0.9	5.666	A

17:00 - 17:15

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	834	345	2395	0.348	834	0.6	2.467	A
2	1813	260	2425	0.748	1808	3.2	6.353	A
3	716	1310	1297	0.553	714	1.6	8.116	A

17:15 - 17:30

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	1022	419	2342	0.436	1021	0.8	2.914	A
2	2221	318	2383	0.932	2187	11.5	17.797	C
3	878	1585	1124	0.781	867	4.3	17.763	C

17:30 - 17:45

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	1022	423	2339	0.437	1022	0.8	2.924	A
2	2221	318	2383	0.932	2215	12.9	22.182	C
3	878	1606	1111	0.790	876	4.7	19.972	C

17:45 - 18:00

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	834	352	2390	0.349	835	0.6	2.478	A
2	1813	260	2425	0.748	1851	3.4	7.340	A
3	716	1342	1277	0.561	728	1.7	8.840	A

18:00 - 18:15

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	699	291	2433	0.287	699	0.4	2.221	A
2	1519	218	2455	0.618	1525	1.8	4.284	A
3	600	1105	1425	0.421	603	1.0	5.801	A

2033 Base+Dorman Point, AM peak

Data Errors and Warnings

No errors or warnings

Junction Network

Junctions

Junction	Name	Junction type	Use circulating lanes	Arm order	Junction Delay (s)	Junction LOS
1	A66 / Tees Dock	Standard Roundabout		1, 2, 3	63.43	F

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)
D3	2033 Base+Dorman Point	AM peak	ONE HOUR	07:45	09:15	15

Vehicle mix source	PCU Factor for a HV (PCU)
HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Use O-D data	Average Demand (PCU/hr)	Scaling Factor (%)
1		✓	2074	100.000
2		✓	1411	100.000
3		✓	988	100.000

Origin-Destination Data

Demand (PCU/hr)

		To		
		1	2	3
From	1	0	1641	433
	2	791	0	620
	3	334	654	0

Vehicle Mix

Heavy Vehicle Percentages

		To		
		1	2	3
From	1	0	8	8
	2	10	0	10
	3	32	32	0

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS

1	1.07	128.50	92.4	F
2	0.68	5.35	2.3	A
3	0.69	9.79	2.9	A

Main Results for each time segment

07:45 - 08:00

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	1561	490	2291	0.682	1552	2.3	5.201	A
2	1062	324	2379	0.447	1059	0.9	2.993	A
3	744	594	1746	0.426	740	1.0	4.704	A

08:00 - 08:15

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	1864	587	2222	0.839	1852	5.3	10.213	B
2	1268	387	2334	0.544	1267	1.3	3.705	A
3	888	710	1673	0.531	886	1.5	6.022	A

08:15 - 08:30

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	2284	716	2128	1.073	2098	51.7	57.763	F
2	1554	438	2297	0.676	1550	2.3	5.274	A
3	1088	869	1574	0.691	1082	2.9	9.563	A

08:30 - 08:45

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	2284	720	2126	1.074	2121	92.4	128.504	F
2	1554	443	2293	0.677	1553	2.3	5.351	A
3	1088	871	1572	0.692	1088	2.9	9.792	A

08:45 - 09:00

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	1864	592	2218	0.841	2195	9.8	88.805	F
2	1268	458	2282	0.556	1272	1.4	3.934	A
3	888	713	1671	0.531	894	1.5	6.156	A

09:00 - 09:15

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	1561	494	2288	0.682	1591	2.4	5.806	A
2	1062	332	2373	0.448	1064	0.9	3.032	A
3	744	597	1744	0.426	746	1.0	4.770	A

2033 Base+Dorman Point, PM peak

Data Errors and Warnings

No errors or warnings

Junction Network

Junctions

Junction	Name	Junction type	Use circulating lanes	Arm order	Junction Delay (s)	Junction LOS
1	A66 / Tees Dock	Standard Roundabout		1, 2, 3	69.54	F

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)
D4	2033 Base+Dorman Point	PM peak	ONE HOUR	16:45	18:15	15

Vehicle mix source	PCU Factor for a HV (PCU)
HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Use O-D data	Average Demand (PCU/hr)	Scaling Factor (%)
1		✓	1070	100.000
2		✓	2294	100.000
3		✓	797	100.000

Origin-Destination Data

Demand (PCU/hr)

		To		
		1	2	3
From	1	0	781	289
	2	1739	0	555
	3	412	385	0

Vehicle Mix

Heavy Vehicle Percentages

		To		
		1	2	3
From	1	0	8	8
	2	10	0	10
	3	32	32	0

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS
1	0.50	3.34	1.1	A
2	1.06	111.41	88.0	F
3	0.89	37.89	8.6	E

Main Results for each time segment

16:45 - 17:00

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	806	288	2436	0.331	803	0.5	2.378	A
2	1727	217	2456	0.703	1717	2.6	5.287	A
3	600	1301	1302	0.461	596	1.1	6.685	A

17:00 - 17:15

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	962	344	2396	0.402	961	0.7	2.709	A
2	2062	260	2425	0.850	2049	5.8	10.189	B
3	716	1553	1144	0.626	712	2.1	10.901	B

17:15 - 17:30

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	1178	414	2345	0.502	1177	1.1	3.321	A
2	2526	318	2383	1.060	2347	50.5	51.793	F
3	878	1779	1002	0.875	857	7.3	29.263	D

17:30 - 17:45

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	1178	421	2340	0.503	1178	1.1	3.345	A
2	2526	318	2383	1.060	2376	88.0	111.412	F
3	878	1801	989	0.888	872	8.6	37.892	E

17:45 - 18:00

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	962	356	2387	0.403	963	0.7	2.734	A
2	2062	260	2425	0.850	2380	8.6	74.767	F
3	716	1804	987	0.726	736	3.7	20.208	C

18:00 - 18:15

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	806	295	2431	0.331	806	0.5	2.395	A
2	1727	218	2455	0.703	1751	2.7	5.804	A
3	600	1327	1286	0.467	610	1.2	7.134	A

Junctions 9

ARCADY 9 - Roundabout Module

Filename: A66_Tees Dock Road_Lackenby Access Roundabout_mitigation.j9
Report generation date: 08/12/2020 18:35:41

Summary of junction performance

	AM peak				PM peak			
	Queue (PCU)	Delay (s)	RFC	LOS	Queue (PCU)	Delay (s)	RFC	LOS
	2033 Cumulative Assessment							
Arm 1	138.6	133.26	1.08	F	1.7	3.27	0.62	A
Arm 2	4.3	7.26	0.80	A	7.6	9.99	0.88	A
Arm 3	1.8	5.26	0.59	A	5.2	14.32	0.81	B
Arm 4	0.3	3.59	0.20	A	1.1	11.13	0.49	B

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

File summary

File Description

Title	A66/Tees Dock Road/Lackenby Access_with mitigation
Location	
Site number	
Date	08/12/2020
Version	
Status	
Identifier	
Client	
Jobnumber	
Enumerator	
Description	

Units

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

Analysis Options

Calculate Queue Percentiles	Calculate residual capacity	RFC Threshold	Average Delay threshold (s)	Queue threshold (PCU)
		0.85	36.00	20.00

Demand Set Summary

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)
D5	2033 Cumulative Assessment	AM peak	ONE HOUR	07:45	09:15	15
D6	2033 Cumulative Assessment	PM peak	ONE HOUR	16:45	18:15	15

Analysis Set Details

ID	Network flow scaling factor (%)
A1	100.000

2033 Cumulative Assessment, AM peak

Data Errors and Warnings

No errors or warnings

Junction Network

Junctions

Junction	Name	Junction type	Use circulating lanes	Arm order	Junction Delay (s)	Junction LOS
1	A66 / Tees Dock	Standard Roundabout		1, 2, 3, 4	65.37	F

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)
D5	2033 Cumulative Assessment	AM peak	ONE HOUR	07:45	09:15	15

Vehicle mix source	PCU Factor for a HV (PCU)
HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Use O-D data	Average Demand (PCU/hr)	Scaling Factor (%)
1		✓	2942	100.000
2		✓	1988	100.000
3		✓	1136	100.000
4		✓	258	100.000

Origin-Destination Data

Demand (PCU/hr)

		To			
		1	2	3	4
From	1	0	1781	859	302
	2	1256	0	647	85
	3	383	753	0	0
	4	201	57	0	0

Vehicle Mix

Heavy Vehicle Percentages

		To			
		1	2	3	4
From	1	0	9	9	9
	2	11	0	11	11
	3	29	29	0	0
	4	14	14	0	0

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS
1	1.08	133.26	138.6	F
2	0.80	7.26	4.3	A
3	0.59	5.26	1.8	A
4	0.20	3.59	0.3	A

Main Results for each time segment

07:45 - 08:00

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	2215	608	3226	0.686	2205	2.4	3.809	A
2	1497	870	2998	0.499	1492	1.1	2.646	A
3	855	1233	2582	0.331	853	0.6	2.683	A
4	194	1795	2103	0.092	194	0.1	2.149	A

08:00 - 08:15

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	2645	727	3127	0.846	2632	5.7	7.726	A
2	1787	1038	2856	0.626	1784	1.8	3.717	A
3	1021	1474	2386	0.428	1020	1.0	3.397	A
4	232	2147	1819	0.127	232	0.2	2.584	A

08:15 - 08:30

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	3239	890	2991	1.083	2961	75.1	56.085	F
2	2189	1169	2746	0.797	2179	4.2	6.940	A
3	1251	1774	2141	0.584	1247	1.8	5.179	A
4	284	2624	1434	0.198	284	0.3	3.563	A

08:30 - 08:45

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	3239	892	2989	1.084	2985	138.6	133.262	F
2	2189	1178	2738	0.799	2188	4.3	7.257	A
3	1251	1783	2134	0.586	1251	1.8	5.257	A
4	284	2633	1427	0.199	284	0.3	3.589	A

08:45 - 09:00

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	2645	730	3124	0.847	3100	24.9	97.719	F
2	1787	1223	2700	0.662	1796	2.2	4.460	A
3	1021	1529	2340	0.436	1024	1.0	3.540	A
4	232	2159	1810	0.128	232	0.2	2.601	A

09:00 - 09:15

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	2215	611	3224	0.687	2305	2.4	4.699	A
2	1497	910	2965	0.505	1501	1.1	2.736	A
3	855	1249	2569	0.333	857	0.6	2.716	A
4	194	1805	2096	0.093	194	0.1	2.160	A

2033 Cumulative Assessment, PM peak

Data Errors and Warnings

No errors or warnings

Junction Network

Junctions

Junction	Name	Junction type	Use circulating lanes	Arm order	Junction Delay (s)	Junction LOS
1	A66 / Tees Dock	Standard Roundabout		1, 2, 3, 4	8.95	A

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)
D6	2033 Cumulative Assessment	PM peak	ONE HOUR	16:45	18:15	15

Vehicle mix source	PCU Factor for a HV (PCU)
HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Use O-D data	Average Demand (PCU/hr)	Scaling Factor (%)
1		✓	1751	100.000
2		✓	2574	100.000
3		✓	1220	100.000
4		✓	321	100.000

Origin-Destination Data

Demand (PCU/hr)

		To			
		1	2	3	4
From	1	0	1209	405	137
	2	1968	0	567	39
	3	629	591	0	0
	4	250	71	0	0

Vehicle Mix

Heavy Vehicle Percentages

		To			
		1	2	3	4
From	1	0	9	9	9
	2	11	0	11	11
	3	29	29	0	0
	4	14	14	0	0

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS
1	0.62	3.27	1.7	A
2	0.88	9.99	7.6	A
3	0.81	14.32	5.2	B
4	0.49	11.13	1.1	B

Main Results for each time segment

16:45 - 17:00

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service

1	1318	497	3320	0.397	1315	0.7	1.955	A
2	1938	407	3390	0.572	1932	1.5	2.729	A
3	918	1609	2275	0.404	915	0.9	3.406	A
4	242	2392	1622	0.149	241	0.2	2.970	A

17:00 - 17:15

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	1574	594	3238	0.486	1573	1.0	2.355	A
2	2314	487	3323	0.696	2310	2.5	3.928	A
3	1097	1924	2019	0.543	1094	1.5	5.009	A
4	289	2860	1244	0.232	288	0.3	4.289	A

17:15 - 17:30

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	1928	722	3131	0.616	1925	1.7	3.248	A
2	2834	596	3230	0.877	2815	7.3	9.215	A
3	1343	2345	1676	0.802	1330	4.9	12.967	B
4	353	3482	742	0.476	351	1.0	10.409	B

17:30 - 17:45

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	1928	728	3126	0.617	1928	1.7	3.275	A
2	2834	597	3230	0.877	2833	7.6	9.991	A
3	1343	2360	1664	0.807	1342	5.2	14.316	B
4	353	3508	721	0.490	353	1.1	11.133	B

17:45 - 18:00

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	1574	603	3231	0.487	1577	1.0	2.377	A
2	2314	488	3322	0.697	2334	2.6	4.126	A
3	1097	1943	2003	0.548	1111	1.6	5.287	A
4	289	2896	1216	0.237	291	0.4	4.456	A

18:00 - 18:15

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	1318	500	3317	0.397	1320	0.7	1.966	A
2	1938	408	3389	0.572	1942	1.5	2.771	A
3	918	1618	2268	0.405	921	0.9	3.453	A
4	242	2406	1610	0.150	242	0.2	3.002	A

Junctions 9

ARCADY 9 - Roundabout Module

Filename: A66_Old Station Road_Middlesbrough Road Roundabout.j9
Report generation date: 09/12/2020 11:55:53

Summary of junction performance

	AM peak				PM peak			
	Queue (PCU)	Delay (s)	RFC	LOS	Queue (PCU)	Delay (s)	RFC	LOS
2033 Base								
Arm 1	0.2	7.22	0.19	A	0.1	3.95	0.13	A
Arm 2	0.4	6.33	0.29	A	0.5	5.06	0.35	A
Arm 3	1.5	3.77	0.58	A	2.8	5.34	0.72	A
Arm 4	0.3	4.68	0.24	A	0.8	8.17	0.43	A
Arm 5	11.1	16.97	0.92	C	1.8	3.89	0.62	A
2033 Base+Dorman Point								
Arm 1	0.3	8.33	0.22	A	0.2	4.31	0.14	A
Arm 2	0.5	7.07	0.32	A	0.6	5.67	0.38	A
Arm 3	2.1	4.58	0.65	A	3.3	5.96	0.75	A
Arm 4	0.4	5.25	0.26	A	0.9	8.89	0.45	A
Arm 5	21.5	31.27	0.97	D	2.3	4.55	0.67	A
2033 Cumulative Assessment								
Arm 1	0.6	11.67	0.38	B	0.4	9.24	0.28	A
Arm 2	1.4	12.71	0.58	B	2.0	16.81	0.67	C
Arm 3	38.2	56.17	1.00	F	5.6	9.41	0.84	A
Arm 4	0.9	9.21	0.45	A	84.1	303.28	1.21	F
Arm 5	142.0	152.76	1.10	F	25.9	38.81	0.98	E

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

File summary

File Description

Title	A66/Old Station Road/Middlesbrough Road roundabout
Location	
Site number	
Date	09/12/2020
Version	
Status	
Identifier	
Client	
Jobnumber	
Enumerator	
Description	

Units

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

Analysis Options

Calculate Queue Percentiles	Calculate residual capacity	RFC Threshold	Average Delay threshold (s)	Queue threshold (PCU)
		0.85	36.00	20.00

Demand Set Summary

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)
D1	2033 Base	AM peak	ONE HOUR	07:45	09:15	15
D2	2033 Base	PM peak	ONE HOUR	16:45	18:15	15
D3	2033 Base+Dorman Point	AM peak	ONE HOUR	07:45	09:15	15
D4	2033 Base+Dorman Point	PM peak	ONE HOUR	16:45	18:15	15
D7	2033 Cumulative Assessment	AM peak	ONE HOUR	07:45	09:15	15
D8	2033 Cumulative Assessment	PM peak	ONE HOUR	16:45	18:15	15

Analysis Set Details

ID	Network flow scaling factor (%)
A1	100.000

2033 Base, AM peak

Data Errors and Warnings

No errors or warnings

Junction Network

Junctions

Junction	Name	Junction type	Use circulating lanes	Arm order	Junction Delay (s)	Junction LOS
1	untitled	Standard Roundabout		1, 2, 3, 4, 5	11.21	B

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

Arms

Arms

Arm	Name	Description
1	Middlesbrough Road WB	
2	Middlesbrough Road NB	
3	A66 EB	
4	Old Station Road	
5	A66 WB	

Roundabout Geometry

Arm	V - Approach road half-width (m)	E - Entry width (m)	l' - Effective flare length (m)	R - Entry radius (m)	D - Inscribed circle diameter (m)	PHI - Conflict (entry) angle (deg)	Exit only
1	3.34	9.00	21.5	42.0	88.0	28.0	
2	4.00	9.20	17.8	28.0	88.0	40.0	
3	8.00	10.50	14.7	51.0	88.0	35.0	
4	3.70	9.00	12.5	36.0	88.0	28.0	
5	7.50	11.00	17.8	35.0	88.0	36.0	

Slope / Intercept / Capacity

Roundabout Slope and Intercept used in model

Arm	Final slope	Final intercept (PCU/hr)
1	0.509	2006
2	0.494	1984
3	0.639	2951
4	0.487	1854
5	0.633	2924

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

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)
D1	2033 Base	AM peak	ONE HOUR	07:45	09:15	15

Vehicle mix source	PCU Factor for a HV (PCU)
HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Use O-D data	Average Demand (PCU/hr)	Scaling Factor (%)
1		✓	103	100.000
2		✓	210	100.000
3		✓	1338	100.000
4		✓	244	100.000
5		✓	2257	100.000

Origin-Destination Data

Demand (PCU/hr)

		To				
		1	2	3	4	5
From	1	0	40	48	15	0
	2	21	0	29	70	90
	3	31	73	0	113	1121
	4	14	44	124	0	62
	5	8	262	1600	387	0

Vehicle Mix

Heavy Vehicle Percentages

		To				
		1	2	3	4	5
From	1	0	0	0	0	0
	2	0	0	0	0	1
	3	0	0	0	13	13
	4	0	0	18	0	18
	5	0	0	13	13	0

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS
1	0.19	7.22	0.2	A
2	0.29	6.33	0.4	A
3	0.58	3.77	1.5	A
4	0.24	4.68	0.3	A
5	0.92	16.97	11.1	C

Main Results for each time segment

07:45 - 08:00

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	78	1867	1056	0.073	77	0.1	3.679	A
2	158	1630	1178	0.134	157	0.2	3.540	A
3	1007	437	2671	0.377	1005	0.7	2.412	A
4	184	1003	1366	0.134	183	0.2	3.441	A
5	1699	230	2778	0.612	1692	1.7	3.665	A

08:00 - 08:15

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	93	2233	869	0.107	92	0.1	4.632	A
2	189	1949	1020	0.185	188	0.2	4.345	A

3	1203	523	2616	0.460	1202	0.9	2.847	A
4	219	1200	1270	0.173	219	0.2	3.874	A
5	2029	276	2749	0.738	2024	3.1	5.479	A

08:15 - 08:30

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	113	2712	625	0.181	113	0.2	7.017	A
2	231	2368	813	0.284	231	0.4	6.196	A
3	1473	636	2544	0.579	1471	1.5	3.746	A
4	269	1468	1140	0.236	268	0.3	4.673	A
5	2485	337	2710	0.917	2456	10.3	14.384	B

08:30 - 08:45

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	113	2738	612	0.185	113	0.2	7.217	A
2	231	2391	802	0.288	231	0.4	6.330	A
3	1473	641	2541	0.580	1473	1.5	3.772	A
4	269	1471	1138	0.236	269	0.3	4.683	A
5	2485	338	2710	0.917	2482	11.1	16.966	C

08:45 - 09:00

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	93	2270	850	0.109	93	0.1	4.755	A
2	189	1983	1004	0.188	189	0.2	4.442	A
3	1203	530	2612	0.461	1205	1.0	2.869	A
4	219	1203	1269	0.173	220	0.2	3.885	A
5	2029	277	2749	0.738	2061	3.2	6.075	A

09:00 - 09:15

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	78	1881	1049	0.074	78	0.1	3.707	A
2	158	1642	1172	0.135	158	0.2	3.568	A
3	1007	440	2669	0.377	1008	0.7	2.428	A
4	184	1007	1364	0.135	184	0.2	3.451	A
5	1699	231	2777	0.612	1705	1.8	3.757	A

2033 Base, PM peak

Data Errors and Warnings

No errors or warnings

Junction Network

Junctions

Junction	Name	Junction type	Use circulating lanes	Arm order	Junction Delay (s)	Junction LOS
1	untitled	Standard Roundabout		1, 2, 3, 4, 5	4.97	A

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)
D2	2033 Base	PM peak	ONE HOUR	16:45	18:15	15

Vehicle mix source	PCU Factor for a HV (PCU)
HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Use O-D data	Average Demand (PCU/hr)	Scaling Factor (%)
1		✓	119	100.000
2		✓	347	100.000
3		✓	1739	100.000
4		✓	336	100.000
5		✓	1509	100.000

Origin-Destination Data

Demand (PCU/hr)

		To				
		1	2	3	4	5
From	1	0	32	70	14	3
	2	50	0	17	81	199
	3	47	25	0	153	1514
	4	14	62	125	0	135
	5	3	82	1376	48	0

Vehicle Mix

Heavy Vehicle Percentages

		To				
		1	2	3	4	5
From	1	0	0	0	0	0
	2	0	0	0	0	0
	3	0	0	0	13	13
	4	0	0	18	0	18
	5	0	0	13	13	0

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS
1	0.13	3.95	0.1	A
2	0.35	5.06	0.5	A
3	0.72	5.34	2.8	A
4	0.43	8.17	0.8	A
5	0.62	3.89	1.8	A

Main Results for each time segment

16:45 - 17:00

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	90	1290	1350	0.066	89	0.1	2.856	A
2	261	1228	1377	0.190	260	0.2	3.220	A
3	1309	296	2761	0.474	1305	1.0	2.771	A
4	253	1379	1183	0.214	252	0.3	4.378	A
5	1136	242	2771	0.410	1133	0.8	2.462	A

17:00 - 17:15

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	107	1543	1221	0.088	107	0.1	3.231	A
2	312	1469	1258	0.248	312	0.3	3.802	A
3	1563	355	2724	0.574	1561	1.5	3.474	A
4	302	1650	1051	0.287	301	0.5	5.439	A
5	1357	290	2740	0.495	1355	1.1	2.913	A

17:15 - 17:30

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	131	1888	1045	0.125	131	0.1	3.937	A
2	382	1798	1095	0.349	381	0.5	5.037	A
3	1915	434	2673	0.716	1910	2.8	5.263	A
4	370	2018	872	0.424	368	0.8	8.080	A
5	1661	354	2700	0.615	1659	1.8	3.870	A

17:30 - 17:45

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	131	1891	1043	0.126	131	0.1	3.946	A
2	382	1801	1094	0.349	382	0.5	5.058	A
3	1915	435	2673	0.716	1915	2.8	5.336	A
4	370	2024	870	0.425	370	0.8	8.168	A
5	1661	356	2699	0.616	1661	1.8	3.892	A

17:45 - 18:00

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	107	1548	1218	0.088	107	0.1	3.243	A
2	312	1474	1255	0.248	313	0.3	3.820	A
3	1563	356	2723	0.574	1568	1.5	3.521	A
4	302	1658	1048	0.288	304	0.5	5.498	A
5	1357	292	2739	0.495	1359	1.1	2.931	A

18:00 - 18:15

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	90	1295	1347	0.067	90	0.1	2.863	A
2	261	1233	1375	0.190	262	0.2	3.235	A

3	1309	298	2760	0.474	1311	1.0	2.798	A
4	253	1386	1180	0.214	254	0.3	4.411	A
5	1136	244	2770	0.410	1137	0.8	2.475	A

2033 Base+Dorman Point, AM peak

Data Errors and Warnings

No errors or warnings

Junction Network

Junctions

Junction	Name	Junction type	Use circulating lanes	Arm order	Junction Delay (s)	Junction LOS
1	untitled	Standard Roundabout		1, 2, 3, 4, 5	19.10	C

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)
D3	2033 Base+Dorman Point	AM peak	ONE HOUR	07:45	09:15	15

Vehicle mix source	PCU Factor for a HV (PCU)
HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Use O-D data	Average Demand (PCU/hr)	Scaling Factor (%)
1		✓	109	100.000
2		✓	218	100.000
3		✓	1500	100.000
4		✓	244	100.000
5		✓	2379	100.000

Origin-Destination Data

Demand (PCU/hr)

		To				
		1	**2**	**3**	**4**	**5**
From	**1**	0	40	48	15	6
	2	21	0	29	70	98
	3	31	73	0	113	1283
	4	14	44	124	0	62
	5	12	279	1701	387	0

Vehicle Mix

Heavy Vehicle Percentages

		To				
		1	2	3	4	5
From	1	0	0	0	0	0
	2	0	0	0	0	0
	3	0	0	0	13	13
	4	0	0	18	0	18
	5	0	0	13	13	0

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS
1	0.22	8.33	0.3	A
2	0.32	7.07	0.5	A
3	0.65	4.58	2.1	A
4	0.26	5.25	0.4	A
5	0.97	31.27	21.5	D

Main Results for each time segment

07:45 - 08:00

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	82	1955	1011	0.081	82	0.1	3.873	A
2	164	1710	1139	0.144	163	0.2	3.689	A
3	1129	448	2664	0.424	1126	0.8	2.615	A
4	184	1135	1302	0.141	183	0.2	3.639	A
5	1791	230	2778	0.645	1783	2.0	3.993	A

08:00 - 08:15

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	98	2337	816	0.120	98	0.1	5.009	A
2	196	2044	974	0.201	196	0.3	4.625	A
3	1348	535	2608	0.517	1347	1.2	3.191	A
4	219	1358	1194	0.184	219	0.3	4.179	A
5	2139	276	2749	0.778	2132	3.8	6.407	A

08:15 - 08:30

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	120	2815	573	0.210	120	0.3	7.933	A
2	240	2462	767	0.313	239	0.5	6.811	A
3	1652	647	2537	0.651	1648	2.1	4.519	A
4	269	1661	1046	0.257	268	0.4	5.234	A
5	2619	337	2710	0.966	2563	17.7	21.835	C

08:30 - 08:45

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	120	2856	552	0.217	120	0.3	8.332	A
2	240	2498	749	0.320	240	0.5	7.070	A
3	1652	655	2532	0.652	1651	2.1	4.578	A
4	269	1665	1044	0.257	269	0.4	5.252	A
5	2619	338	2710	0.967	2604	21.5	31.266	D

08:45 - 09:00

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	98	2415	777	0.126	99	0.1	5.312	A
2	196	2113	940	0.209	197	0.3	4.852	A
3	1348	549	2600	0.519	1352	1.2	3.239	A
4	219	1363	1191	0.184	220	0.3	4.198	A
5	2139	277	2749	0.778	2209	4.0	8.344	A

09:00 - 09:15

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	82	1972	1002	0.082	82	0.1	3.913	A
2	164	1725	1132	0.145	165	0.2	3.723	A
3	1129	451	2662	0.424	1131	0.8	2.636	A
4	184	1140	1299	0.141	184	0.2	3.654	A
5	1791	231	2777	0.645	1799	2.0	4.125	A

2033 Base+Dorman Point, PM peak

Data Errors and Warnings

No errors or warnings

Junction Network

Junctions

Junction	Name	Junction type	Use circulating lanes	Arm order	Junction Delay (s)	Junction LOS
1	untitled	Standard Roundabout		1, 2, 3, 4, 5	5.58	A

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)
D4	2033 Base+Dorman Point	PM peak	ONE HOUR	16:45	18:15	15

Vehicle mix source	PCU Factor for a HV (PCU)
HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Use O-D data	Average Demand (PCU/hr)	Scaling Factor (%)
1		✓	122	100.000
2		✓	354	100.000
3		✓	1805	100.000
4		✓	336	100.000
5		✓	1645	100.000

Origin-Destination Data

Demand (PCU/hr)

		To				
		1	2	3	4	5
From	1	0	32	70	14	6
	2	50	0	17	81	206
	3	47	25	0	153	1580
	4	14	62	125	0	135
	5	8	89	1500	48	0

Vehicle Mix

Heavy Vehicle Percentages

		To				
		1	2	3	4	5
From	1	0	0	0	0	0
	2	0	0	0	0	0
	3	0	0	0	13	13
	4	0	0	18	0	18
	5	0	0	13	13	0

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS
1	0.14	4.31	0.2	A
2	0.38	5.67	0.6	A
3	0.75	5.96	3.3	A
4	0.45	8.89	0.9	A
5	0.67	4.55	2.3	A

Main Results for each time segment

16:45 - 17:00

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	92	1388	1300	0.071	92	0.1	2.979	A

2	267	1323	1330	0.200	266	0.2	3.378	A
3	1359	304	2756	0.493	1355	1.1	2.879	A
4	253	1436	1155	0.219	252	0.3	4.510	A
5	1238	242	2771	0.447	1235	0.9	2.624	A

17:00 - 17:15

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	110	1660	1161	0.094	110	0.1	3.423	A
2	318	1583	1202	0.265	318	0.4	4.072	A
3	1623	364	2718	0.597	1620	1.6	3.679	A
4	302	1718	1018	0.297	301	0.5	5.691	A
5	1479	290	2740	0.540	1477	1.3	3.191	A

17:15 - 17:30

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	134	2031	972	0.138	134	0.2	4.294	A
2	390	1937	1027	0.380	389	0.6	5.644	A
3	1987	445	2666	0.745	1981	3.2	5.853	A
4	370	2101	832	0.445	368	0.9	8.773	A
5	1811	354	2700	0.671	1807	2.3	4.506	A

17:30 - 17:45

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	134	2036	970	0.139	134	0.2	4.308	A
2	390	1941	1025	0.380	390	0.6	5.670	A
3	1987	446	2665	0.746	1987	3.3	5.962	A
4	370	2107	829	0.446	370	0.9	8.892	A
5	1811	356	2699	0.671	1811	2.3	4.548	A

17:45 - 18:00

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	110	1667	1157	0.095	110	0.1	3.439	A
2	318	1589	1198	0.266	319	0.4	4.098	A
3	1623	365	2717	0.597	1629	1.7	3.739	A
4	302	1727	1014	0.298	304	0.5	5.761	A
5	1479	292	2739	0.540	1483	1.3	3.221	A

18:00 - 18:15

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	92	1394	1296	0.071	92	0.1	2.990	A
2	267	1329	1327	0.201	267	0.3	3.396	A
3	1359	305	2755	0.493	1361	1.1	2.907	A
4	253	1443	1152	0.220	254	0.3	4.547	A
5	1238	244	2770	0.447	1240	0.9	2.641	A

2033 Cumulative Assessment, AM peak

Data Errors and Warnings

No errors or warnings

Junction Network

Junctions

Junction	Name	Junction type	Use circulating lanes	Arm order	Junction Delay (s)	Junction LOS
1	untitled	Standard Roundabout		1, 2, 3, 4, 5	94.51	F

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)
D7	2033 Cumulative Assessment	AM peak	ONE HOUR	07:45	09:15	15

Vehicle mix source	PCU Factor for a HV (PCU)
HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Use O-D data	Average Demand (PCU/hr)	Scaling Factor (%)
1		✓	170	100.000
2		✓	355	100.000
3		✓	2188	100.000
4		✓	326	100.000
5		✓	2658	100.000

Origin-Destination Data

Demand (PCU/hr)

		To				
		1	2	3	4	5
From	1	0	40	48	49	33
	2	21	0	29	174	131
	3	31	73	0	361	1723
	4	18	59	166	0	83
	5	25	315	1909	409	0

Vehicle Mix

Heavy Vehicle Percentages

		To				
		1	2	3	4	5
From	1	0	0	0	0	0
	2	0	0	0	0	0
	3	0	0	0	13	13
	4	0	0	16	0	16
	5	0	0	12	12	0

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS
1	0.38	11.67	0.6	B
2	0.58	12.71	1.4	B
3	1.00	56.17	38.2	F
4	0.45	9.21	0.9	A
5	1.10	152.76	142.0	F

Main Results for each time segment

07:45 - 08:00

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	128	2194	889	0.144	127	0.2	4.721	A
2	267	1957	1017	0.263	266	0.4	4.785	A
3	1647	612	2559	0.644	1639	2.0	4.357	A
4	245	1507	1121	0.219	244	0.3	4.584	A
5	2001	276	2749	0.728	1990	2.9	5.150	A

08:00 - 08:15

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	153	2616	674	0.227	152	0.3	6.894	A
2	319	2334	830	0.384	318	0.6	7.013	A
3	1967	731	2484	0.792	1959	4.1	7.580	A
4	293	1801	978	0.300	292	0.5	5.867	A
5	2389	330	2715	0.880	2372	7.4	11.027	B

08:15 - 08:30

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	187	2947	506	0.370	186	0.6	11.225	B
2	391	2634	682	0.573	388	1.3	12.137	B
3	2409	854	2405	1.002	2320	26.4	32.162	D
4	359	2139	813	0.441	357	0.9	8.797	A
5	2927	400	2671	1.096	2648	76.9	64.794	F

08:30 - 08:45

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	187	2968	495	0.378	187	0.6	11.673	B
2	391	2651	674	0.580	391	1.4	12.710	B
3	2409	859	2401	1.003	2362	38.2	56.171	F
4	359	2176	795	0.451	359	0.9	9.210	A
5	2927	403	2669	1.097	2666	142.0	152.757	F

08:45 - 09:00

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service

1	153	2937	511	0.299	153	0.4	10.090	B
2	319	2612	693	0.461	321	0.9	9.737	A
3	1967	783	2450	0.803	2100	4.8	15.850	C
4	293	1921	919	0.319	295	0.5	6.454	A
5	2389	338	2710	0.882	2689	67.2	141.541	F

09:00 - 09:15

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	128	2462	753	0.170	129	0.2	5.779	A
2	267	2193	900	0.297	269	0.4	5.722	A
3	1647	657	2531	0.651	1658	2.1	4.690	A
4	245	1525	1112	0.221	246	0.3	4.650	A
5	2001	278	2748	0.728	2258	3.0	13.921	B

2033 Cumulative Assessment, PM peak

Data Errors and Warnings

No errors or warnings

Junction Network

Junctions

Junction	Name	Junction type	Use circulating lanes	Arm order	Junction Delay (s)	Junction LOS
1	untitled	Standard Roundabout		1, 2, 3, 4, 5	65.01	F

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)
D8	2033 Cumulative Assessment	PM peak	ONE HOUR	16:45	18:15	15

Vehicle mix source	PCU Factor for a HV (PCU)
HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Use O-D data	Average Demand (PCU/hr)	Scaling Factor (%)
1		✓	137	100.000
2		✓	399	100.000
3		✓	1991	100.000
4		✓	827	100.000
5		✓	2271	100.000

Origin-Destination Data

Demand (PCU/hr)

		To				
		1	2	3	4	5
From	1	0	32	70	21	14
	2	50	0	17	111	221
	3	47	25	0	219	1700
	4	36	153	307	0	331
	5	40	122	2055	54	0

Vehicle Mix

Heavy Vehicle Percentages

		To				
		1	2	3	4	5
From	1	0	0	0	0	0
	2	0	0	0	0	0
	3	0	0	0	13	13
	4	0	0	16	0	16
	5	0	0	12	12	0

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS
1	0.28	9.24	0.4	A
2	0.67	16.81	2.0	C
3	0.84	9.41	5.6	A
4	1.21	303.28	84.1	F
5	0.98	38.81	25.9	E

Main Results for each time segment

16:45 - 17:00

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	103	2034	971	0.106	103	0.1	4.145	A
2	300	1888	1051	0.286	299	0.4	4.778	A
3	1499	353	2725	0.550	1493	1.4	3.273	A
4	623	1543	1104	0.564	617	1.4	8.188	A
5	1710	461	2632	0.650	1702	2.0	4.262	A

17:00 - 17:15

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	123	2429	770	0.160	123	0.2	5.563	A
2	359	2255	869	0.413	358	0.7	7.021	A

3	1790	422	2681	0.668	1786	2.2	4.510	A
4	743	1845	956	0.777	735	3.6	17.534	C
5	2042	550	2576	0.793	2033	4.1	7.262	A

17:15 - 17:30

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	151	2836	562	0.268	150	0.4	8.722	A
2	439	2655	672	0.654	435	1.8	14.939	B
3	2192	513	2623	0.836	2179	5.4	8.886	A
4	911	2250	759	1.199	747	44.4	130.615	F
5	2500	582	2556	0.978	2436	20.2	25.355	D

17:30 - 17:45

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	151	2879	540	0.279	151	0.4	9.239	A
2	439	2695	652	0.674	439	2.0	16.806	C
3	2192	517	2620	0.837	2191	5.6	9.411	A
4	911	2264	753	1.210	752	84.1	303.284	F
5	2500	585	2554	0.979	2477	25.9	38.810	E

17:45 - 18:00

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	123	2629	667	0.185	124	0.2	6.630	A
2	359	2415	790	0.454	363	0.8	8.516	A
3	1790	430	2676	0.669	1803	2.3	4.708	A
4	743	1864	947	0.785	935	36.3	233.360	F
5	2042	671	2499	0.817	2124	5.2	12.808	B

18:00 - 18:15

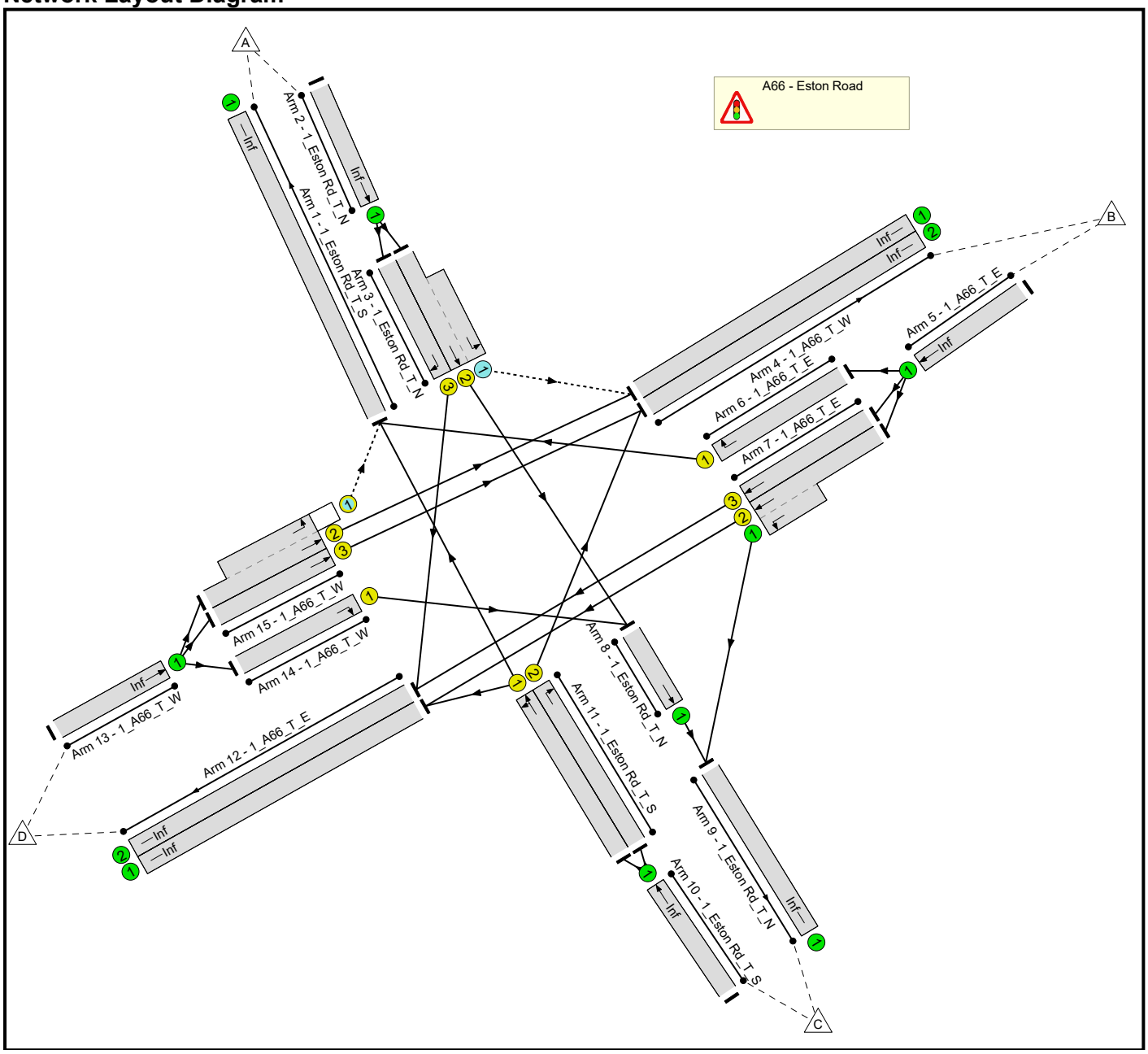
Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	103	2134	920	0.112	104	0.1	4.414	A
2	300	1961	1015	0.296	302	0.4	5.063	A
3	1499	357	2723	0.551	1503	1.4	3.330	A
4	623	1553	1098	0.567	762	1.5	18.234	C
5	1710	549	2576	0.664	1722	2.2	4.742	A

Basic Results Summary

User and Project Details

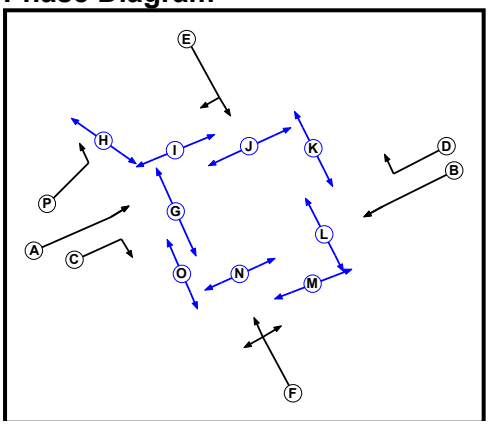
Project:	**Teesworks**
Title:	**A66 / Eston Road**

Network Layout Diagram



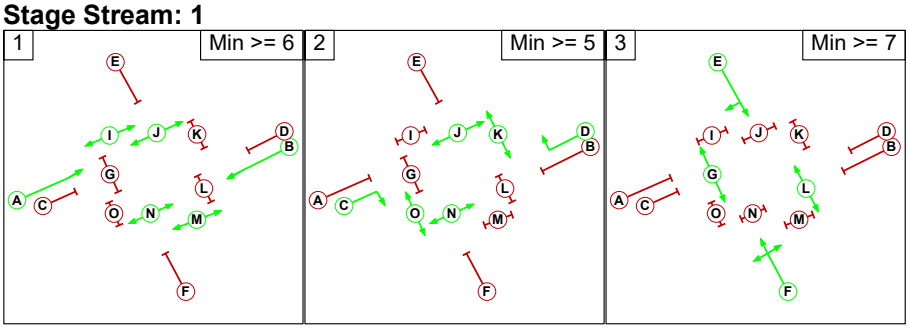
Basic Results Summary

Phase Diagram

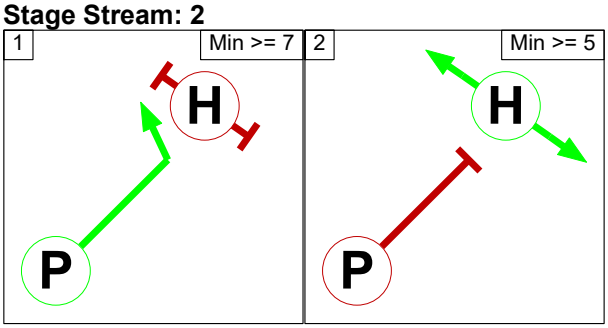


Stage Diagram

Stage Stream: 1



Stage Stream: 2



Basic Results Summary

Phase Intergreens Matrix

Terminating Phase \ Starting Phase	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
A		-	-	6	6	6	5	-	-	-	8	-	-	-	-	-
B	-		6	-	6	6	-	-	-	-	-	5	-	-	9	-
C	-	7		-	5	5	5	-	-	-	-	-	9	-	-	-
D	7	-	-		5	5	-	-	10	-	-	5	-	-	-	-
E	5	7	6	0		-	-	-	-	5	-	-	9	-	10	-
F	7	5	6	6	-		-	-	9	-	10	-	-	5	7	-
G	12	-	12	-	-	-		-	-	-	-	-	-	-	-	-
H	-	-	-	-	-	-	-		-	-	-	-	-	-	-	7
I	-	-	-	6	-	6	-	-		-	-	-	-	-	-	-
J	-	-	-	-	10	-	-	-	-		-	-	-	-	-	-
K	9	-	-	-	-	8	-	-	-	-		-	-	-	-	-
L	-	12	-	12	-	-	-	-	-	-	-		-	-	-	-
M	-	-	6	-	6	-	-	-	-	-	-	-		-	-	-
N	-	-	-	-	-	10	-	-	-	-	-	-	-		-	-
O	-	9	-	-	0	9	-	-	-	-	-	-	-	-		-
P	-	-	-	-	-	-	-	5	-	-	-	-	-	-	-	

Scenario 1: '2033 AM Do Min' (FG1: '2033 AM Do Min', Plan 1: 'Network Control Plan 1')

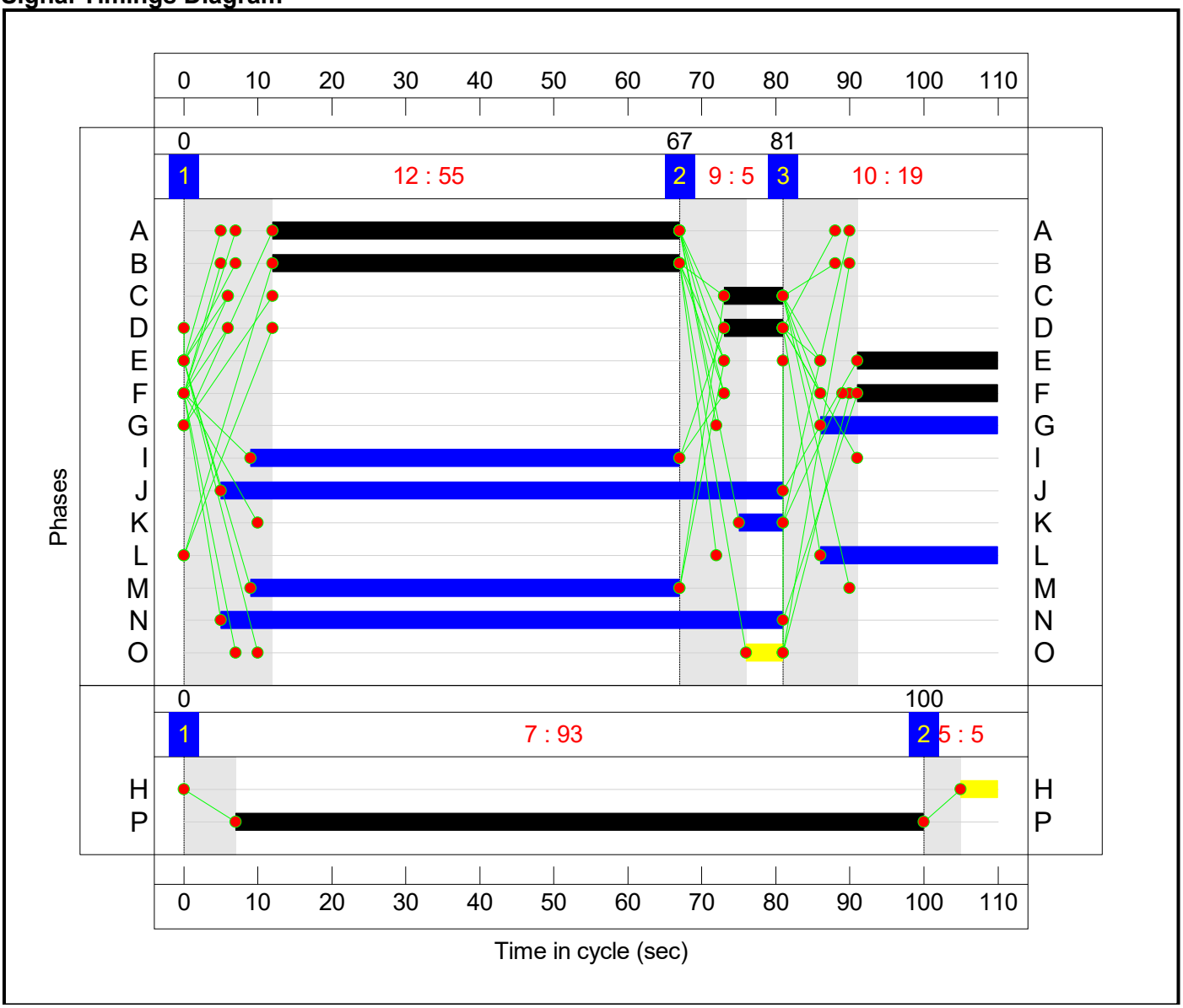
Traffic Flows, Actual

Actual Flow :

Origin \ Destination	A	B	C	D	Tot.
A	0	48	29	101	178
B	103	0	44	1835	1982
C	71	46	0	235	352
D	155	1099	98	0	1352
Tot.	329	1193	171	2171	3864

Basic Results Summary

Signal Timings Diagram



Basic Results Summary

Network Results

Item	Lane Description	Lane Type	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)	Mean Max Queue (pcu)
Network: A66 / Eston Road	-	-	-		-	-	-	-	-	-	**90.9%**	**57**	**146**	**0**	**41.8**	-	-
A66 - Eston Road	-	-	-		-	-	-	-	-	-	**90.9%**	**57**	**146**	**0**	**41.8**	-	-
3/2+3/1	1_Eston Rd_T_N Left Ahead	U+O	E -		1	19	-	77	1915:2014	285+472	10.2 : 10.2%	24	24	0	0.4	16.8	0.8
3/3	1_Eston Rd_T_N Right	U	E		1	19	-	101	1775	323	31.3%	-	-	-	1.3	47.2	2.9
6/1	1_A66_T_E Right	U	D		1	8	-	103	1976	162	63.7%	-	-	-	2.3	78.8	3.9
7/2+7/1	1_A66_T_E Left Ahead	U	B -		1	55	-	914	1975:2015	971+49	89.6 : 89.6%	-	-	-	10.0	39.4	29.0
7/3	1_A66_T_E Ahead	U	B		1	55	-	965	2115	1077	89.6%	-	-	-	10.6	39.4	30.6
8/1	1_Eston Rd_T_N Ahead	U	-		-	-	-	127	1965	1965	6.5%	-	-	-	0.0	1.0	0.0
11/1	1_Eston Rd_T_S Ahead Left	U	F		1	19	-	306	1851	337	90.9%	-	-	-	7.7	90.9	13.1
11/2	1_Eston Rd T S Right	U	F		1	19	-	46	1920	349	13.2%	-	-	-	0.6	43.7	1.3
14/1	1_A66_T_W Right	U	C		1	8	-	98	1914	157	62.6%	-	-	-	2.1	78.8	3.7
15/2+15/1	1_A66_T_W Left Ahead	U+O	A P		1	55:93	-	688	1975:1905	906+264	58.8 : 58.8%	32	123	0	3.5	18.2	11.5
15/3	1_A66_T_W Ahead	U	A		1	55	-	566	2115	1077	52.6%	-	-	-	3.4	21.6	12.0

C1	Stream: 1 PRC for Signalled Lanes (%):	-1.0	Total Delay for Signalled Lanes (pcuHr):	41.80	Cycle Time (s): 110
C1	Stream: 2 PRC for Signalled Lanes (%):	0.0	Total Delay for Signalled Lanes (pcuHr):	0.00	Cycle Time (s): 110
	PRC Over All Lanes (%):	-1.0	Total Delay Over All Lanes(pcuHr):	41.84	

Basic Results Summary

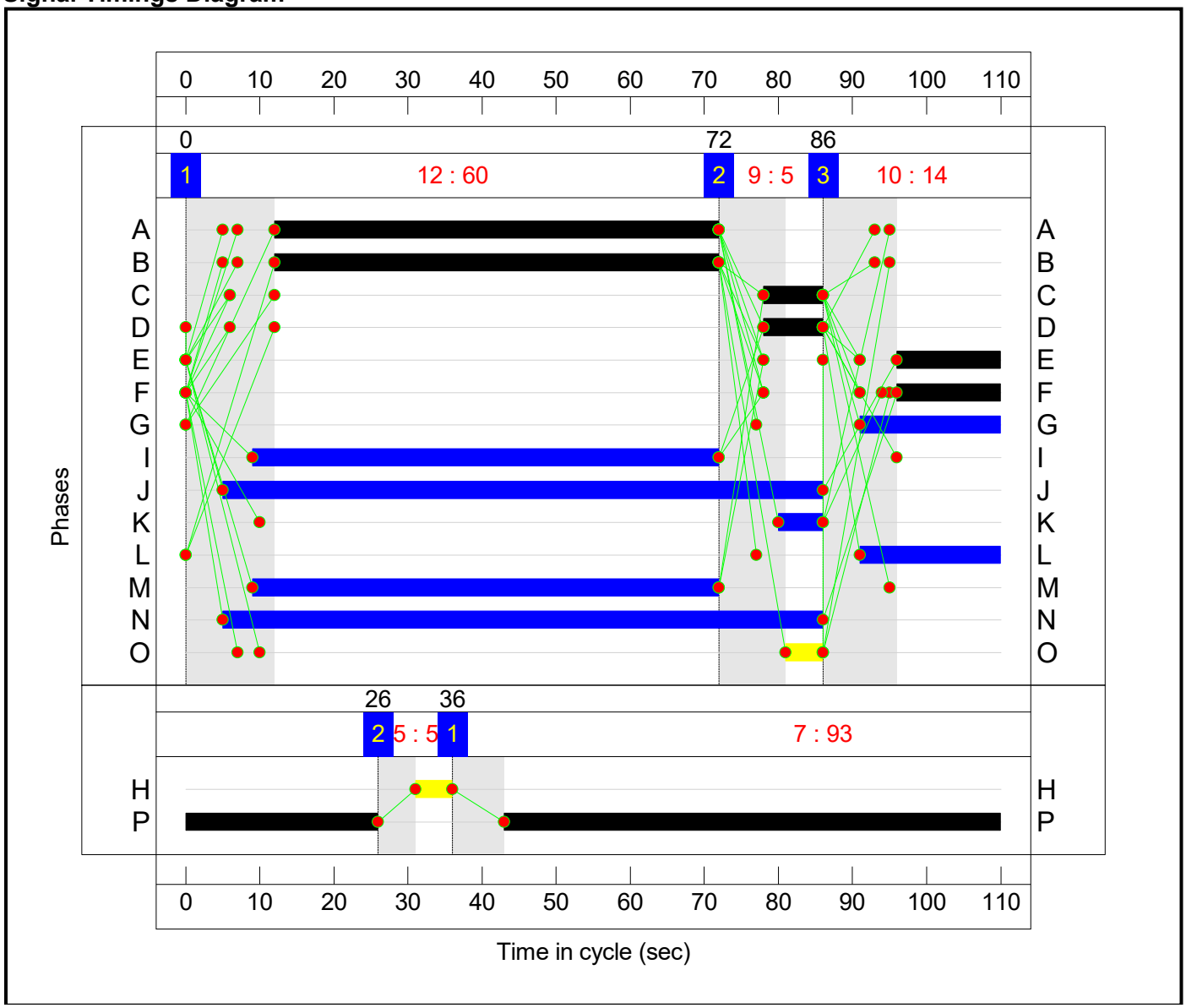
Scenario 2: '2033 PM Do Min' (FG2: '2033 PM Do Min', Plan 1: 'Network Control Plan 1')

Traffic Flows, Actual

Actual Flow :

		Destination				
		A	B	C	D	Tot.
Origin	A	0	155	47	185	387
	B	66	0	61	901	1028
	C	31	26	0	170	227
	D	162	1839	103	0	2104
	Tot.	259	2020	211	1256	3746

Signal Timings Diagram



Basic Results Summary

Network Results

Item	Lane Description	Lane Type	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)	Mean Max Queue (pcu)
Network: A66 / Eston Road	-	-	-		-	-	-	-	-	-	**85.9%**	**127**	**187**	**3**	**32.8**	-	-
A66 - Eston Road	-	-	-		-	-	-	-	-	-	**85.9%**	**127**	**187**	**3**	**32.8**	-	-
3/2+3/1	1_Eston Rd_T_N Left Ahead	U+O	E -		1	14	-	202	1915:2014	159+523	29.6 : 29.6%	86	69	0	0.8	13.5	1.5
3/3	1_Eston Rd_T_N Right	U	E		1	14	-	185	1775	242	76.4%	-	-	-	3.9	75.7	7.0
6/1	1_A66_T_E Right	U	D		1	8	-	66	1976	162	40.8%	-	-	-	1.2	66.7	2.2
7/2+7/1	1_A66_T_E Left Ahead	U	B -		1	60	-	484	1975:2015	985+142	42.9 : 42.9%	-	-	-	2.0	15.1	8.0
7/3	1_A66_T_E Ahead	U	B		1	60	-	478	2115	1173	40.8%	-	-	-	2.2	16.7	8.7
8/1	1_Eston Rd_T_N Ahead	U	-		-	-	-	150	1965	1965	7.6%	-	-	-	0.0	1.0	0.0
11/1	1_Eston Rd_T_S Ahead Left	U	F		1	14	-	201	1836	250	80.3%	-	-	-	4.5	79.9	7.8
11/2	1_Eston Rd_T_S Right	U	F		1	14	-	26	1920	262	9.9%	-	-	-	0.4	49.3	0.7
14/1	1_A66_T_W Right	U	C		1	8	-	103	1914	157	65.8%	-	-	-	2.3	81.5	4.0
15/2+15/1	1_A66_T_W Left Ahead	U+O	A P		1	60:93	-	1034	1975:1905	1015+189	85.9 : 85.9%	41	118	3	7.8	27.1	25.5
15/3	1_A66_T_W Ahead	U	A		1	60	-	967	2115	1173	82.4%	-	-	-	7.7	28.7	26.5

C1	Stream: 1 PRC for Signalled Lanes (%):	4.7	Total Delay for Signalled Lanes (pcuHr):	32.75	Cycle Time (s): 110
C1	Stream: 2 PRC for Signalled Lanes (%):	0.0	Total Delay for Signalled Lanes (pcuHr):	0.00	Cycle Time (s): 110
	PRC Over All Lanes (%):	4.7	Total Delay Over All Lanes(pcuHr):	32.79	

Basic Results Summary

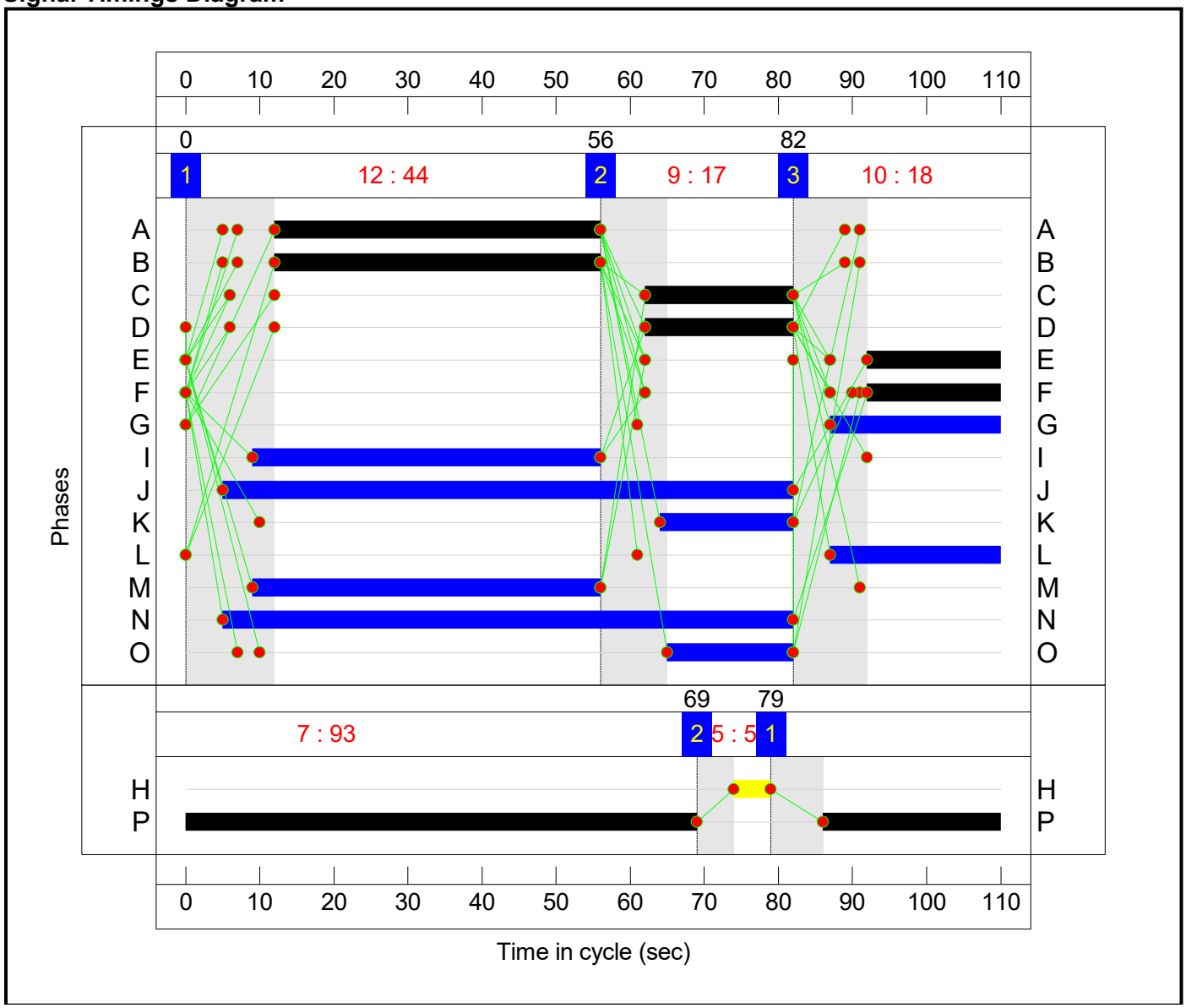
Scenario 3: '2033 AM+Dorman' (FG3: '2033 AM+Dorman', Plan 1: 'Network Control Plan 1')

Traffic Flows, Actual

Actual Flow :

		Destination				
		A	B	C	D	Tot.
Origin	A	0	257	64	206	527
	B	416	0	44	1835	2295
	C	124	46	0	235	405
	D	312	1107	98	0	1517
	Tot.	852	1410	206	2276	4744

Signal Timings Diagram



Basic Results Summary

Network Results

Item	Lane Description	Lane Type	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)	Mean Max Queue (pcu)
Network: A66 / Eston Road	-	-	-		-	-	-	-	-	-	**111.5%**	**169**	**372**	**28**	**207.6**	-	-
A66 - Eston Road	-	-	-		-	-	-	-	-	-	**111.5%**	**169**	**372**	**28**	**207.6**	-	-
3/2+3/1	1_Eston Rd_T_N Left Ahead	U+O	E -		1	18	-	321	1915:2014	148+596	43.2 : 43.2%	105	152	0	1.1	12.0	2.1
3/3	1_Eston Rd_T_N Right	U	E		1	18	-	206	1775	307	67.2%	-	-	-	3.4	60.1	6.8
6/1	1_A66_T_E Right	U	D		1	20	-	416	1976	377	110.3%	-	-	-	30.5	263.7	37.7
7/2+7/1	1_A66_T_E Left Ahead	U	B -		1	44	-	914	1975:2015	783+40	111.1 : 111.1%	-	-	-	63.1	248.6	93.9
7/3	1_A66_T_E Ahead	U	B		1	44	-	965	2115	865	111.5%	-	-	-	68.1	254.2	86.9
8/1	1_Eston Rd_T_N Ahead	U	-		-	-	-	162	1965	1965	8.2%	-	-	-	0.0	1.0	0.0
11/1	1_Eston Rd_T_S Ahead Left	U	F		1	18	-	359	1873	324	111.0%	-	-	-	28.6	287.0	34.7
11/2	1_Eston Rd_T_S Right	U	F		1	18	-	46	1920	332	13.9%	-	-	-	0.6	44.9	1.3
14/1	1_A66_T_W Right	U	C		1	20	-	98	1914	365	26.8%	-	-	-	1.2	44.7	2.7
15/2+15/1	1_A66_T_W Left Ahead	U+O	A P		1	44:93	-	855	1975:1905	716+411	75.9 : 75.9%	64	220	28	5.8	24.6	15.0
15/3	1_A66_T_W Ahead	U	A		1	44	-	564	2115	865	65.2%	-	-	-	5.0	32.1	14.7

C1	Stream: 1 PRC for Signalled Lanes (%):	-23.9	Total Delay for Signalled Lanes (pcuHr):	207.51	Cycle Time (s): 110
C1	Stream: 2 PRC for Signalled Lanes (%):	0.0	Total Delay for Signalled Lanes (pcuHr):	0.00	Cycle Time (s): 110
	PRC Over All Lanes (%):	-23.9	Total Delay Over All Lanes(pcuHr):	207.56	

Basic Results Summary

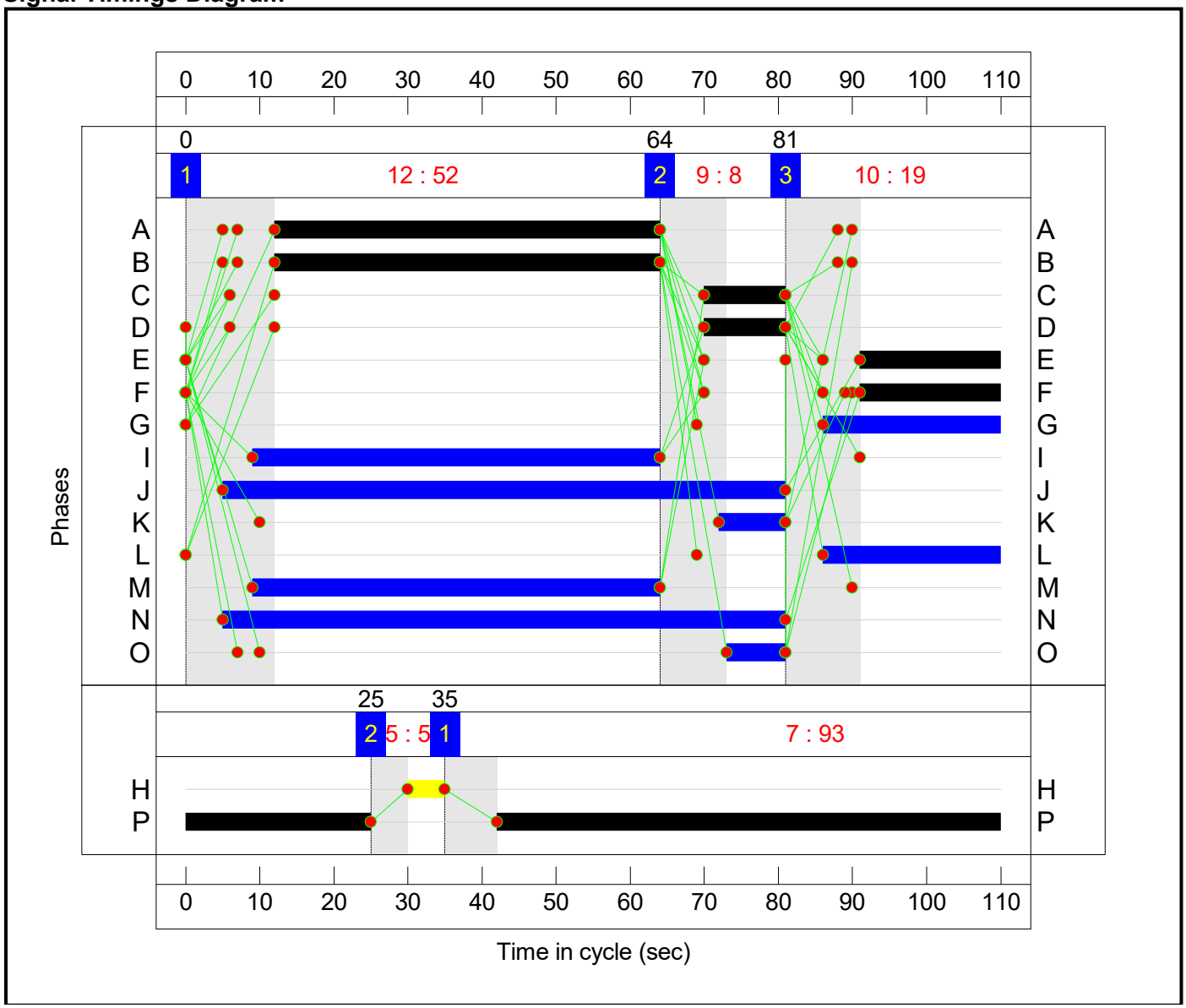
Scenario 4: '2033 PM+Dorman' (FG4: '2033 PM+Dorman', Plan 1: 'Network Control Plan 1')

Traffic Flows, Actual

Actual Flow :

		Destination				
		A	B	C	D	Tot.
Origin	A	0	414	90	315	819
	B	209	0	61	901	1171
	C	54	26	0	170	250
	D	233	1856	103	0	2192
	Tot.	496	2296	254	1386	4432

Signal Timings Diagram



Basic Results Summary

Network Results

Item	Lane Description	Lane Type	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)	Mean Max Queue (pcu)
Network: A66 / Eston Road	-	-	-		-	-	-	-	-	-	**100.2%**	**200**	**447**	**0**	**75.2**	-	-
A66 - Eston Road	-	-	-		-	-	-	-	-	-	**100.2%**	**200**	**447**	**0**	**75.2**	-	-
3/2+3/1	1_Eston Rd_T_N Left Ahead	U+O	E -		1	19	-	504	1915:2014	114+523	79.1 : 79.1%	153	261	0	3.3	23.9	9.9
3/3	1_Eston Rd_T_N Right	U	E		1	19	-	315	1775	323	97.6%	-	-	-	11.1	126.5	16.7
6/1	1_A66_T_E Right	U	D		1	11	-	209	1976	216	97.0%	-	-	-	8.6	148.2	12.1
7/2+7/1	1_A66_T_E Left Ahead	U	B -		1	52	-	484	1975:2015	860+124	49.2 : 49.2%	-	-	-	2.7	20.4	9.6
7/3	1_A66_T_E Ahead	U	B		1	52	-	478	2115	1019	46.9%	-	-	-	3.0	22.4	10.1
8/1	1_Eston Rd_T_N Ahead	U	-		-	-	-	193	1965	1965	9.8%	-	-	-	0.1	1.0	0.1
11/1	1_Eston Rd_T_S Ahead Left	U	F		1	19	-	224	1853	337	66.5%	-	-	-	3.6	57.6	7.3
11/2	1_Eston Rd_T_S Right	U	F		1	19	-	26	1920	349	7.4%	-	-	-	0.3	43.0	0.7
14/1	1_A66_T_W Right	U	C		1	11	-	103	1914	209	49.3%	-	-	-	1.8	63.0	3.4
15/2+15/1	1_A66_T_W Left Ahead	U+O	A P		1	52:93	-	1106	1975:1905	871+233	100.2 : 100.2%	47	186	0	24.1	78.4	46.9
15/3	1_A66_T_W Ahead	U	A		1	52	-	983	2115	1019	96.5%	-	-	-	16.6	60.8	38.0

C1	Stream: 1 PRC for Signalled Lanes (%):	-11.3	Total Delay for Signalled Lanes (pcuHr):	75.14	Cycle Time (s): 110
C1	Stream: 2 PRC for Signalled Lanes (%):	0.0	Total Delay for Signalled Lanes (pcuHr):	0.00	Cycle Time (s): 110
	PRC Over All Lanes (%):	-11.3	Total Delay Over All Lanes(pcuHr):	75.19	

Basic Results Summary

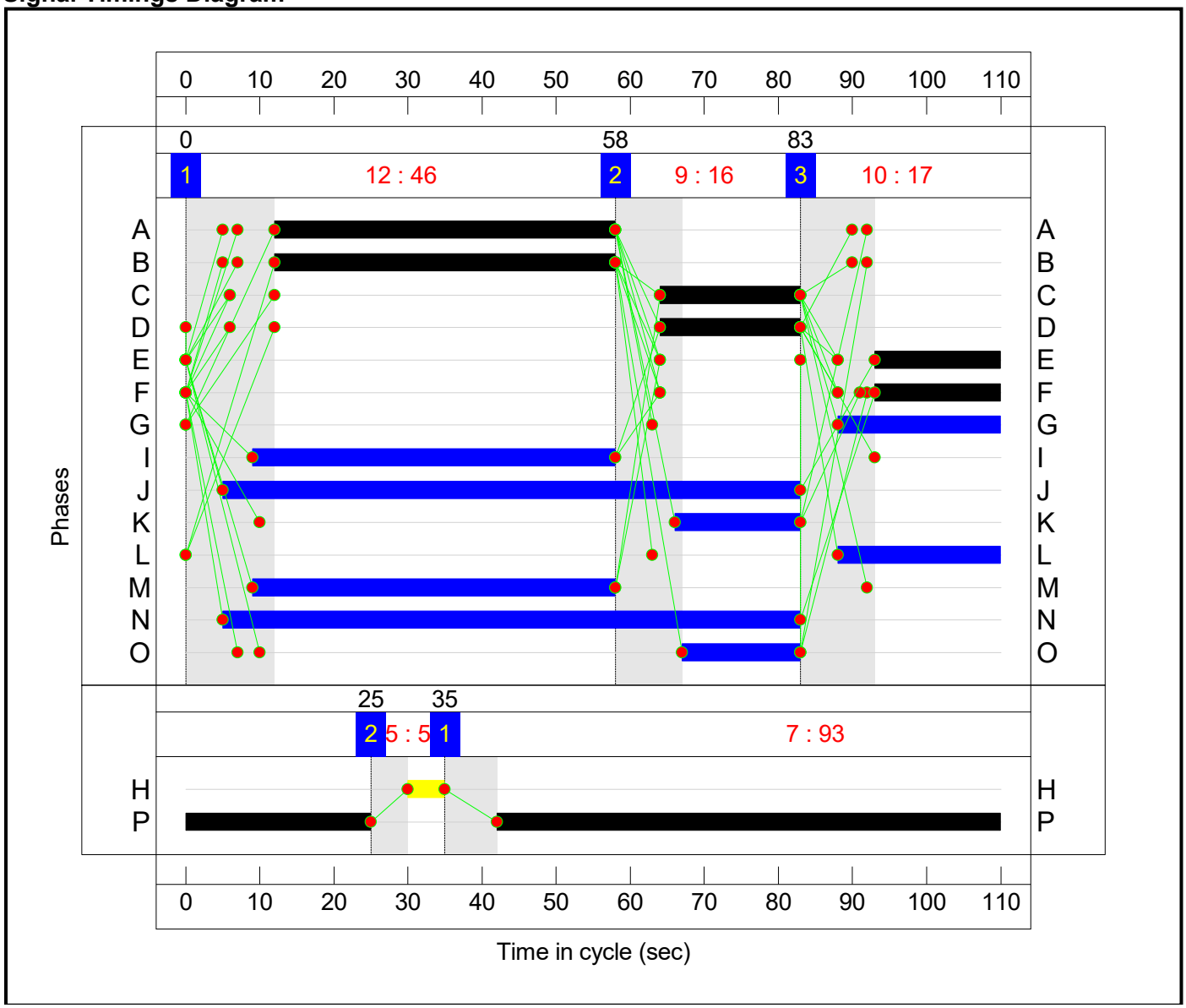
Scenario 7: '2033 AM Cumulative' (FG7: '2033 AM Cumulative', Plan 1: 'Network Control Plan 1')

Traffic Flows, Actual

Actual Flow :

		Destination				
		A	B	C	D	Tot.
Origin	A	0	257	64	206	527
	B	422	0	56	2113	2591
	C	124	79	0	235	438
	D	315	1642	100	0	2057
	Tot.	861	1978	220	2554	5613

Signal Timings Diagram



Basic Results Summary

Network Results

Item	Lane Description	Lane Type	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)	Mean Max Queue (pcu)
Network: A66 / Eston Road	-	-	-		-	-	-	-	-	-	**123.1%**	**167**	**403**	**2**	**379.1**	-	-
A66 - Eston Road	-	-	-		-	-	-	-	-	-	**123.1%**	**167**	**403**	**2**	**379.1**	-	-
3/2+3/1	1_Eston Rd_T_N Left Ahead	U+O	E -		1	17	-	321	1915:2014	136+547	47.0 : 47.0%	110	147	0	1.1	12.9	2.1
3/3	1_Eston Rd_T_N Right	U	E		1	17	-	206	1775	290	70.9%	-	-	-	3.7	64.3	7.1
6/1	1_A66_T_E Right	U	D		1	19	-	422	1976	359	117.5%	-	-	-	42.2	360.2	49.2
7/2+7/1	1_A66_T_E Left Ahead	U	B -		1	46	-	1057	1975:2015	814+46	123.0 : 123.0%	-	-	-	120.5	410.6	180.4
7/3	1_A66_T_E Ahead	U	B		1	46	-	1112	2115	904	123.1%	-	-	-	127.1	411.4	147.1
8/1	1_Eston Rd_T_N Ahead	U	-		-	-	-	164	1965	1965	8.3%	-	-	-	0.0	1.0	0.0
11/1	1_Eston Rd_T_S Ahead Left	U	F		1	17	-	359	1873	306	117.1%	-	-	-	37.2	373.1	43.2
11/2	1_Eston Rd_T_S Right	U	F		1	17	-	79	1920	314	25.1%	-	-	-	1.0	47.8	2.3
14/1	1_A66_T_W Right	U	C		1	19	-	100	1914	348	28.7%	-	-	-	1.3	46.1	2.8
15/2+15/1	1_A66_T_W Left Ahead	U+O	A P		1	46:93	-	1090	1975:1905	762+310	101.7 : 101.7%	57	255	2	29.3	96.7	50.2
15/3	1_A66_T_W Ahead	U	A		1	46	-	867	2115	904	95.9%	-	-	-	15.5	64.5	33.7

C1	Stream: 1 PRC for Signalled Lanes (%):	-36.7	Total Delay for Signalled Lanes (pcuHr):	379.03	Cycle Time (s): 110
C1	Stream: 2 PRC for Signalled Lanes (%):	0.0	Total Delay for Signalled Lanes (pcuHr):	0.00	Cycle Time (s): 110
	PRC Over All Lanes (%):	-36.7	Total Delay Over All Lanes(pcuHr):	379.08	

Basic Results Summary

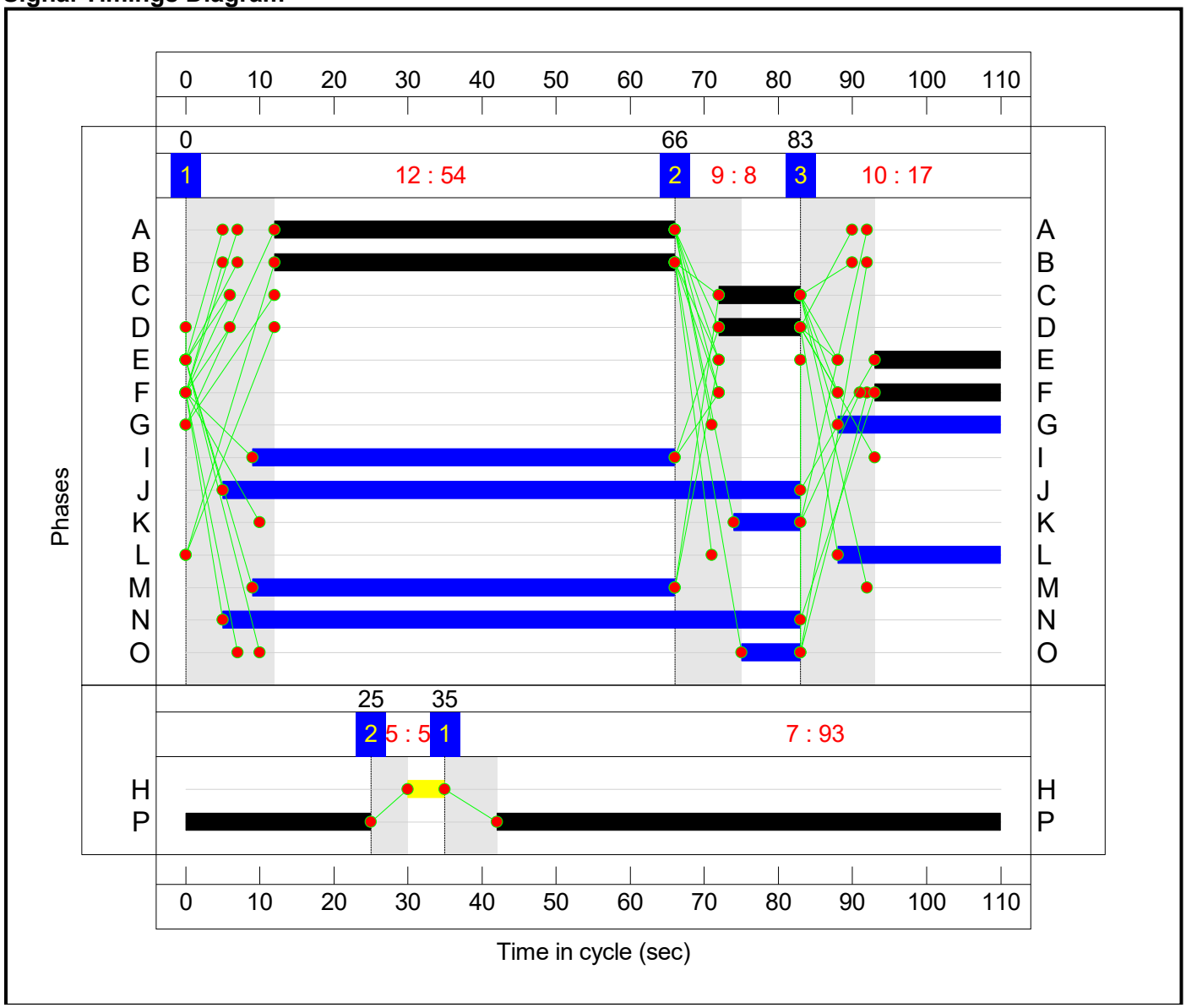
Scenario 8: '2033 PM Cumulative' (FG8: '2033 PM Cumulative', Plan 1: 'Network Control Plan 1')

Traffic Flows, Actual

Actual Flow :

		Destination				
		A	B	C	D	Tot.
Origin	A	0	414	90	315	819
	B	222	0	104	1547	1873
	C	54	37	0	170	261
	D	244	2145	113	0	2502
	Tot.	520	2596	307	2032	5455

Signal Timings Diagram



Basic Results Summary

Network Results

Item	Lane Description	Lane Type	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)	Mean Max Queue (pcu)
Network: A66 / Eston Road	-	-	-		-	-	-	-	-	-	**110.8%**	**220**	**437**	**0**	**198.4**	-	-
A66 - Eston Road	-	-	-		-	-	-	-	-	-	**110.8%**	**220**	**437**	**0**	**198.4**	-	-
3/2+3/1	1_Eston Rd_T_N Left Ahead	U+O	E -		1	17	-	504	1915:2014	112+516	80.3 : 80.3%	158	256	0	3.6	25.4	10.3
3/3	1_Eston Rd_T_N Right	U	E		1	17	-	315	1775	290	108.5%	-	-	-	22.5	257.1	27.8
6/1	1_A66_T_E Right	U	D		1	11	-	222	1976	216	103.0%	-	-	-	12.5	202.8	16.2
7/2+7/1	1_A66_T_E Left Ahead	U	B -		1	54	-	817	1975:2015	890+130	80.1 : 80.1%	-	-	-	6.7	29.6	21.7
7/3	1_A66_T_E Ahead	U	B		1	54	-	834	2115	1058	78.9%	-	-	-	7.1	30.6	22.7
8/1	1_Eston Rd_T_N Ahead	U	-		-	-	-	203	1965	1965	10.3%	-	-	-	0.1	1.0	0.1
11/1	1_Eston Rd_T_S Ahead Left	U	F		1	17	-	224	1853	303	73.9%	-	-	-	4.1	65.7	7.8
11/2	1_Eston Rd_T_S Right	U	F		1	17	-	37	1920	314	11.8%	-	-	-	0.5	45.8	1.0
14/1	1_A66_T_W Right	U	C		1	11	-	113	1914	209	54.1%	-	-	-	2.0	65.0	3.8
15/2+15/1	1_A66_T_W Left Ahead	U+O	A P		1	54:93	-	1248	1975:1905	907+220	110.8 : 110.8%	62	181	0	78.8	227.2	117.6
15/3	1_A66_T_W Ahead	U	A		1	54	-	1141	2115	1058	107.9%	-	-	-	60.6	191.2	85.1

C1 Stream: 1 PRC for Signalled Lanes (%): -23.1
C1 Stream: 2 PRC for Signalled Lanes (%): 0.0
PRC Over All Lanes (%): -23.1

Total Delay for Signalled Lanes (pcuHr): 198.31
Total Delay for Signalled Lanes (pcuHr): 0.00
Total Delay Over All Lanes(pcuHr): 198.36

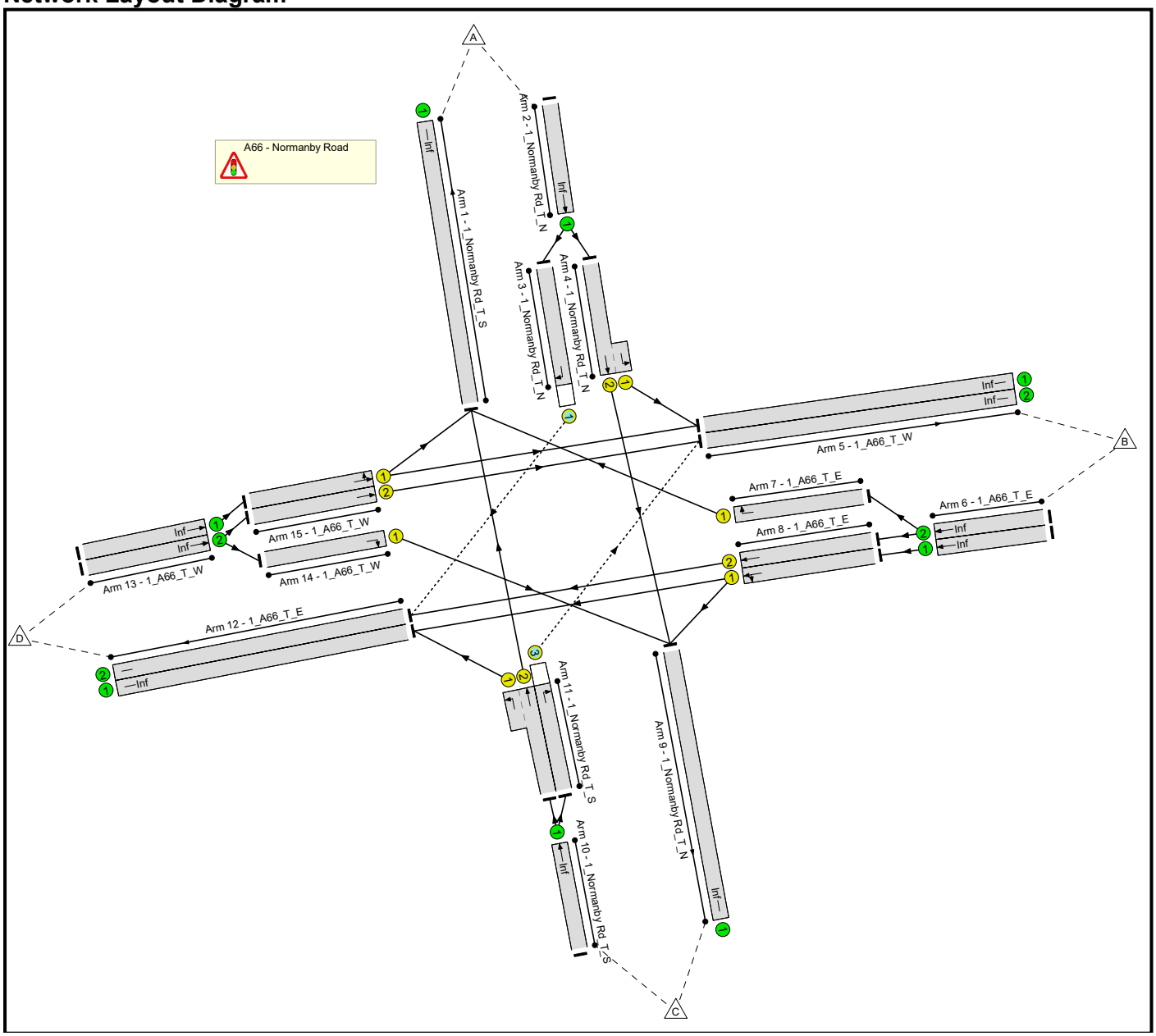
Cycle Time (s): 110
Cycle Time (s): 110

Basic Results Summary

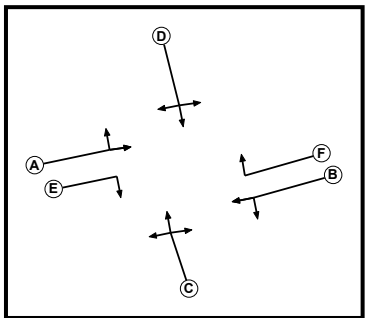
User and Project Details

Project:	**Teesworks**
Title:	**A66 - Normanby Road**

Network Layout Diagram

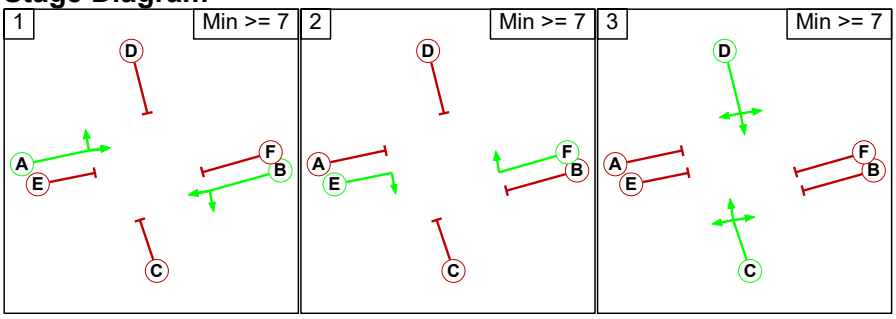


Phase Diagram



Basic Results Summary

Stage Diagram



Phase Intergreens Matrix

		Starting Phase					
		A	B	C	D	E	F
Terminating Phase	A		-	8	8	8	8
	B	-		8	8	8	8
	C	7	7		-	7	7
	D	7	7	-		7	7
	E	8	8	7	7		-
	F	8	8	7	7	-	

Scenario 1: '2033 AM Do Min' (FG1: '2033 AM Do Min', Plan 1: 'Network Control Plan 1')

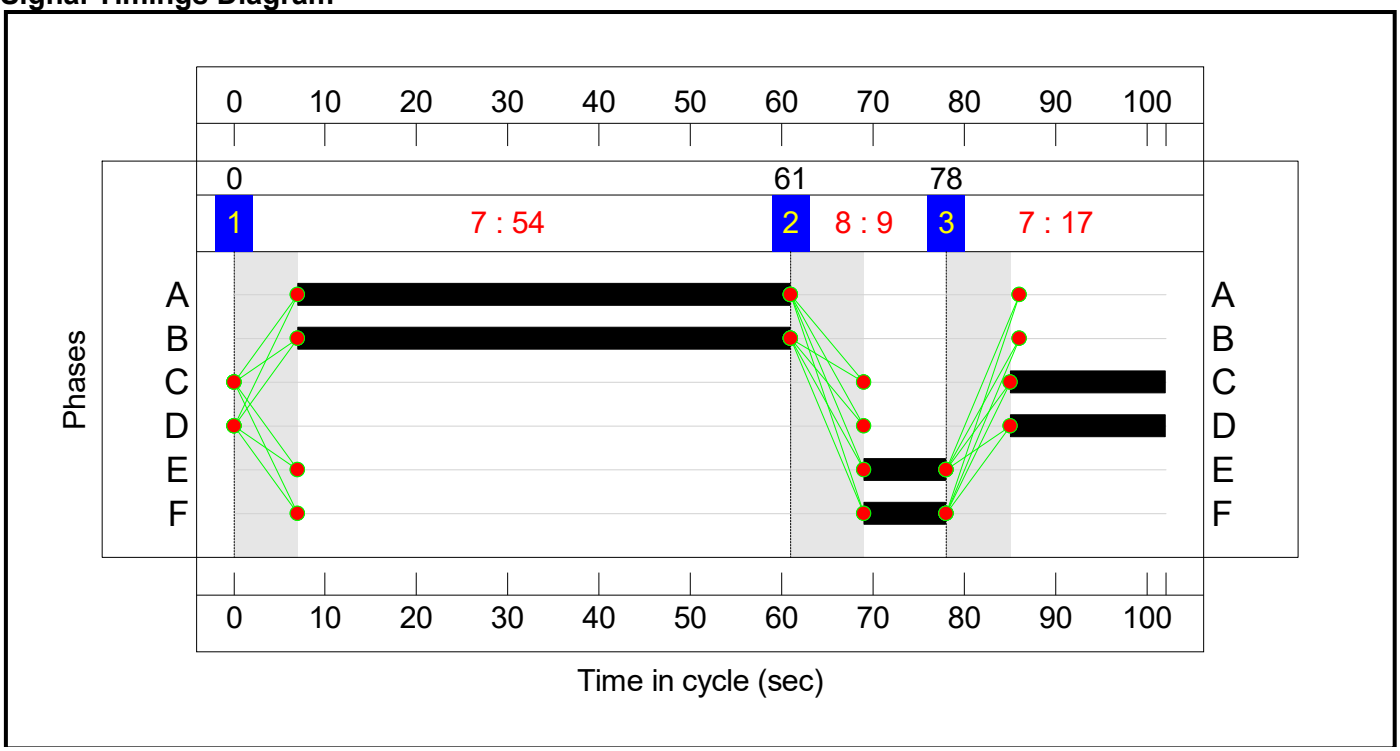
Traffic Flows, Actual

Actual Flow :

		Destination				
		A	B	C	D	Tot.
Origin	A	0	31	34	86	151
	B	87	0	49	1836	1972
	C	102	40	0	224	366
	D	105	963	165	0	1233
	Tot.	294	1034	248	2146	3722

Basic Results Summary

Signal Timings Diagram



Basic Results Summary

Network Results

Item	Lane Description	Lane Type	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)	Mean Max Queue (pcu)
Network: A66 - Normanby Road	-	-	-		-	-	-	-	-	-	**89.0%**	**95**	**0**	**31**	**39.2**	-	-
A66 - Normanby Road	-	-	-		-	-	-	-	-	-	**89.0%**	**95**	**0**	**31**	**39.2**	-	-
3/1	1_Normanby Rd_T_N Right	O	D		1	17	-	86	1988	104	82.4%	55	0	31	3.1	130.8	4.3
4/2+4/1	1_Normanby Rd_T_N Left Ahead	U	D		1	17	-	65	2135:1752	239+218	14.2 : 14.2%	-	-	-	0.7	39.8	0.9
7/1	1_A66_T_E Right	U	F		1	9	-	87	1883	185	47.1%	-	-	-	1.5	61.8	2.8
8/1	1_A66_T_E Left Ahead	U	B		1	54	-	939	1956	1055	89.0%	-	-	-	9.2	35.4	27.3
8/2	1_A66_T_E Ahead	U	B		1	54	-	946	2105	1135	83.3%	-	-	-	7.6	29.0	24.8
11/2+11/1	1_Normanby Rd_T_S Ahead Left	U	C		1	17	-	326	2105:1945	129+283	79.1 : 79.1%	-	-	-	5.3	58.9	8.8
11/3	1_Normanby Rd_T_S Right	O	C		1	17	-	40	2080	258	15.5%	40	0	0	0.5	45.6	1.0
12/2	1_A66_T_E	U	-		-	-	-	1032	1975	1975	52.3%	-	-	-	0.8	2.7	22.2
14/1	1_A66_T_W Right	U	E		1	9	-	165	1902	186	88.5%	-	-	-	5.1	111.0	7.6
15/1	1_A66_T_W Left Ahead	U	A		1	54	-	500	1925	1038	48.2%	-	-	-	2.5	18.0	9.2
15/2	1_A66_T_W Ahead	U	A		1	54	-	568	2095	1130	50.3%	-	-	-	2.8	18.1	10.6

C1 PRC for Signalled Lanes (%): 1.1 Total Delay for Signalled Lanes (pcuHr): 38.46 Cycle Time (s): 102

PRC Over All Lanes (%): 1.1 Total Delay Over All Lanes(pcuHr): 39.22

Basic Results Summary

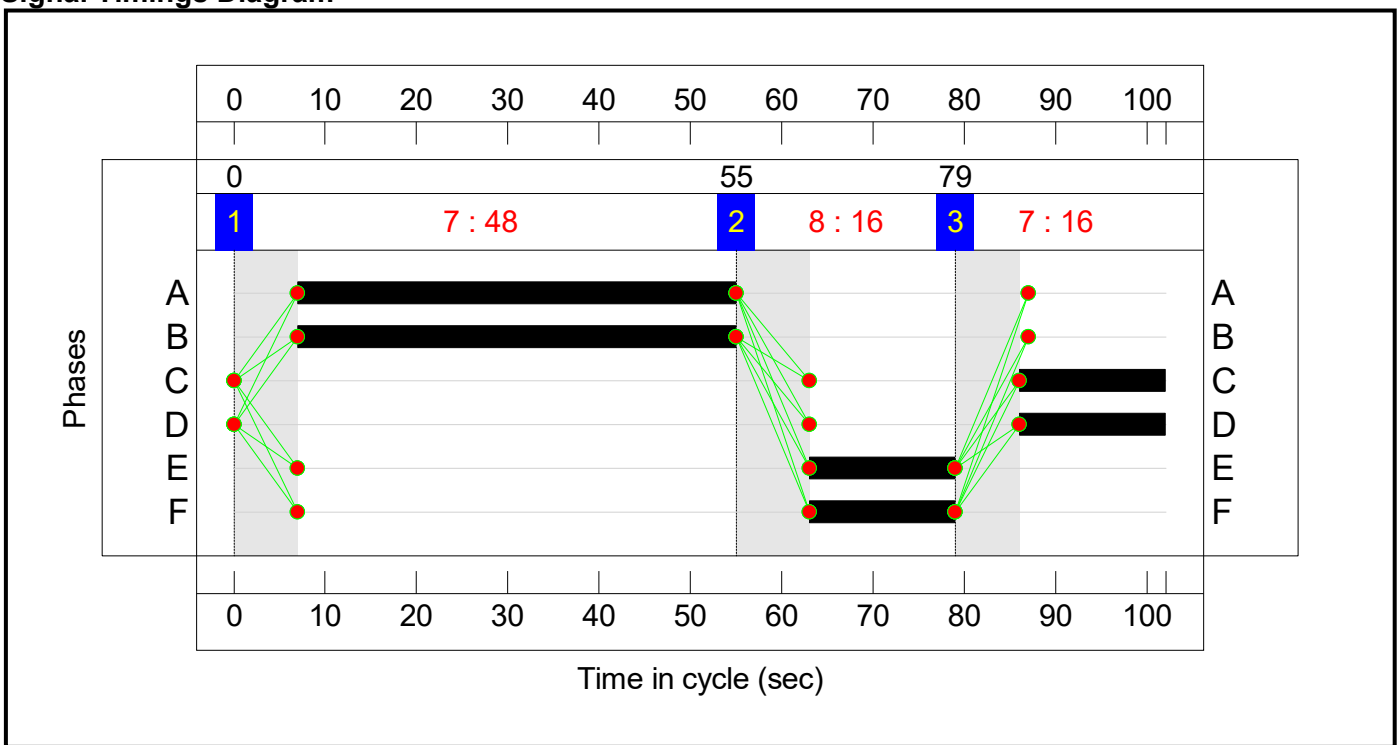
Scenario 2: '2033 PM Do Min' (FG2: '2033 PM Do Min', Plan 1: 'Network Control Plan 1')

Traffic Flows, Actual

Actual Flow :

		Destination				
		A	B	C	D	Tot.
Origin	A	0	158	173	114	445
	B	78	0	31	1227	1336
	C	103	92	0	155	350
	D	85	1496	252	0	1833
	Tot.	266	1746	456	1496	3964

Signal Timings Diagram



Basic Results Summary

Network Results

Item	Lane Description	Lane Type	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)	Mean Max Queue (pcu)
Network: A66 - Normanby Road	-	-	-		-	-	-	-	-	-	**82.4%**	**173**	**0**	**33**	**43.5**	-	-
A66 - Normanby Road	-	-	-		-	-	-	-	-	-	**82.4%**	**173**	**0**	**33**	**43.5**	-	-
3/1	1_Normanby Rd_T_N Right	O	D		1	16	-	114	1988	154	73.8%	107	0	7	2.8	88.4	4.4
4/2+4/1	1_Normanby Rd_T_N Left Ahead	U	D		1	16	-	331	2135:1752	229+209	75.5 : 75.5%	-	-	-	5.1	55.3	7.6
7/1	1_A66_T_E Right	U	F		1	16	-	78	1883	314	24.9%	-	-	-	1.0	44.6	2.1
8/1	1_A66_T_E Left Ahead	U	B		1	48	-	660	1957	940	70.2%	-	-	-	5.0	27.1	15.7
8/2	1_A66_T_E Ahead	U	B		1	48	-	598	2105	1011	59.1%	-	-	-	3.9	23.6	13.0
11/2+11/1	1_Normanby Rd_T_S Ahead Left	U	C		1	16	-	258	2105:1945	168+254	61.1 : 61.1%	-	-	-	3.5	48.9	4.9
11/3	1_Normanby Rd_T_S Right	O	C		1	16	-	92	2080	116	79.5%	66	0	26	2.9	115.2	4.2
12/2	1_A66_T_E	U	-		-	-	-	712	1975	1975	36.1%	-	-	-	0.3	1.7	10.9
14/1	1_A66_T_W Right	U	E		1	16	-	252	1902	317	79.5%	-	-	-	4.7	67.0	8.6
15/1	1_A66_T_W Left Ahead	U	A		1	48	-	752	1943	933	80.6%	-	-	-	6.7	32.2	20.0
15/2	1_A66_T_W Ahead	U	A		1	48	-	829	2095	1006	82.4%	-	-	-	7.5	32.7	22.3

C1 PRC for Signalled Lanes (%): 9.3 Total Delay for Signalled Lanes (pcuHr): 43.13 Cycle Time (s): 102

PRC Over All Lanes (%): 9.3 Total Delay Over All Lanes(pcuHr): 43.46

Basic Results Summary

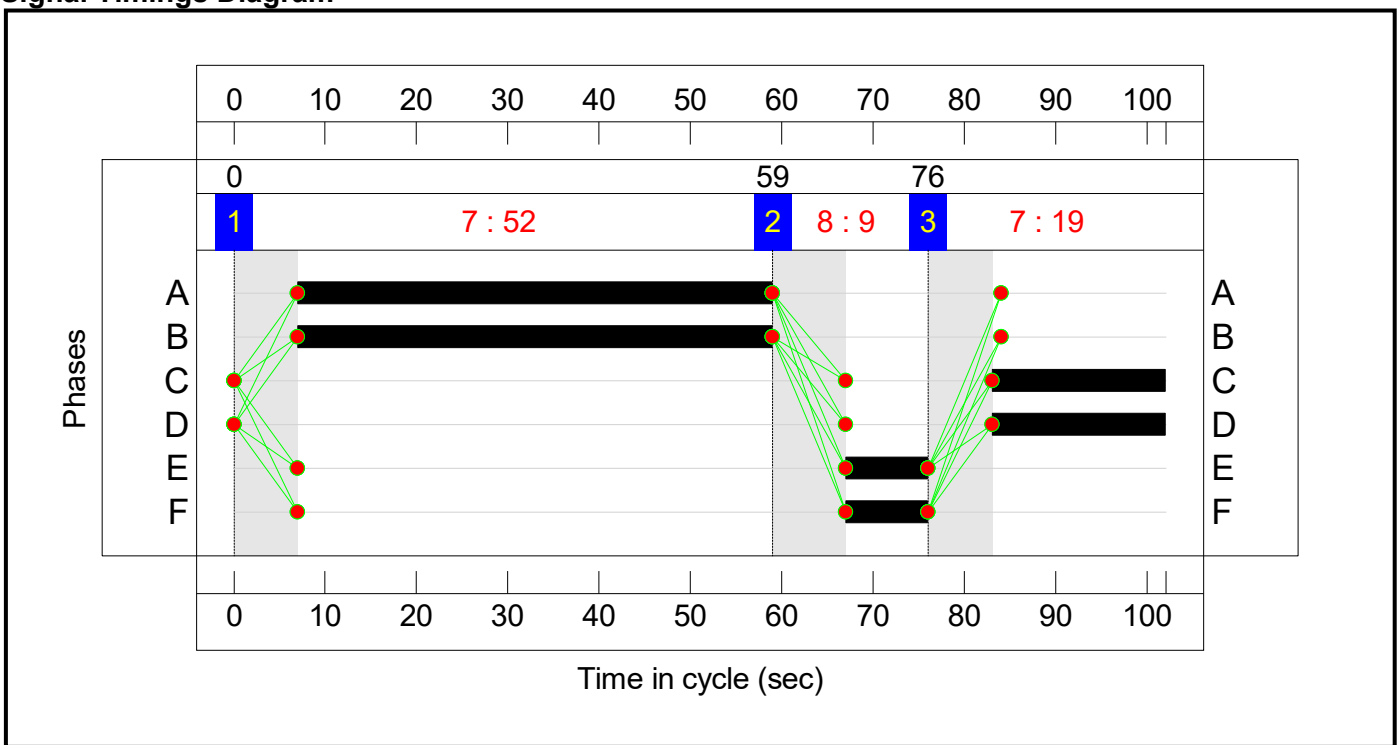
Scenario 3: '2033 AM+Dorman' (FG3: '2033 AM+Dorman', Plan 1: 'Network Control Plan 1')

Traffic Flows, Actual

Actual Flow :

		Destination				
		A	B	C	D	Tot.
Origin	A	0	39	43	109	191
	B	87	0	55	1935	2077
	C	131	49	0	224	404
	D	135	1110	165	0	1410
	Tot.	353	1198	263	2268	4082

Signal Timings Diagram



Basic Results Summary

Network Results

Item	Lane Description	Lane Type	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)	Mean Max Queue (pcu)
Network: A66 - Normanby Road	-	-	-		-	-	-	-	-	-	**96.8%**	**122**	**0**	**36**	**53.3**	-	-
A66 - Normanby Road	-	-	-		-	-	-	-	-	-	**96.8%**	**122**	**0**	**36**	**53.3**	-	-
3/1	1_Normanby Rd_T_N Right	O	D		1	19	-	109	1988	123	88.9%	73	0	36	4.3	142.3	5.9
4/2+4/1	1_Normanby Rd_T_N Left Ahead	U	D		1	19	-	82	2135:1752	260+236	16.5 : 16.5%	-	-	-	0.9	38.1	1.1
7/1	1_A66_T_E Right	U	F		1	9	-	87	1883	185	47.1%	-	-	-	1.5	61.8	2.8
8/1	1_A66_T_E Left Ahead	U	B		1	52	-	984	1956	1016	96.8%	-	-	-	16.0	58.7	36.3
8/2	1_A66_T_E Ahead	U	B		1	52	-	1006	2105	1094	92.0%	-	-	-	11.4	40.9	31.1
11/2+11/1	1_Normanby Rd_T_S Ahead Left	U	C		1	19	-	355	2105:1945	173+296	75.6 : 75.6%	-	-	-	5.2	52.4	8.6
11/3	1_Normanby Rd_T_S Right	O	C		1	19	-	49	2080	282	17.4%	49	0	0	0.6	43.6	1.2
12/2	1_A66_T_E	U	-		-	-	-	1115	1975	1975	56.5%	-	-	-	1.0	3.1	26.6
14/1	1_A66_T_W Right	U	E		1	9	-	165	1902	186	88.5%	-	-	-	5.1	111.0	7.6
15/1	1_A66_T_W Left Ahead	U	A		1	52	-	585	1921	998	58.6%	-	-	-	3.5	21.3	12.1
15/2	1_A66_T_W Ahead	U	A		1	52	-	660	2095	1089	60.6%	-	-	-	3.9	21.4	13.8

C1 PRC for Signalled Lanes (%): -7.6 Total Delay for Signalled Lanes (pcuHr): 52.35 Cycle Time (s): 102
PRC Over All Lanes (%): -7.6 Total Delay Over All Lanes(pcuHr): 53.32

Basic Results Summary

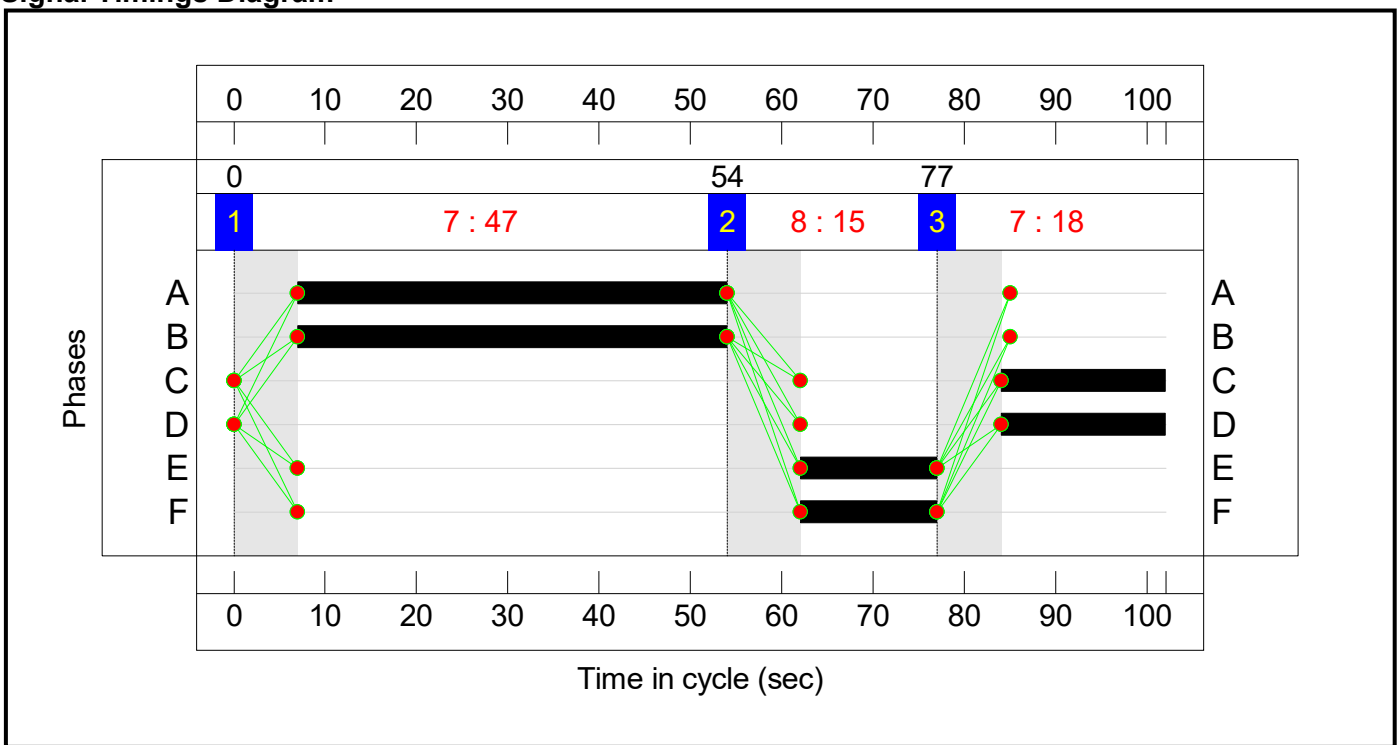
Scenario 4: '2033 PM+Dorman' (FG4: '2033 PM+Dorman', Plan 1: 'Network Control Plan 1')

Traffic Flows, Actual

Actual Flow :

		Destination				
		A	B	C	D	Tot.
Origin	A	0	175	192	127	494
	B	78	0	37	1352	1467
	C	117	100	0	155	372
	D	97	1560	252	0	1909
	Tot.	292	1835	481	1634	4242

Signal Timings Diagram



Basic Results Summary

Network Results

Item	Lane Description	Lane Type	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)	Mean Max Queue (pcu)
Network: A66 - Normanby Road	-	-	-		-	-	-	-	-	-	**88.0%**	**193**	**0**	**34**	**51.1**	-	-
A66 - Normanby Road	-	-	-		-	-	-	-	-	-	**88.0%**	**193**	**0**	**34**	**51.1**	-	-
3/1	1_Normanby Rd_T_N Right	O	D		1	18	-	127	1988	179	70.9%	127	0	0	2.8	78.1	4.6
4/2+4/1	1_Normanby Rd_T_N Left Ahead	U	D		1	18	-	367	2135:1752	249+227	77.0 : 77.0%	-	-	-	5.5	53.7	8.7
7/1	1_A66_T_E Right	U	F		1	15	-	78	1883	295	26.4%	-	-	-	1.0	46.1	2.1
8/1	1_A66_T_E Left Ahead	U	B		1	47	-	720	1957	921	78.2%	-	-	-	6.3	31.4	18.8
8/2	1_A66_T_E Ahead	U	B		1	47	-	669	2105	991	67.5%	-	-	-	4.9	26.5	15.7
11/2+11/1	1_Normanby Rd_T_S Ahead Left	U	C		1	18	-	272	2105:1945	204+270	57.4 : 57.4%	-	-	-	3.4	45.2	4.7
11/3	1_Normanby Rd_T_S Right	O	C		1	18	-	100	2080	116	86.0%	66	0	34	3.7	134.9	5.2
12/2	1_A66_T_E	U	-		-	-	-	796	1975	1975	40.3%	-	-	-	0.4	1.9	13.0
14/1	1_A66_T_W Right	U	E		1	15	-	252	1902	298	84.5%	-	-	-	5.4	76.9	9.4
15/1	1_A66_T_W Left Ahead	U	A		1	47	-	789	1941	913	86.4%	-	-	-	8.3	37.9	22.7
15/2	1_A66_T_W Ahead	U	A		1	47	-	868	2095	986	88.0%	-	-	-	9.4	38.8	25.7

C1 PRC for Signalled Lanes (%): 2.2 Total Delay for Signalled Lanes (pcuHr): 50.65 Cycle Time (s): 102
PRC Over All Lanes (%): 2.2 Total Delay Over All Lanes(pcuHr): 51.06

Basic Results Summary

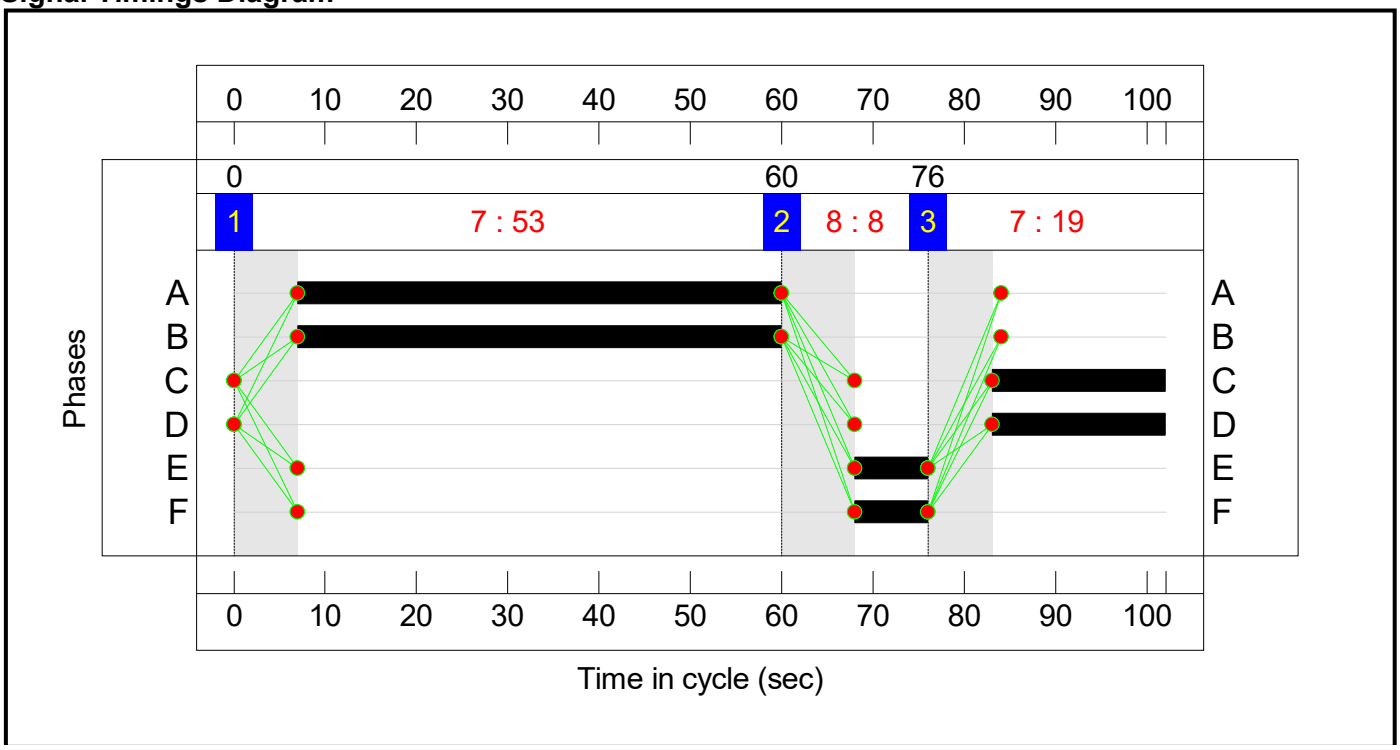
Scenario 7: '2033 AM+Cumulative' (FG7: '2033 AM+Cumulative', Plan 1: 'Network Control Plan 1')

Traffic Flows, Actual

Actual Flow :

		Destination				
		A	B	C	D	Tot.
Origin	A	0	39	43	109	191
	B	91	0	66	2199	2356
	C	131	70	0	235	436
	D	139	1627	168	0	1934
	Tot.	361	1736	277	2543	4917

Signal Timings Diagram



Basic Results Summary

Network Results

Item	Lane Description	Lane Type	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)	Mean Max Queue (pcu)
Network: A66 - Normanby Road	-	-	-		-	-	-	-	-	-	**106.3%**	**133**	**0**	**46**	**133.3**	-	-
A66 - Normanby Road	-	-	-		-	-	-	-	-	-	**106.3%**	**133**	**0**	**46**	**133.3**	-	-
3/1	1_Normanby Rd_T_N Right	O	D		1	19	-	109	1988	113	96.4%	63	0	46	5.8	191.9	7.4
4/2+4/1	1_Normanby Rd_T_N Left Ahead	U	D		1	19	-	82	2135:1752	260+236	16.5 : 16.5%	-	-	-	0.9	38.1	1.1
7/1	1_A66_T_E Right	U	F		1	8	-	91	1883	166	54.8%	-	-	-	1.7	68.1	3.0
8/1	1_A66_T_E Left Ahead	U	B		1	53	-	1100	1955	1035	106.3%	-	-	-	49.8	163.1	72.5
8/2	1_A66_T_E Ahead	U	B		1	53	-	1165	2105	1114	104.5%	-	-	-	44.0	136.0	68.3
11/2+11/1	1_Normanby Rd_T_S Ahead Left	U	C		1	19	-	366	2105:1945	167+299	78.6 : 78.6%	-	-	-	5.6	54.8	9.4
11/3	1_Normanby Rd_T_S Right	O	C		1	19	-	70	2080	282	24.8%	70	0	0	0.9	45.0	1.8
12/2	1_A66_T_E	U	-		-	-	-	1274	1975	1975	61.9%	-	-	-	1.3	3.7	30.7
14/1	1_A66_T_W Right	U	E		1	8	-	168	1902	168	100.1%	-	-	-	8.7	186.5	11.3
15/1	1_A66_T_W Left Ahead	U	A		1	53	-	839	1933	1023	82.0%	-	-	-	6.9	29.5	21.8
15/2	1_A66_T_W Ahead	U	A		1	53	-	927	2095	1109	83.6%	-	-	-	7.7	29.9	24.6

C1 PRC for Signalled Lanes (%): -18.1 Total Delay for Signalled Lanes (pcuHr): 131.98 Cycle Time (s): 102
PRC Over All Lanes (%): -18.1 Total Delay Over All Lanes(pcuHr): 133.25

Basic Results Summary

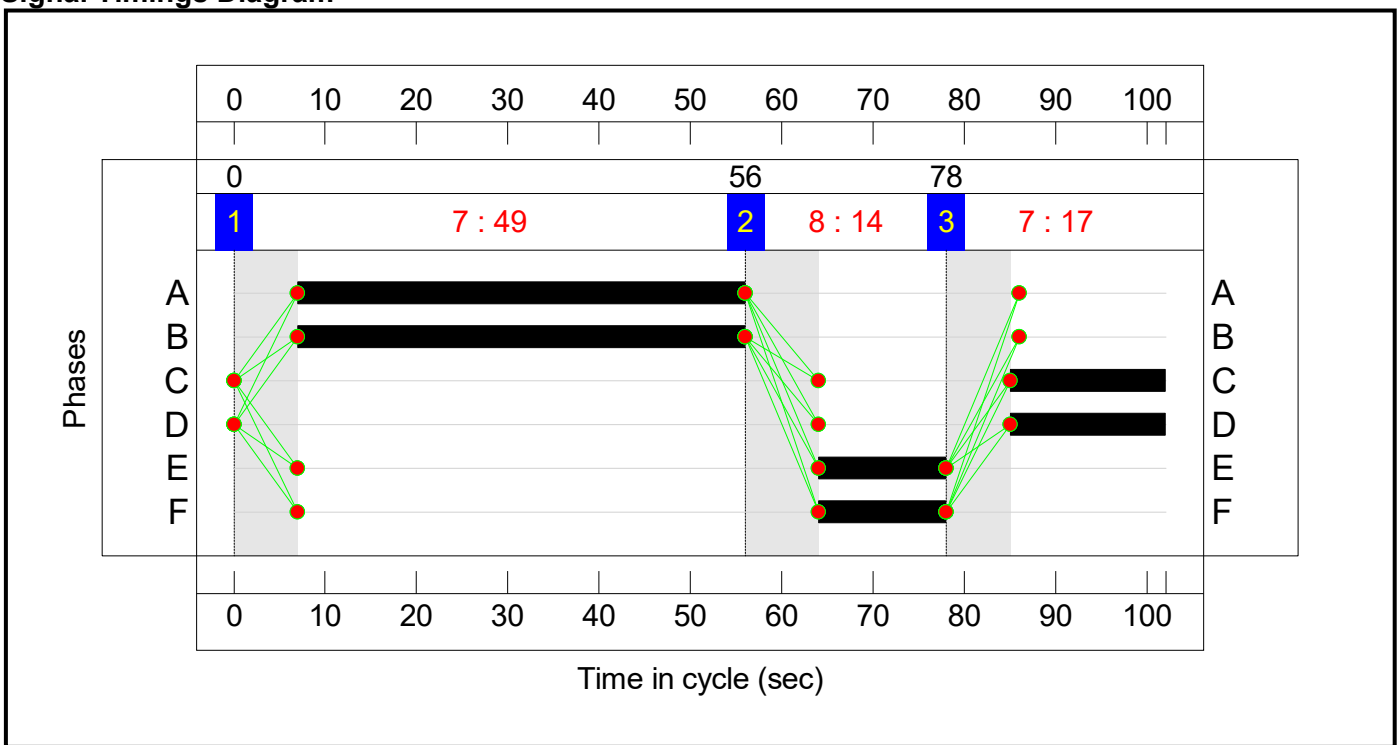
Scenario 8: '2033 PM+Cumulative' (FG8: '2033 PM+Cumulative', Plan 1: 'Network Control Plan 1')

Traffic Flows, Actual

Actual Flow :

		Destination				
		A	B	C	D	Tot.
Origin	A	0	175	192	127	494
	B	89	0	65	1959	2113
	C	117	109	0	159	385
	D	108	1862	279	0	2249
	Tot.	314	2146	536	2245	5241

Signal Timings Diagram



Basic Results Summary

Network Results

Item	Lane Description	Lane Type	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)	Mean Max Queue (pcu)
Network: A66 - Normanby Road	-	-	-		-	-	-	-	-	-	**104.6%**	**168**	**0**	**64**	**138.4**	-	-
A66 - Normanby Road	-	-	-		-	-	-	-	-	-	**104.6%**	**168**	**0**	**64**	**138.4**	-	-
3/1	1_Normanby Rd_T_N Right	O	D		1	17	-	127	1988	162	78.5%	114	0	13	3.3	93.6	5.1
4/2+4/1	1_Normanby Rd_T_N Left Ahead	U	D		1	17	-	367	2135:1752	239+218	80.2 : 80.2%	-	-	-	5.9	57.7	9.1
7/1	1_A66_T_E Right	U	F		1	14	-	89	1883	277	32.1%	-	-	-	1.2	48.5	2.5
8/1	1_A66_T_E Left Ahead	U	B		1	49	-	998	1954	958	104.2%	-	-	-	37.9	136.6	58.2
8/2	1_A66_T_E Ahead	U	B		1	49	-	1026	2105	1032	99.4%	-	-	-	22.0	77.1	43.4
11/2+11/1	1_Normanby Rd_T_S Ahead Left	U	C		1	17	-	276	2105:1945	191+260	61.1 : 61.1%	-	-	-	3.6	47.4	5.0
11/3	1_Normanby Rd_T_S Right	O	C		1	17	-	109	2080	104	104.6%	54	0	50	8.4	276.1	9.8
12/2	1_A66_T_E	U	-		-	-	-	1153	1975	1975	58.4%	-	-	-	1.1	3.3	28.0
14/1	1_A66_T_W Right	U	E		1	14	-	279	1902	280	99.7%	-	-	-	11.5	149.0	16.0
15/1	1_A66_T_W Left Ahead	U	A		1	49	-	941	1943	952	98.8%	-	-	-	19.5	74.4	38.9
15/2	1_A66_T_W Ahead	U	A		1	49	-	1029	2095	1027	100.2%	-	-	-	24.1	84.3	45.8

C1 PRC for Signalled Lanes (%): -16.3 Total Delay for Signalled Lanes (pcuHr): 137.33 Cycle Time (s): 102
PRC Over All Lanes (%): -16.3 Total Delay Over All Lanes(pcuHr): 138.40

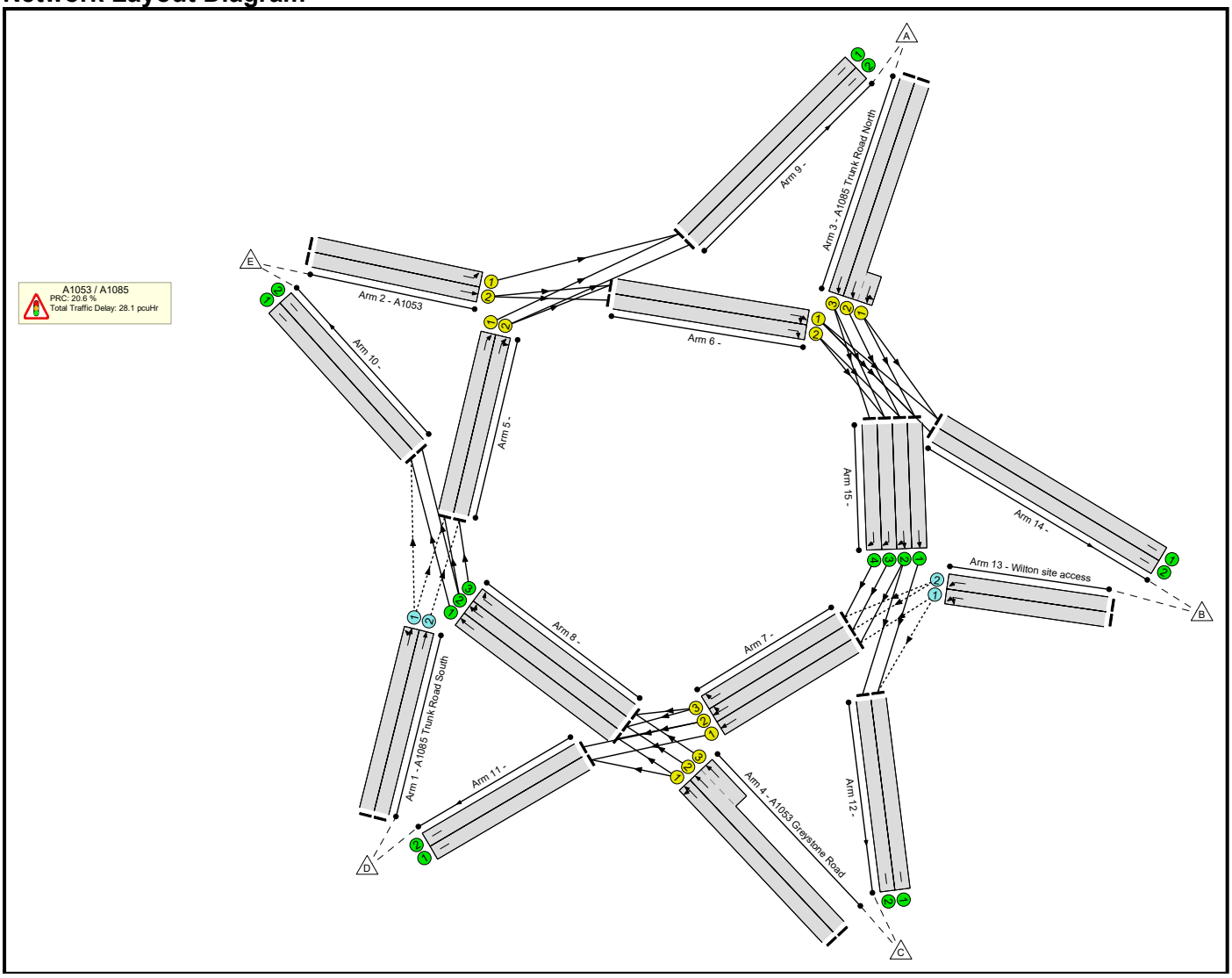
Basic Results Summary

User and Project Details

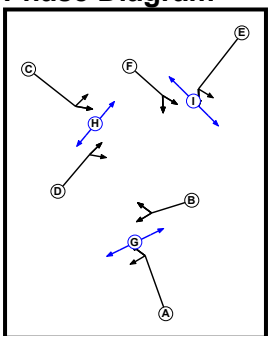
Project:	**Teesworks**
Title:	**A1053 / A1085 Trunk Road Roundabout**

Scenario 1: '2033 AM Base' (FG1: '2033 AM Base', Plan 1: 'Network Control Plan 1')

Network Layout Diagram



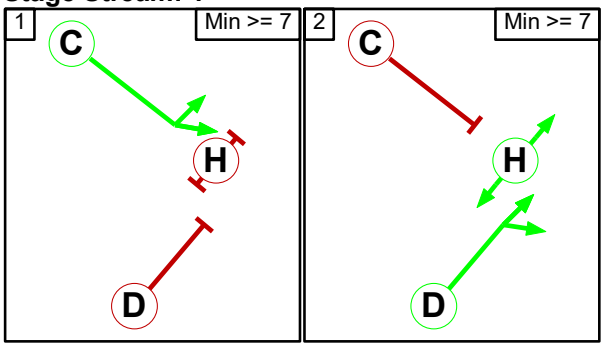
Phase Diagram



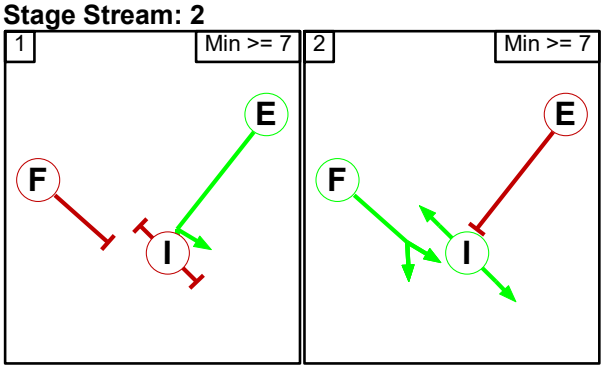
Basic Results Summary

Stage Diagram

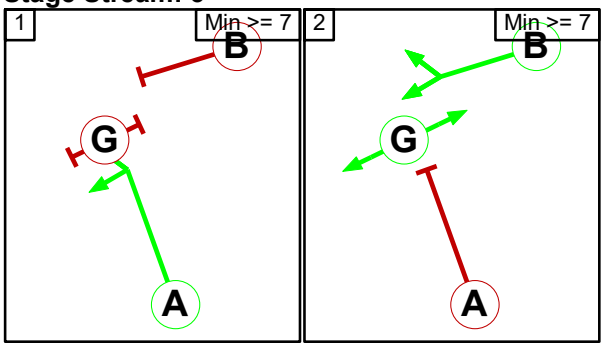
Stage Stream: 1



Stage Stream: 2



Stage Stream: 3

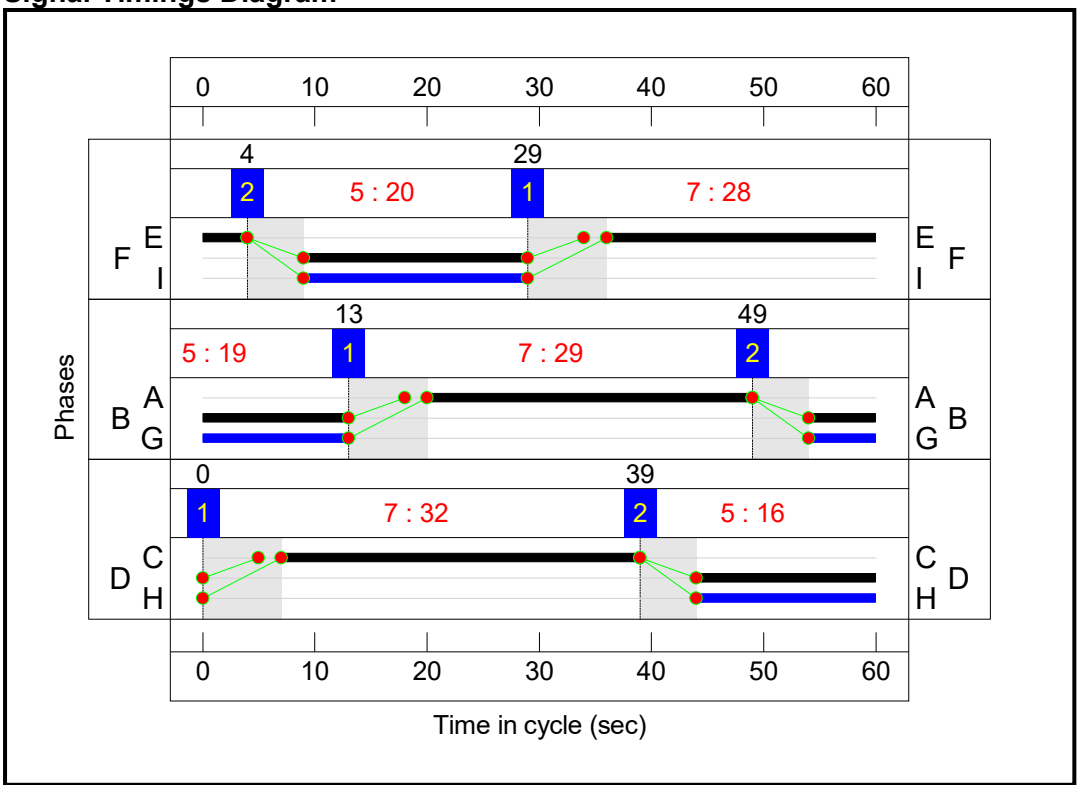


Basic Results Summary

Phase Intergreens Matrix

Terminating Phase \ Starting Phase	A	B	C	D	E	F	G	H	I
A	-	5	-	-	-	-	5	-	-
B	5	-	-	-	-	-	-	-	-
C	-	-	-	5	-	-	-	5	-
D	-	-	5	-	-	-	-	-	-
E	-	-	-	-	-	5	-	-	5
F	-	-	-	-	5	-	-	-	-
G	7	-	-	-	-	-	-	-	-
H	-	-	7	-	-	-	-	-	-
I	-	-	-	-	7	-	-	-	-

Signal Timings Diagram



Basic Results Summary

Traffic Flows, Actual

Actual Flow :

	Destination						
		A	B	C	D	E	Tot.
Origin	A	0	6	34	196	696	932
	B	1	0	16	16	92	125
	C	63	93	0	334	952	1442
	D	112	19	84	0	21	236
	E	344	130	408	26	0	908
	Tot.	520	248	542	572	1761	3643

Basic Results Summary

Item	Lane Description	Lane Type	Full Phase	Arrow Phase	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Deg Sat (%)	Mean Max Queue (pcu)	Capacity (pcu)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)
Network	-	-	-		-	-	-	-	**74.6%**	-	-	**361**	**0**	**0**	**28.1**	-
A1053 / A1085	-	-	-		-	-	-	-	**74.6%**	-	-	**361**	**0**	**0**	**28.1**	-
1/1	A1085 Trunk Road South Ahead Left	O	-		-	-	58	1972	28.7%	0.7	202	58	0	0	0.3	20.6
1/2	A1085 Trunk Road South Ahead	O	-		-	-	178	2015	37.1%	1.2	480	178	0	0	0.5	9.5
2/1	A1053 Left	U	C		32	-	344	1947	32.1%	3.3	1071	-	-	-	0.9	9.9
2/2	A1053 Ahead	U	C		32	-	564	2000	51.3%	6.3	1100	-	-	-	1.9	11.8
3/2+3/1	A1085 Trunk Road North Left Ahead	U	E		28	-	236	1955:1600	25.1 : 25.1%	2.0	780+159	-	-	-	0.7	11.4
3/3	A1085 Trunk Road North Ahead	U	E		28	-	696	1940	74.2%	10.7	938	-	-	-	3.8	19.9
4/1	A1053 Greystone Road Ahead Left	U	A		29	-	680	1854	73.4%	10.2	927	-	-	-	3.6	19.1
4/2+4/3	A1053 Greystone Road Ahead	U	A		29	-	762	1940:1950	74.6 : 74.6%	10.5	897+125	-	-	-	3.8	18.2
5/1	Ahead	U	D		16	-	101	1800	19.8%	1.2	510	-	-	-	0.4	12.9
5/2	Right Ahead	U	D		16	-	271	1800	53.1%	3.8	510	-	-	-	1.6	20.9
6/1	Ahead Right	U	F		20	-	381	1800	60.5%	5.9	630	-	-	-	2.2	20.9
6/2	Right	U	F		20	-	379	1800	60.2%	2.5	630	-	-	-	1.7	16.2
7/1	Ahead	U	B		19	-	238	1800	39.7%	3.4	600	-	-	-	0.9	14.2
7/2	Right Ahead	U	B		19	-	430	1800	71.7%	7.0	600	-	-	-	2.1	17.2
7/3	Right	U	B		19	-	359	1700	63.4%	5.4	567	-	-	-	1.4	14.2
8/1	Ahead	U	-		-	-	776	1800	43.1%	0.4	1800	-	-	-	0.4	1.8
8/2	Right Ahead	U	-		-	-	1028	1800	57.1%	6.7	1800	-	-	-	0.7	2.4

Basic Results Summary

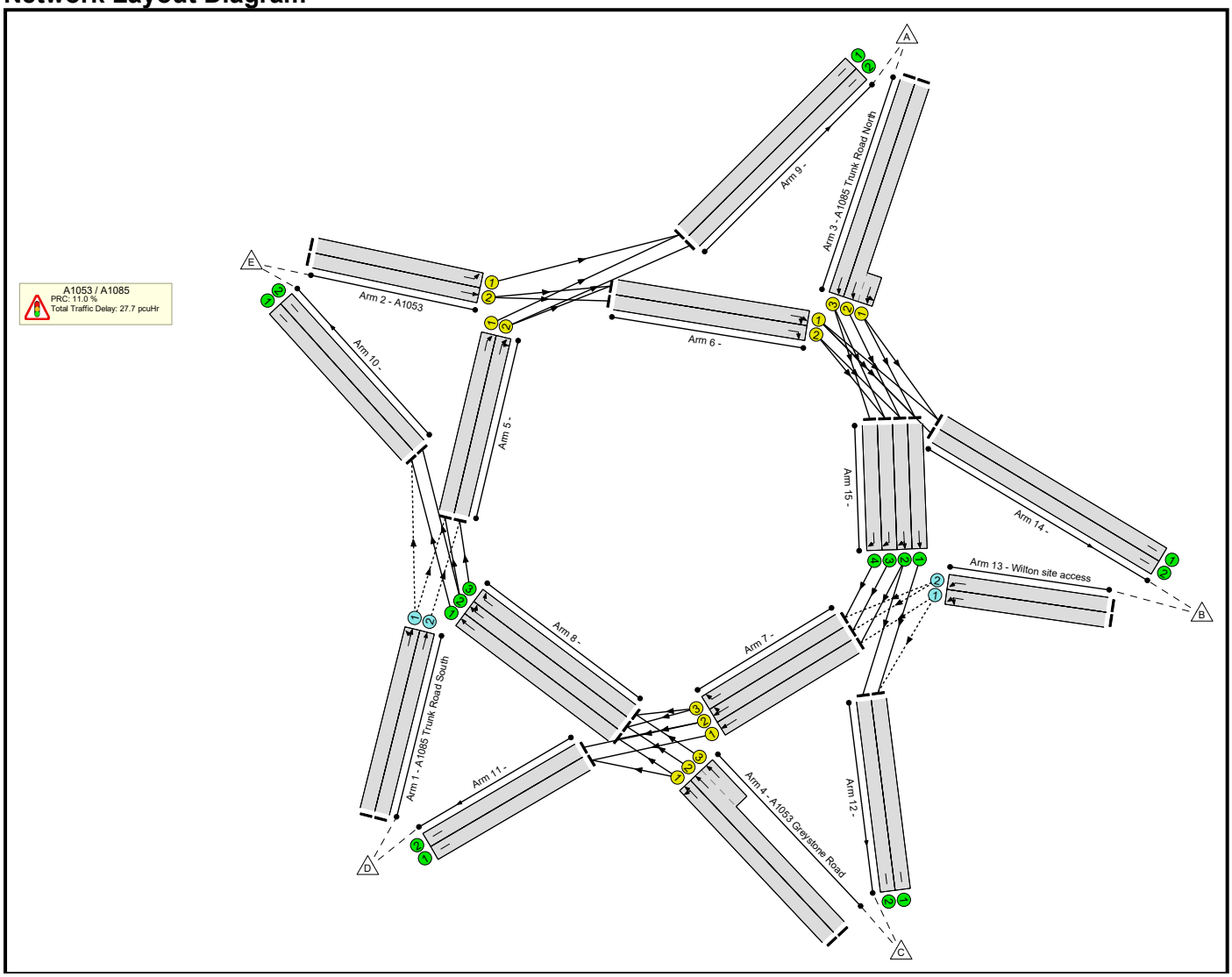
8/3	Right	U	-		-	-	93	1800	5.2%	0.0	1800	-	-	-	0.0	1.1
13/1	Wilton site access Ahead Left	O	-		-	-	32	1925	9.7%	0.2	331	32	0	0	0.1	11.8
13/2	Wilton site access Ahead	O	-		-	-	93	2015	31.5%	1.0	296	93	0	0	0.4	16.3
15/1	Ahead	U	-		-	-	173	1600	10.8%	0.1	1600	-	-	-	0.1	1.3
15/2	Right Ahead	U	-		-	-	575	1600	35.9%	0.3	1600	-	-	-	0.3	1.8
15/3	Right	U	-		-	-	367	1600	22.9%	0.1	1600	-	-	-	0.1	1.5
15/4	Right	U	-		-	-	329	1600	20.6%	0.1	1600	-	-	-	0.1	1.4

C1	Stream: 1 PRC for Signalled Lanes (%):	69.4	Total Delay for Signalled Lanes (pcuHr):	4.73	Cycle Time (s): 60
C1	Stream: 2 PRC for Signalled Lanes (%):	21.3	Total Delay for Signalled Lanes (pcuHr):	8.51	Cycle Time (s): 60
C1	Stream: 3 PRC for Signalled Lanes (%):	20.6	Total Delay for Signalled Lanes (pcuHr):	11.85	Cycle Time (s): 60
	PRC Over All Lanes (%):	20.6	Total Delay Over All Lanes(pcuHr):	28.12	

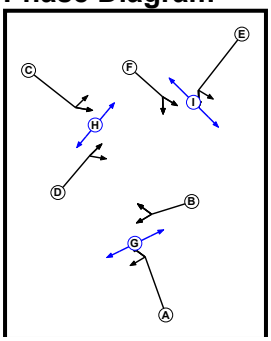
Basic Results Summary

Scenario 2: '2033 PM Base' (FG2: '2033 PM Base', Plan 1: 'Network Control Plan 1')

Network Layout Diagram



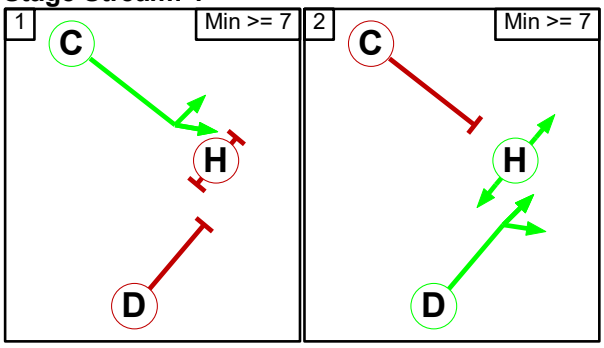
Phase Diagram



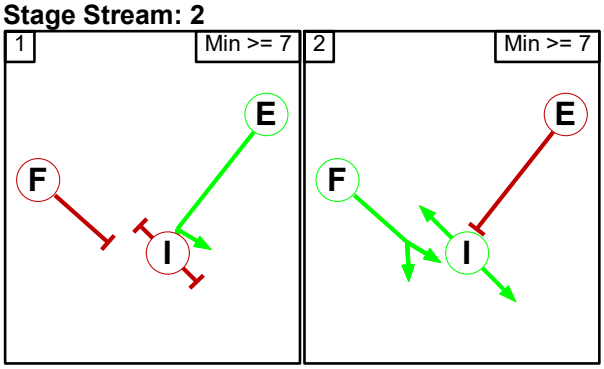
Basic Results Summary

Stage Diagram

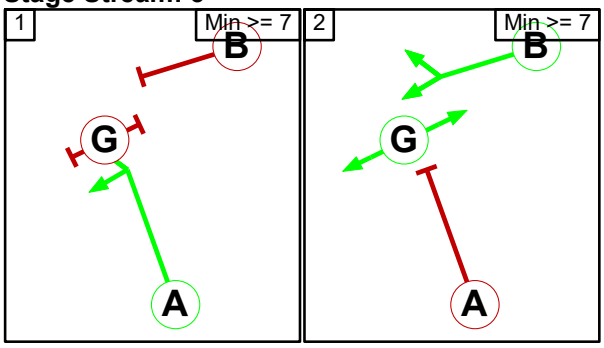
Stage Stream: 1



Stage Stream: 2



Stage Stream: 3

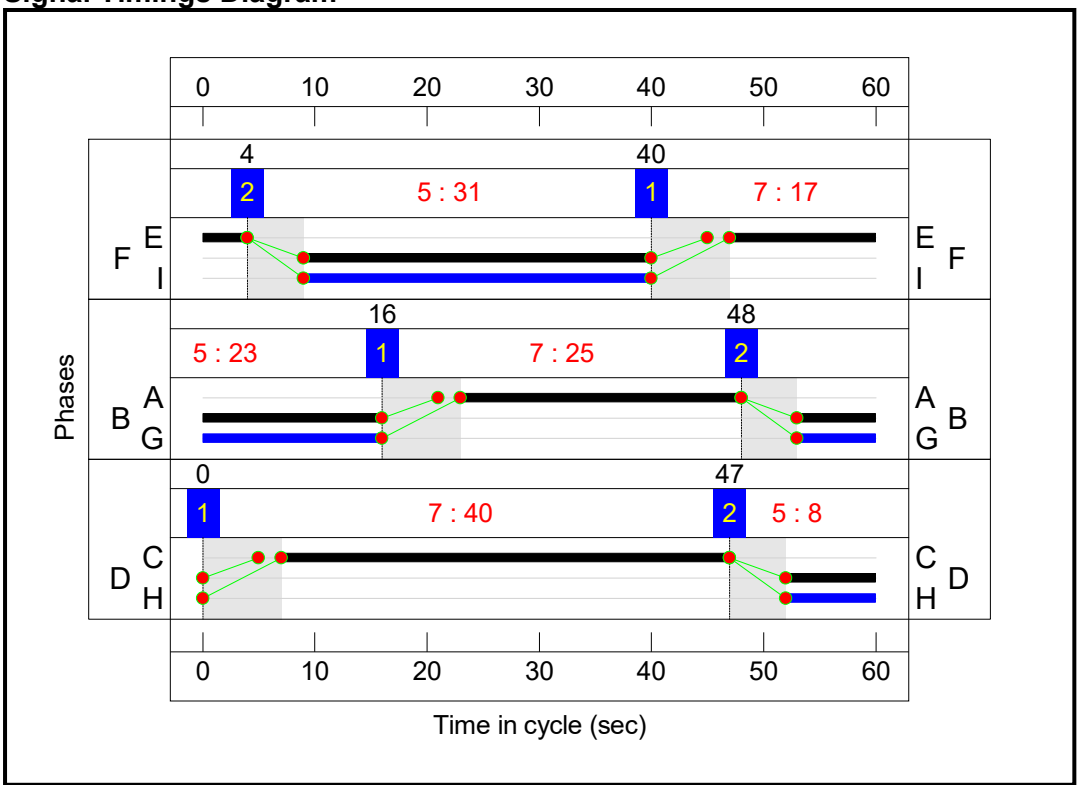


Basic Results Summary

Phase Intergreens Matrix

Terminating Phase \ Starting Phase	A	B	C	D	E	F	G	H	I
A	-	5	-	-	-	-	5	-	-
B	5	-	-	-	-	-	-	-	-
C	-	-	-	5	-	-	-	5	-
D	-	-	5	-	-	-	-	-	-
E	-	-	-	-	-	5	-	-	5
F	-	-	-	-	5	-	-	-	-
G	7	-	-	-	-	-	-	-	-
H	-	-	7	-	-	-	-	-	-
I	-	-	-	-	7	-	-	-	-

Signal Timings Diagram



Basic Results Summary

Traffic Flows, Actual

Actual Flow :

	Destination						
		A	B	C	D	E	Tot.
Origin	A	0	14	52	162	422	650
	B	4	0	3	23	110	140
	C	41	19	0	87	377	524
	D	142	12	188	0	21	363
	E	775	53	970	77	0	1875
	Tot.	962	98	1213	349	930	3552

Basic Results Summary

Item	Lane Description	Lane Type	Full Phase	Arrow Phase	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Deg Sat (%)	Mean Max Queue (pcu)	Capacity (pcu)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)
Network	-	-	-		-	-	-	-	**81.1%**	-	-	**503**	**0**	**0**	**27.7**	-
A1053 / A1085	-	-	-		-	-	-	-	**81.1%**	-	-	**503**	**0**	**0**	**27.7**	-
1/1	A1085 Trunk Road South Ahead Left	O	-		-	-	163	2000	29.9%	1.2	544	163	0	0	0.4	7.8
1/2	A1085 Trunk Road South Ahead	O	-		-	-	200	2015	25.8%	0.7	776	200	0	0	0.2	3.7
2/1	A1053 Left	U	C		40	-	775	1947	58.3%	7.4	1330	-	-	-	1.8	8.2
2/2	A1053 Ahead	U	C		40	-	1100	2000	80.5%	14.9	1367	-	-	-	4.1	13.3
3/2+3/1	A1085 Trunk Road North Left Ahead	U	E		17	-	228	1955:1600	36.8 : 36.8%	2.3	443+177	-	-	-	1.3	20.4
3/3	A1085 Trunk Road North Ahead	U	E		17	-	422	1940	72.5%	7.5	582	-	-	-	3.5	29.9
4/1	A1053 Greystone Road Ahead Left	U	A		25	-	237	1860	29.4%	2.7	806	-	-	-	0.9	14.2
4/2+4/3	A1053 Greystone Road Ahead	U	A		25	-	287	1940:1950	32.9 : 32.9%	3.1	813+58	-	-	-	1.1	14.2
5/1	Ahead	U	D		8	-	187	1800	69.3%	4.0	270	-	-	-	2.1	41.3
5/2	Right Ahead	U	D		8	-	219	1800	81.1%	5.5	270	-	-	-	3.4	56.2
6/1	Ahead Right	U	F		31	-	652	1800	67.9%	8.6	960	-	-	-	2.6	14.5
6/2	Right	U	F		31	-	667	1800	69.5%	4.3	960	-	-	-	2.1	11.6
7/1	Ahead	U	B		23	-	243	1800	33.8%	1.5	720	-	-	-	0.6	9.1
7/2	Right Ahead	U	B		23	-	387	1800	53.8%	1.7	720	-	-	-	0.8	7.5
7/3	Right	U	B		23	-	168	1700	24.7%	0.3	680	-	-	-	0.2	4.2
8/1	Ahead	U	-		-	-	518	1800	28.8%	0.2	1800	-	-	-	0.2	1.4
8/2	Right Ahead	U	-		-	-	436	1800	24.2%	0.2	1800	-	-	-	0.2	1.3

Basic Results Summary

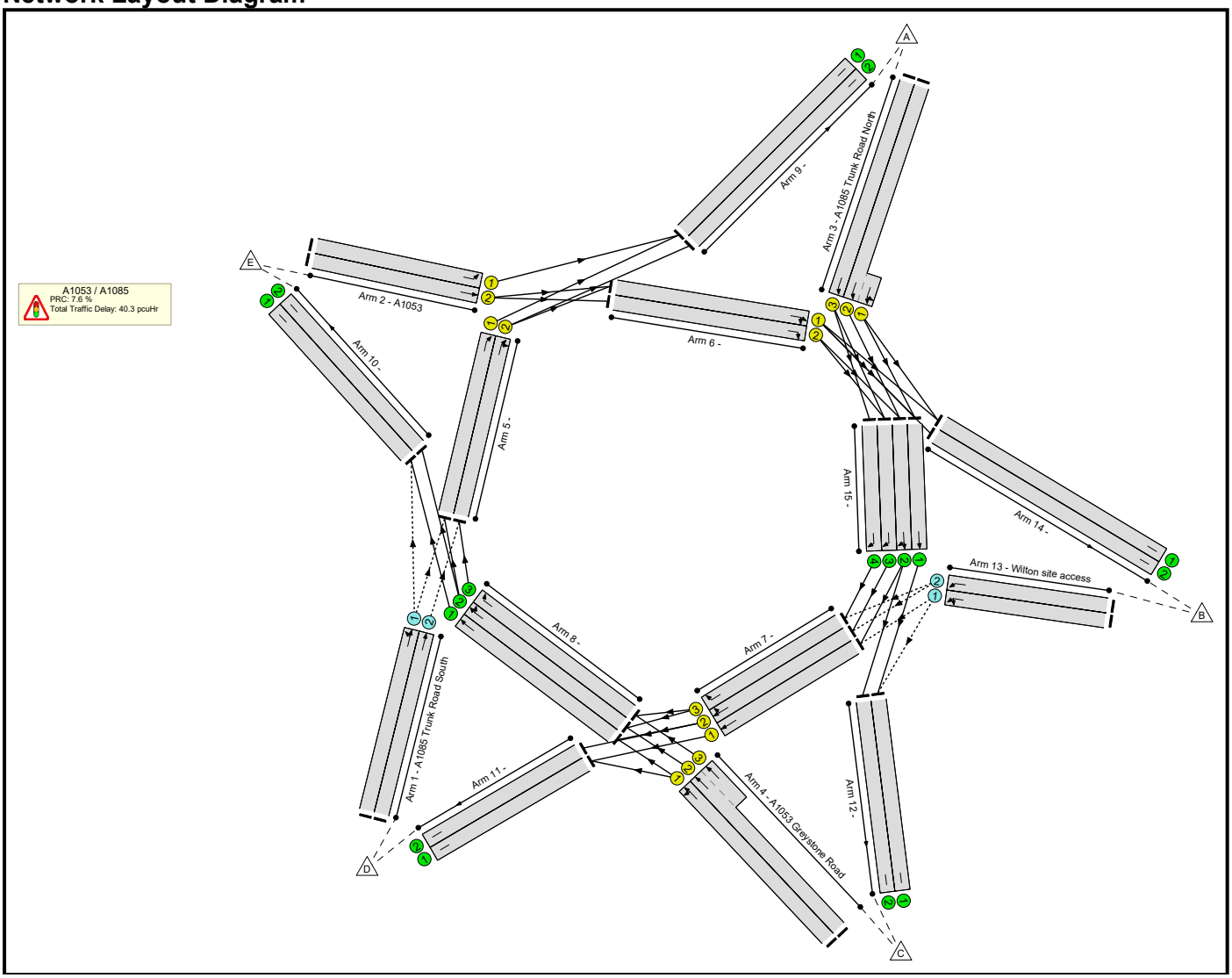
8/3	Right	U	-		-	-	19	1800	1.1%	0.0	1800	-	-	-	0.0	1.0
13/1	Wilton site access Ahead Left	O	-		-	-	26	1993	12.4%	0.3	210	26	0	0	0.1	19.9
13/2	Wilton site access Ahead	O	-		-	-	114	2015	55.2%	1.7	206	114	0	0	1.0	30.8
15/1	Ahead	U	-		-	-	619	1600	38.7%	0.3	1600	-	-	-	0.3	1.8
15/2	Right Ahead	U	-		-	-	811	1600	50.7%	0.5	1600	-	-	-	0.5	2.3
15/3	Right	U	-		-	-	291	1600	18.2%	0.1	1600	-	-	-	0.1	1.4
15/4	Right	U	-		-	-	150	1600	9.4%	0.1	1600	-	-	-	0.1	1.2

C1	Stream: 1 PRC for Signalled Lanes (%):	11.0	Total Delay for Signalled Lanes (pcuHr):	11.41	Cycle Time (s): 60
C1	Stream: 2 PRC for Signalled Lanes (%):	24.1	Total Delay for Signalled Lanes (pcuHr):	9.57	Cycle Time (s): 60
C1	Stream: 3 PRC for Signalled Lanes (%):	67.4	Total Delay for Signalled Lanes (pcuHr):	3.68	Cycle Time (s): 60
	PRC Over All Lanes (%):	11.0	Total Delay Over All Lanes(pcuHr):	27.69	

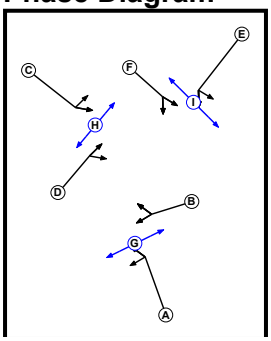
Basic Results Summary

Scenario 3: '2033 AM Base+Dorman' (FG3: '2033 AM Base+Dorman', Plan 1: 'Network Control Plan 1')

Network Layout Diagram



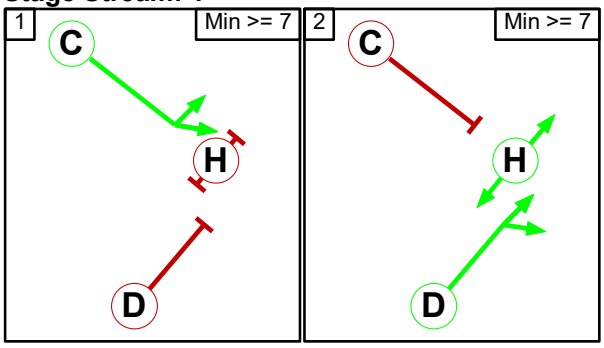
Phase Diagram



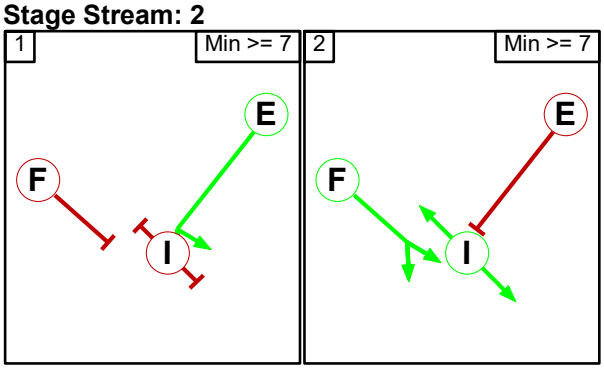
Basic Results Summary

Stage Diagram

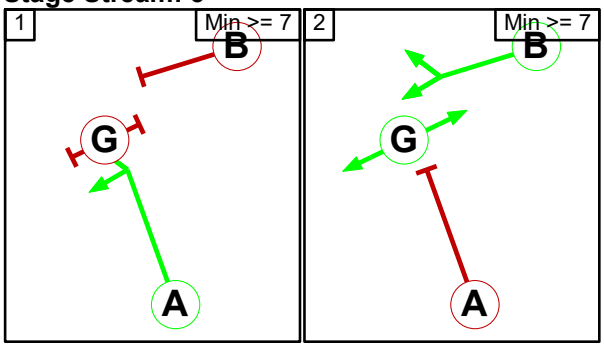
Stage Stream: 1



Stage Stream: 2



Stage Stream: 3

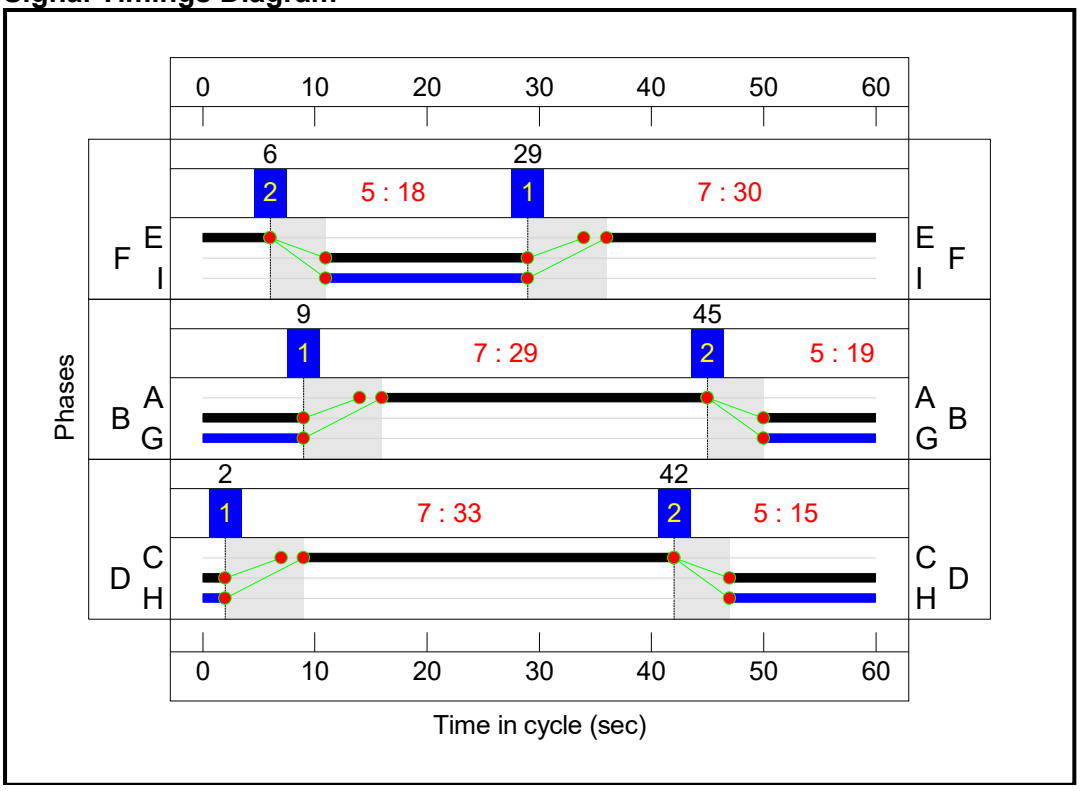


Basic Results Summary

Phase Intergreens Matrix

Terminating Phase \ Starting Phase	A	B	C	D	E	F	G	H	I
A	-	5	-	-	-	-	5	-	-
B	5	-	-	-	-	-	-	-	-
C	-	-	-	5	-	-	-	5	-
D	-	-	5	-	-	-	-	-	-
E	-	-	-	-	-	5	-	-	5
F	-	-	-	-	5	-	-	-	-
G	7	-	-	-	-	-	-	-	-
H	-	-	7	-	-	-	-	-	-
I	-	-	-	-	7	-	-	-	-

Signal Timings Diagram



Basic Results Summary

Traffic Flows, Actual

Actual Flow :

	Destination						
		A	B	C	D	E	Tot.
Origin	A	0	6	34	196	824	1060
	B	1	0	16	16	92	125
	C	63	93	0	334	1131	1621
	D	112	19	84	0	27	242
	E	444	130	517	35	0	1126
	Tot.	620	248	651	581	2074	4174

Basic Results Summary

Item	Lane Description	Lane Type	Full Phase	Arrow Phase	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Deg Sat (%)	Mean Max Queue (pcu)	Capacity (pcu)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)
Network	-	-	-		-	-	-	-	**83.6%**	-	-	**367**	**0**	**0**	**40.3**	-
A1053 / A1085	-	-	-		-	-	-	-	**83.6%**	-	-	**367**	**0**	**0**	**40.3**	-
1/1	A1085 Trunk Road South Ahead Left	O	-		-	-	53	1955	36.7%	0.8	145	53	0	0	0.5	31.0
1/2	A1085 Trunk Road South Ahead	O	-		-	-	189	2015	54.9%	2.0	344	189	0	0	1.0	18.7
2/1	A1053 Left	U	C		33	-	444	1947	40.2%	4.4	1103	-	-	-	1.2	10.0
2/2	A1053 Ahead	U	C		33	-	682	2000	60.2%	8.1	1133	-	-	-	2.4	12.5
3/2+3/1	A1085 Trunk Road North Left Ahead	U	E		30	-	236	1955:1600	23.6 : 23.6%	1.9	832+170	-	-	-	0.7	10.1
3/3	A1085 Trunk Road North Ahead	U	E		30	-	824	1940	82.2%	13.7	1002	-	-	-	5.0	22.0
4/1	A1053 Greystone Road Ahead Left	U	A		29	-	771	1857	83.0%	13.3	928	-	-	-	5.1	23.9
4/2+4/3	A1053 Greystone Road Ahead	U	A		29	-	850	1940:1950	83.6 : 83.6%	13.7	905+111	-	-	-	5.4	22.8
5/1	Ahead	U	D		15	-	90	1800	18.8%	1.2	480	-	-	-	0.4	15.1
5/2	Right Ahead	U	D		15	-	282	1800	58.8%	4.0	480	-	-	-	1.8	22.6
6/1	Ahead Right	U	F		18	-	439	1800	77.0%	7.7	570	-	-	-	3.4	28.3
6/2	Right	U	F		18	-	439	1800	77.0%	4.8	570	-	-	-	3.1	25.3
7/1	Ahead	U	B		19	-	247	1800	41.2%	3.6	600	-	-	-	1.1	16.2
7/2	Right Ahead	U	B		19	-	487	1800	81.2%	8.3	600	-	-	-	3.3	24.7
7/3	Right	U	B		19	-	430	1700	75.9%	6.8	567	-	-	-	2.6	21.9
8/1	Ahead	U	-		-	-	924	1800	51.3%	1.5	1800	-	-	-	0.5	2.1
8/2	Right Ahead	U	-		-	-	1187	1800	65.9%	9.0	1800	-	-	-	1.0	3.0

Basic Results Summary

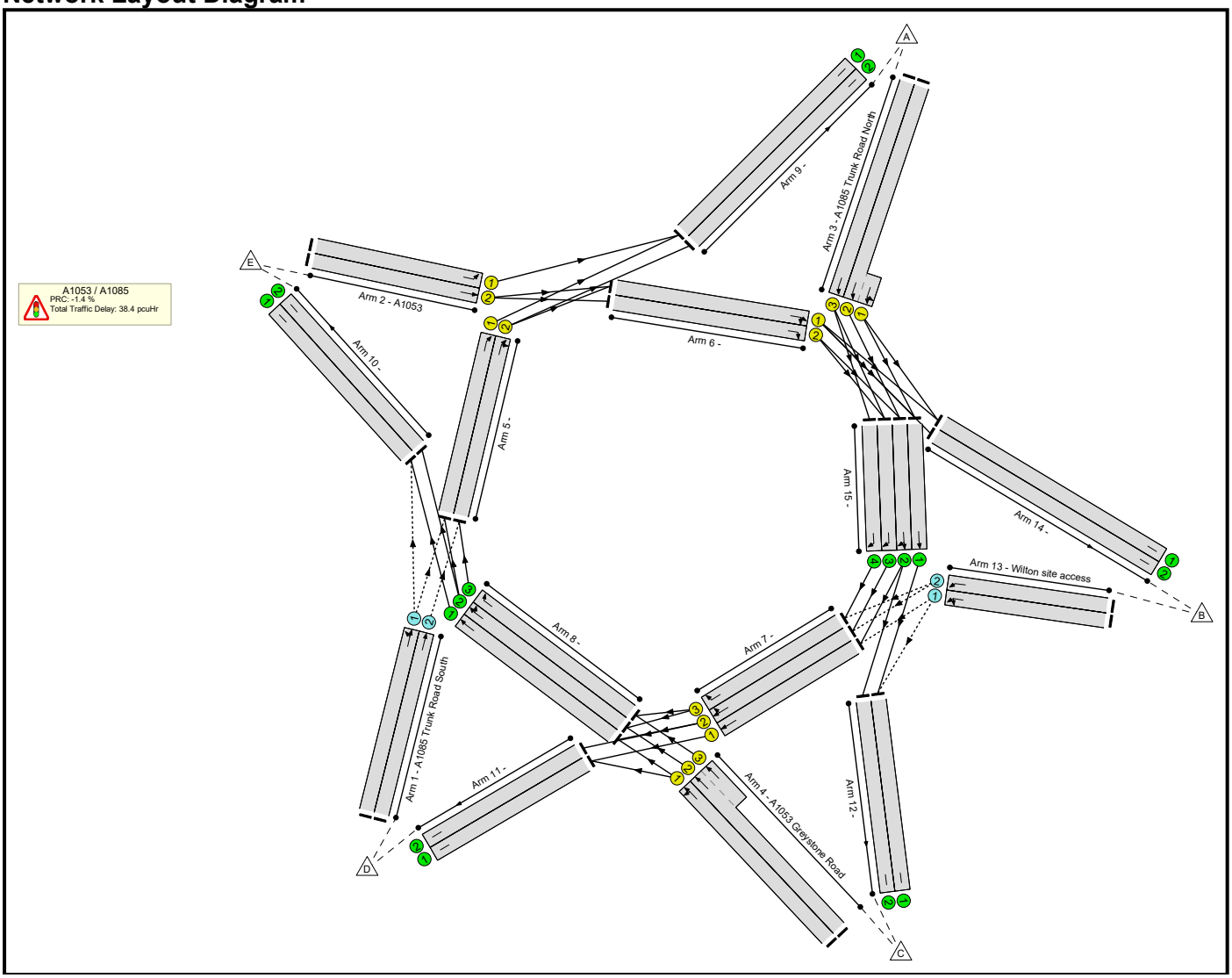
8/3	Right	U	-		-	-	93	1800	5.2%	0.0	1800	-	-	-	0.0	1.1
13/1	Wilton site access Ahead Left	O	-		-	-	32	1925	15.0%	0.3	213	32	0	0	0.2	18.8
13/2	Wilton site access Ahead	O	-		-	-	93	2015	49.2%	1.3	189	93	0	0	0.8	29.6
15/1	Ahead	U	-		-	-	231	1600	14.4%	0.1	1600	-	-	-	0.1	1.3
15/2	Right Ahead	U	-		-	-	635	1600	39.7%	1.2	1600	-	-	-	0.3	1.9
15/3	Right	U	-		-	-	437	1600	27.3%	0.2	1600	-	-	-	0.2	1.5
15/4	Right	U	-		-	-	387	1600	24.2%	0.2	1600	-	-	-	0.2	1.5

C1	Stream: 1 PRC for Signalled Lanes (%):	49.6	Total Delay for Signalled Lanes (pcuHr):	5.76	Cycle Time (s): 60
C1	Stream: 2 PRC for Signalled Lanes (%):	9.5	Total Delay for Signalled Lanes (pcuHr):	12.24	Cycle Time (s): 60
C1	Stream: 3 PRC for Signalled Lanes (%):	7.6	Total Delay for Signalled Lanes (pcuHr):	17.58	Cycle Time (s): 60
	PRC Over All Lanes (%):	7.6	Total Delay Over All Lanes(pcuHr):	40.26	

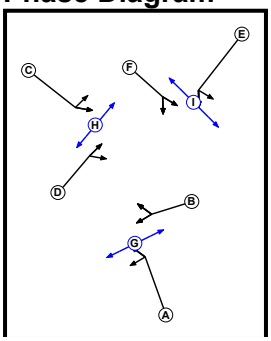
Basic Results Summary

Scenario 4: '2033 PM Base+Dorman' (FG4: '2033 PM Base+Dorman', Plan 1: 'Network Control Plan 1')

Network Layout Diagram



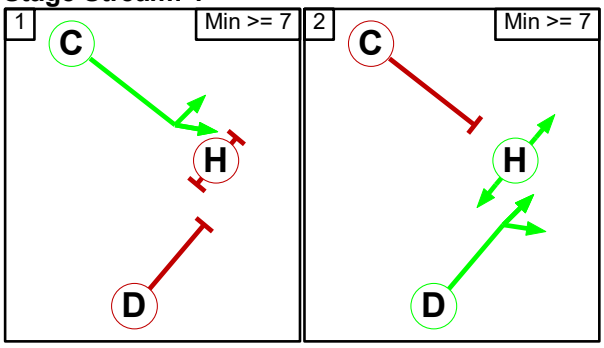
Phase Diagram



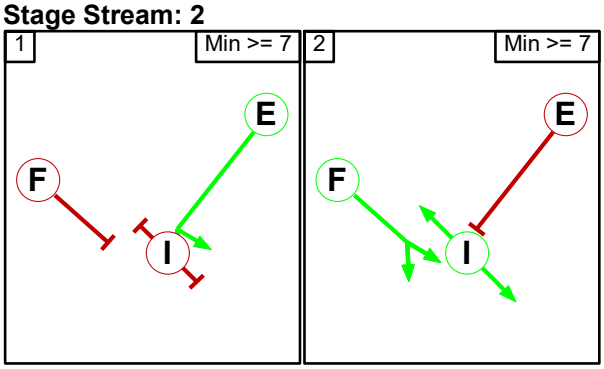
Basic Results Summary

Stage Diagram

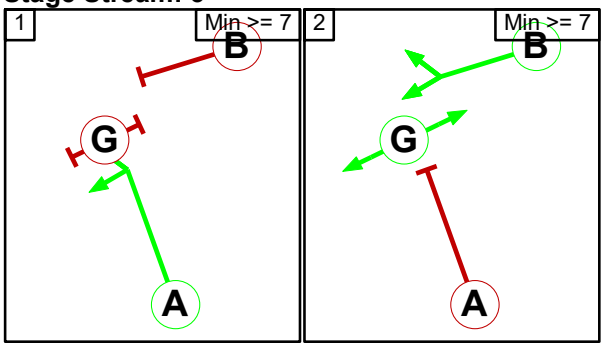
Stage Stream: 1



Stage Stream: 2



Stage Stream: 3

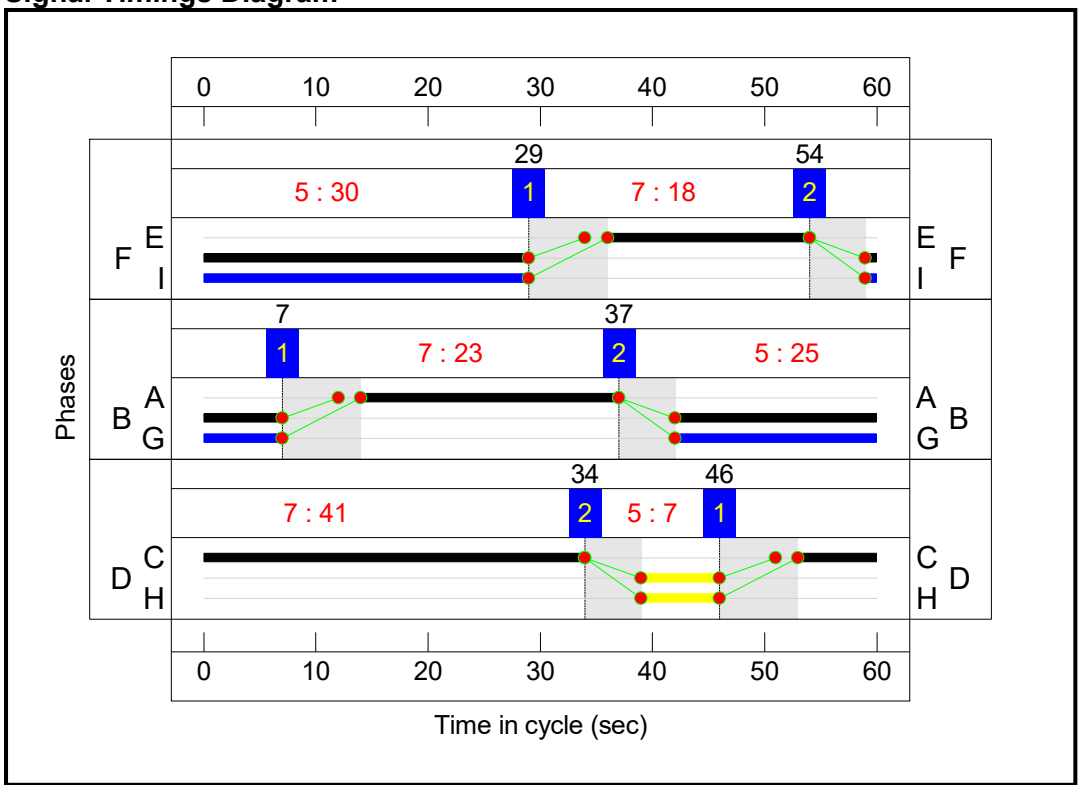


Basic Results Summary

Phase Intergreens Matrix

Terminating Phase \ Starting Phase	A	B	C	D	E	F	G	H	I
A	-	5	-	-	-	-	5	-	-
B	5	-	-	-	-	-	-	-	-
C	-	-	-	5	-	-	-	5	-
D	-	-	5	-	-	-	-	-	-
E	-	-	-	-	-	5	-	-	5
F	-	-	-	-	5	-	-	-	-
G	7	-	-	-	-	-	-	-	-
H	-	-	7	-	-	-	-	-	-
I	-	-	-	-	7	-	-	-	-

Signal Timings Diagram



Basic Results Summary

Traffic Flows, Actual

Actual Flow :

	Destination						
		A	B	C	D	E	Tot.
Origin	A	0	14	52	162	496	724
	B	4	0	3	23	110	140
	C	41	19	0	87	443	590
	D	142	12	188	0	23	365
	E	891	53	1118	90	0	2152
	Tot.	1078	98	1361	362	1072	3971

Basic Results Summary

Item	Lane Description	Lane Type	Full Phase	Arrow Phase	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Deg Sat (%)	Mean Max Queue (pcu)	Capacity (pcu)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)
Network	-	-	-		-	-	-	-	**91.3%**	-	-	**505**	**0**	**0**	**38.4**	-
A1053 / A1085	-	-	-		-	-	-	-	**91.3%**	-	-	**505**	**0**	**0**	**38.4**	-
1/1	A1085 Trunk Road South Ahead Left	O	-		-	-	165	1998	35.7%	1.5	462	165	0	0	0.5	11.0
1/2	A1085 Trunk Road South Ahead	O	-		-	-	200	2015	28.8%	0.9	695	200	0	0	0.2	4.5
2/1	A1053 Left	U	C		41	-	891	1947	65.4%	9.1	1363	-	-	-	2.2	8.8
2/2	A1053 Ahead	U	C		41	-	1261	2000	90.1%	21.1	1400	-	-	-	6.8	19.5
3/2+3/1	A1085 Trunk Road North Left Ahead	U	E		18	-	228	1955:1600	35.1 : 35.1%	2.3	465+185	-	-	-	1.2	19.4
3/3	A1085 Trunk Road North Ahead	U	E		18	-	496	1940	80.7%	9.6	614	-	-	-	4.6	33.5
4/1	A1053 Greystone Road Ahead Left	U	A		23	-	270	1862	36.3%	3.4	745	-	-	-	1.2	16.4
4/2+4/3	A1053 Greystone Road Ahead	U	A		23	-	320	1940:1950	39.8 : 39.8%	3.8	756+48	-	-	-	1.5	16.4
5/1	Ahead	U	D		7	-	187	1800	77.9%	4.7	240	-	-	-	2.6	50.9
5/2	Right Ahead	U	D		7	-	219	1800	91.3%	7.4	240	-	-	-	5.3	86.8
6/1	Ahead Right	U	F		30	-	727	1800	78.2%	11.0	930	-	-	-	3.8	19.0
6/2	Right	U	F		30	-	753	1800	81.0%	8.7	930	-	-	-	3.4	16.0
7/1	Ahead	U	B		25	-	243	1800	31.2%	1.4	780	-	-	-	0.6	8.2
7/2	Right Ahead	U	B		25	-	432	1800	55.4%	1.8	780	-	-	-	0.9	7.4
7/3	Right	U	B		25	-	210	1700	28.5%	0.3	737	-	-	-	0.2	3.9
8/1	Ahead	U	-		-	-	583	1800	32.4%	0.2	1800	-	-	-	0.2	1.5
8/2	Right Ahead	U	-		-	-	511	1800	28.4%	0.7	1800	-	-	-	0.2	1.4

Basic Results Summary

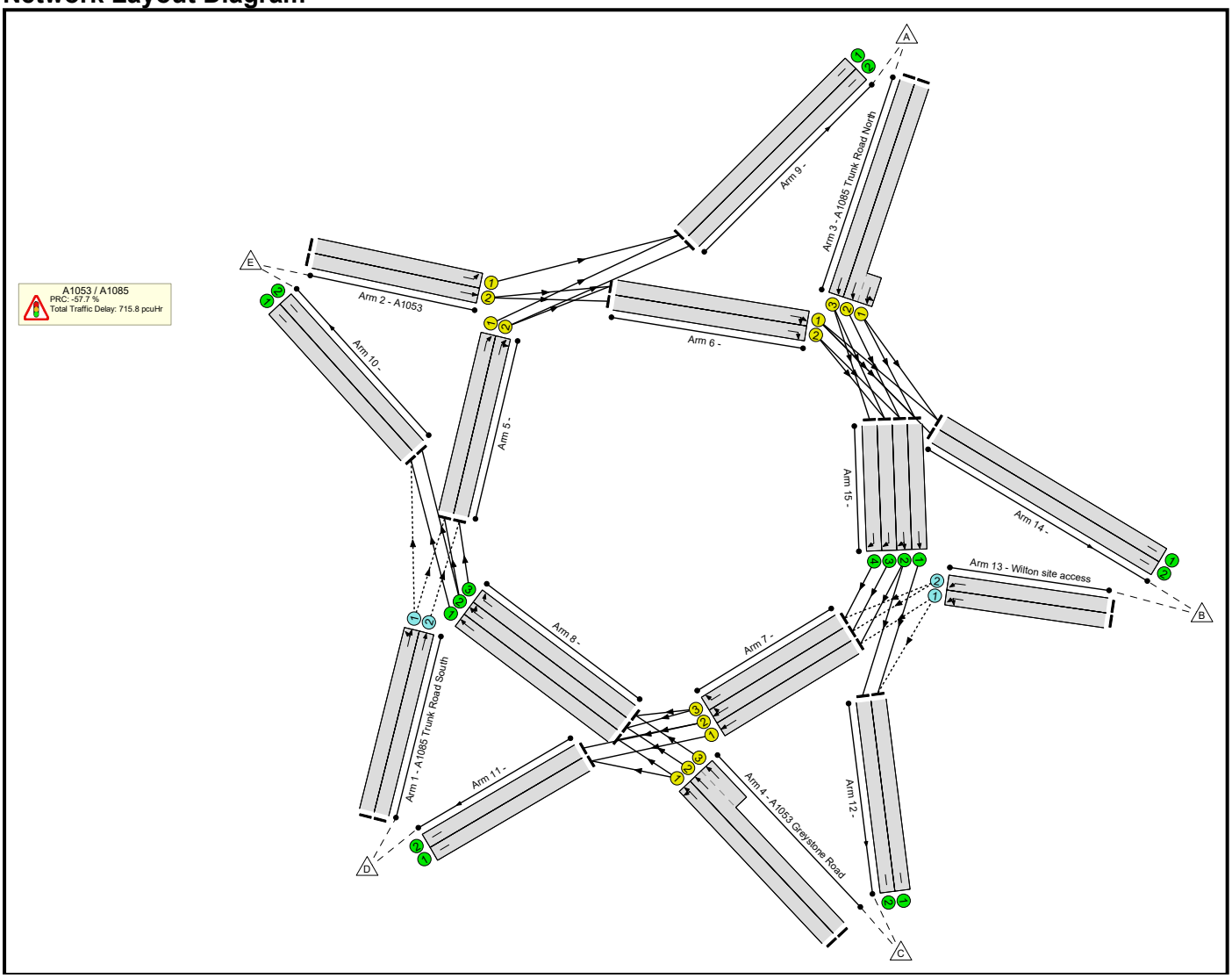
8/3	Right	U	-		-	-	19	1800	1.1%	0.0	1800	-	-	-	0.0	1.0
13/1	Wilton site access Ahead Left	O	-		-	-	26	1993	15.3%	0.3	169	26	0	0	0.2	23.3
13/2	Wilton site access Ahead	O	-		-	-	114	2015	68.7%	2.2	166	114	0	0	1.4	45.7
15/1	Ahead	U	-		-	-	694	1600	43.4%	1.7	1600	-	-	-	0.4	2.0
15/2	Right Ahead	U	-		-	-	884	1600	55.3%	5.5	1600	-	-	-	0.6	2.6
15/3	Right	U	-		-	-	334	1600	20.9%	0.1	1600	-	-	-	0.1	1.4
15/4	Right	U	-		-	-	194	1600	12.1%	0.1	1600	-	-	-	0.1	1.3

C1	Stream: 1 PRC for Signalled Lanes (%):	-1.4	Total Delay for Signalled Lanes (pcuHr):	16.93	Cycle Time (s): 60
C1	Stream: 2 PRC for Signalled Lanes (%):	11.2	Total Delay for Signalled Lanes (pcuHr):	13.05	Cycle Time (s): 60
C1	Stream: 3 PRC for Signalled Lanes (%):	62.5	Total Delay for Signalled Lanes (pcuHr):	4.36	Cycle Time (s): 60
	PRC Over All Lanes (%):	-1.4	Total Delay Over All Lanes(pcuHr):	38.36	

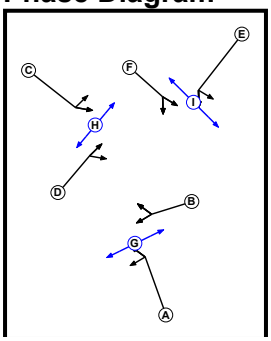
Basic Results Summary

Scenario 7: '2033 AM Cumulative' (FG7: '2033 AM Cumulative', Plan 1: 'Network Control Plan 1')

Network Layout Diagram



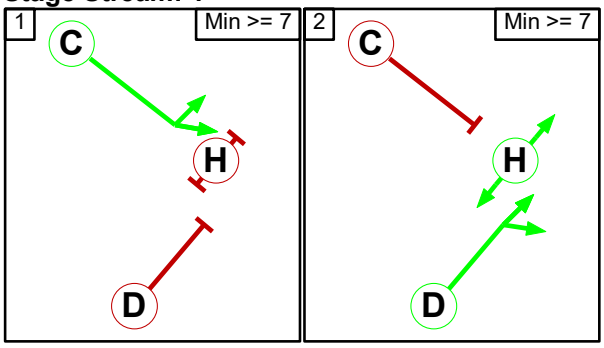
Phase Diagram



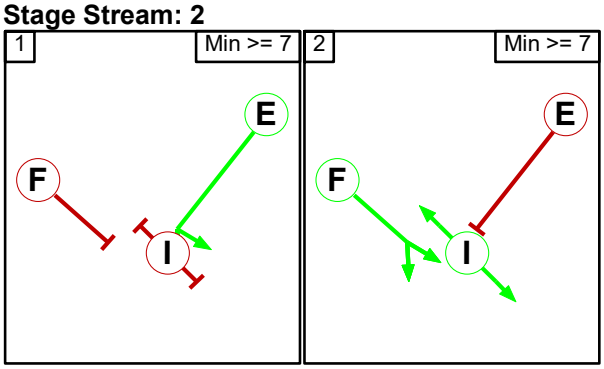
Basic Results Summary

Stage Diagram

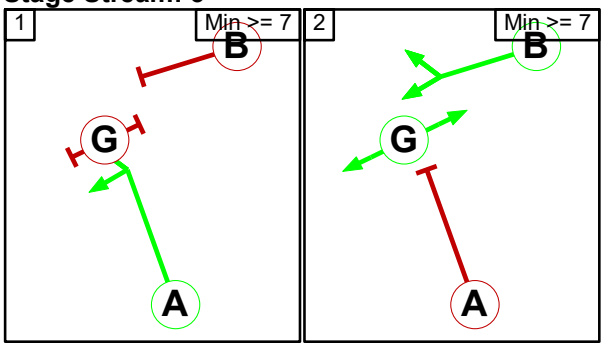
Stage Stream: 1



Stage Stream: 2



Stage Stream: 3

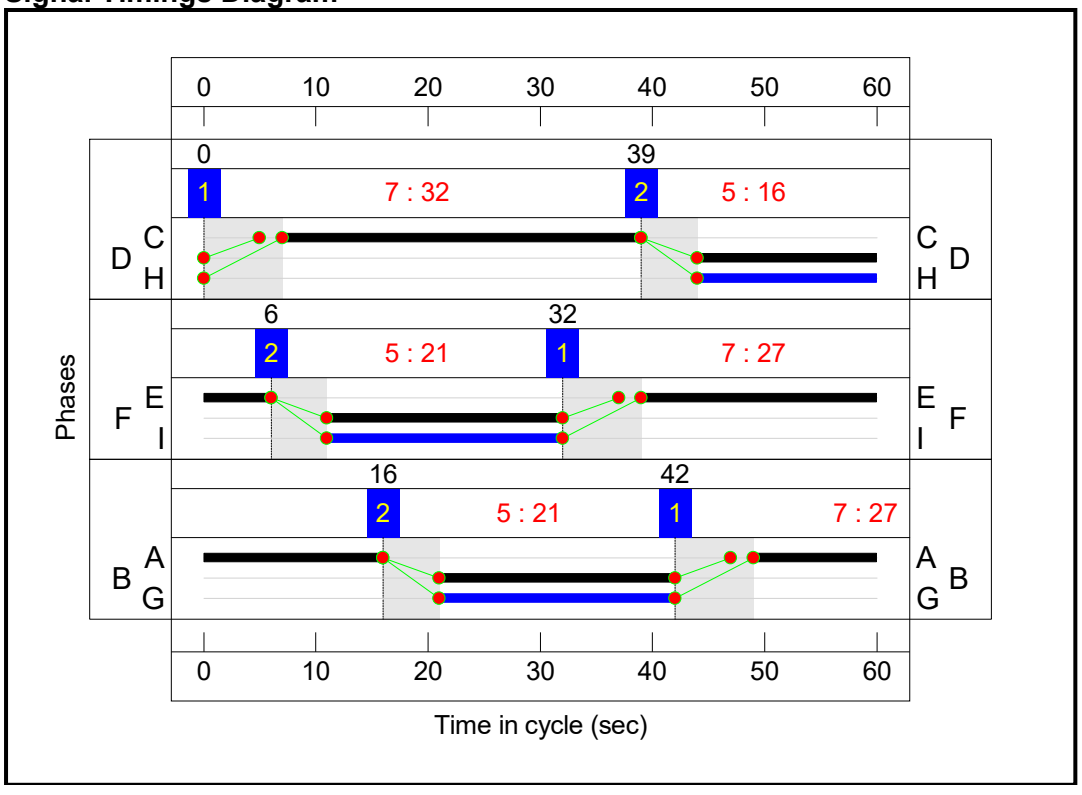


Basic Results Summary

Phase Intergreens Matrix

Terminating Phase \ Starting Phase	A	B	C	D	E	F	G	H	I
A	-	5	-	-	-	-	5	-	-
B	5	-	-	-	-	-	-	-	-
C	-	-	-	5	-	-	-	5	-
D	-	-	5	-	-	-	-	-	-
E	-	-	-	-	-	5	-	-	5
F	-	-	-	-	5	-	-	-	-
G	7	-	-	-	-	-	-	-	-
H	-	-	7	-	-	-	-	-	-
I	-	-	-	-	7	-	-	-	-

Signal Timings Diagram



Basic Results Summary

Traffic Flows, Actual

Actual Flow :

	Destination						
		A	B	C	D	E	Tot.
Origin	A	0	6	208	260	1256	1730
	B	1	0	16	16	111	144
	C	632	93	0	334	1536	2595
	D	322	19	84	0	37	462
	E	1016	138	642	45	0	1841
	Tot.	1971	256	950	655	2940	6772

Basic Results Summary

Item	Lane Description	Lane Type	Full Phase	Arrow Phase	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Deg Sat (%)	Mean Max Queue (pcu)	Capacity (pcu)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)
Network	**-**	**-**	**-**		**-**	**-**	**-**	**-**	**141.9%**	**-**	**-**	**497**	**0**	**0**	**715.8**	**-**
A1053 / A1085	**-**	**-**	**-**		**-**	**-**	**-**	**-**	**141.9%**	**-**	**-**	**497**	**0**	**0**	**715.8**	**-**
1/1	A1085 Trunk Road South Ahead Left	O	-		-	-	92	1968	59.0%	2.1	156	92	0	0	1.3	51.2
1/2	A1085 Trunk Road South Ahead	O	-		-	-	370	2015	141.9%	74.8	261	261	0	0	62.4	607.3
2/1	A1053 Left	U	C		32	-	1016	1947	94.9%	23.1	1071	-	-	-	10.9	38.6
2/2	A1053 Ahead	U	C		32	-	825	2000	75.0%	11.8	1100	-	-	-	3.9	16.8
3/2+3/1	A1085 Trunk Road North Left Ahead	U	E		27	-	474	1955:1600	49.0 : 49.0%	3.3	557+410	-	-	-	1.8	13.5
3/3	A1085 Trunk Road North Ahead	U	E		27	-	1256	1940	138.7%	206.6	905	-	-	-	194.9	558.7
4/1	A1053 Greystone Road Ahead Left	U	A		27	-	1235	1865	141.9%	210.7	870	-	-	-	201.2	586.5
4/2+4/3	A1053 Greystone Road Ahead	U	A		27	-	1360	1940:1950	136.3 : 136.3%	211.8	782+216	-	-	-	200.3	530.3
5/1	Ahead	U	D		16	-	486	1800	72.8%	6.9	510	-	-	-	4.2	40.5
5/2	Right Ahead	U	D		16	-	665	1800	93.6%	11.0	510	-	-	-	8.4	63.0
6/1	Ahead Right	U	F		21	-	584	1800	80.1%	8.6	660	-	-	-	3.6	24.8
6/2	Right	U	F		21	-	437	1800	66.2%	3.5	660	-	-	-	2.0	16.2
7/1	Ahead	U	B		21	-	321	1800	48.6%	5.4	660	-	-	-	2.6	28.6
7/2	Right Ahead	U	B		21	-	705	1800	79.4%	10.6	660	-	-	-	5.8	39.7
7/3	Right	U	B		21	-	663	1700	79.1%	10.1	623	-	-	-	5.5	40.3
8/1	Ahead	U	-		-	-	1606	1800	64.4%	6.9	1800	-	-	-	0.9	2.8
8/2	Right Ahead	U	-		-	-	1728	1800	70.8%	5.3	1800	-	-	-	1.2	3.4

Basic Results Summary

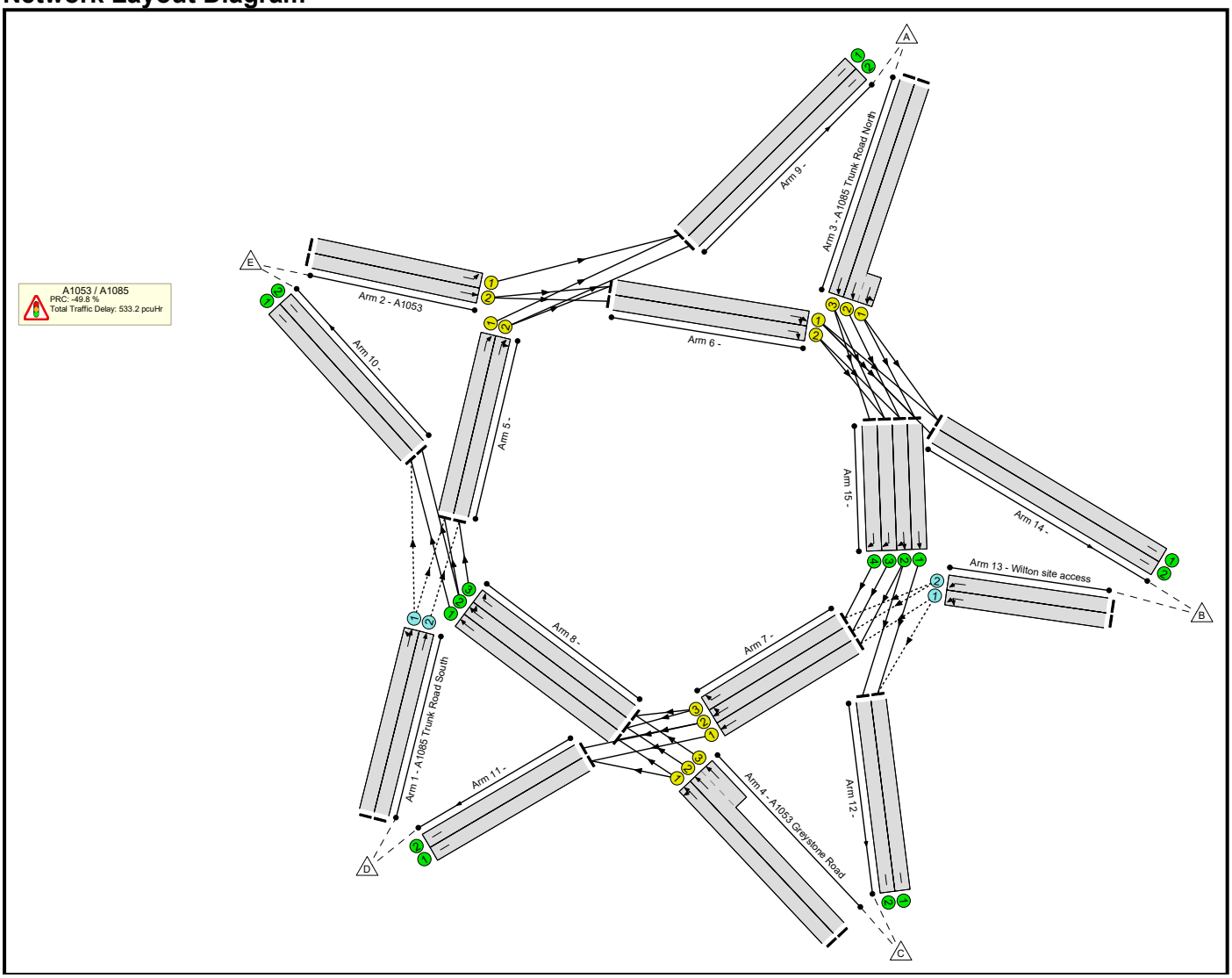
8/3	Right	U	-		-	-	295	1800	12.0%	0.1	1800	-	-	-	0.1	1.1
13/1	Wilton site access Ahead Left	O	-		-	-	32	1925	23.8%	0.4	134	32	0	0	0.3	29.1
13/2	Wilton site access Ahead	O	-		-	-	112	2015	89.8%	4.8	125	112	0	0	3.6	116.8
15/1	Ahead	U	-		-	-	529	1600	31.5%	0.2	1600	-	-	-	0.2	1.6
15/2	Right Ahead	U	-		-	-	710	1600	44.4%	0.9	1600	-	-	-	0.4	2.0
15/3	Right	U	-		-	-	648	1600	29.2%	0.2	1600	-	-	-	0.2	1.6
15/4	Right	U	-		-	-	608	1600	27.4%	0.2	1600	-	-	-	0.2	1.5

C1	Stream: 1 PRC for Signalled Lanes (%):	-5.4	Total Delay for Signalled Lanes (pcuHr):	27.28	Cycle Time (s): 60
C1	Stream: 2 PRC for Signalled Lanes (%):	-54.1	Total Delay for Signalled Lanes (pcuHr):	202.31	Cycle Time (s): 60
C1	Stream: 3 PRC for Signalled Lanes (%):	-57.7	Total Delay for Signalled Lanes (pcuHr):	415.39	Cycle Time (s): 60
	PRC Over All Lanes (%):	-57.7	Total Delay Over All Lanes(pcuHr):	715.81	

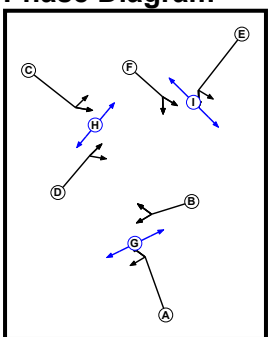
Basic Results Summary

Scenario 8: '2033 PM Cumulative' (FG8: '2033 PM Cumulative', Plan 1: 'Network Control Plan 1')

Network Layout Diagram



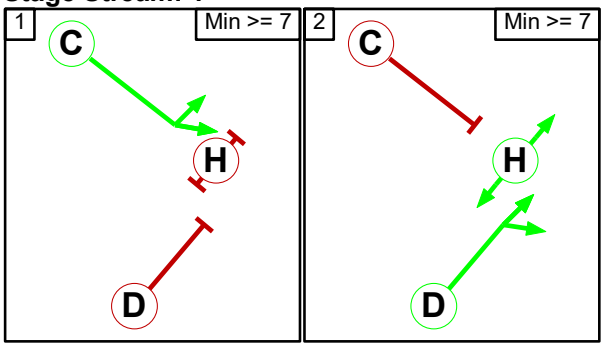
Phase Diagram



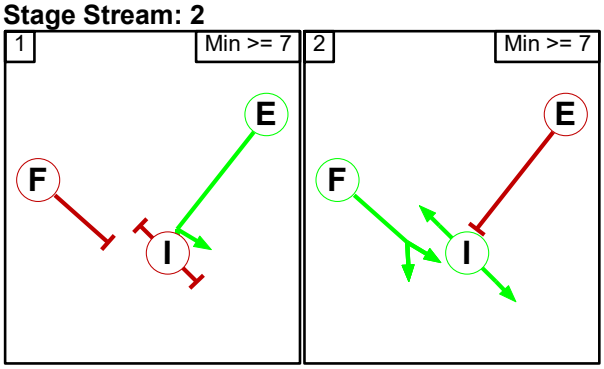
Basic Results Summary

Stage Diagram

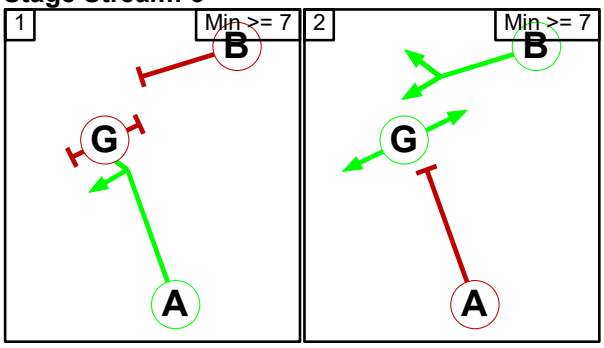
Stage Stream: 1



Stage Stream: 2



Stage Stream: 3

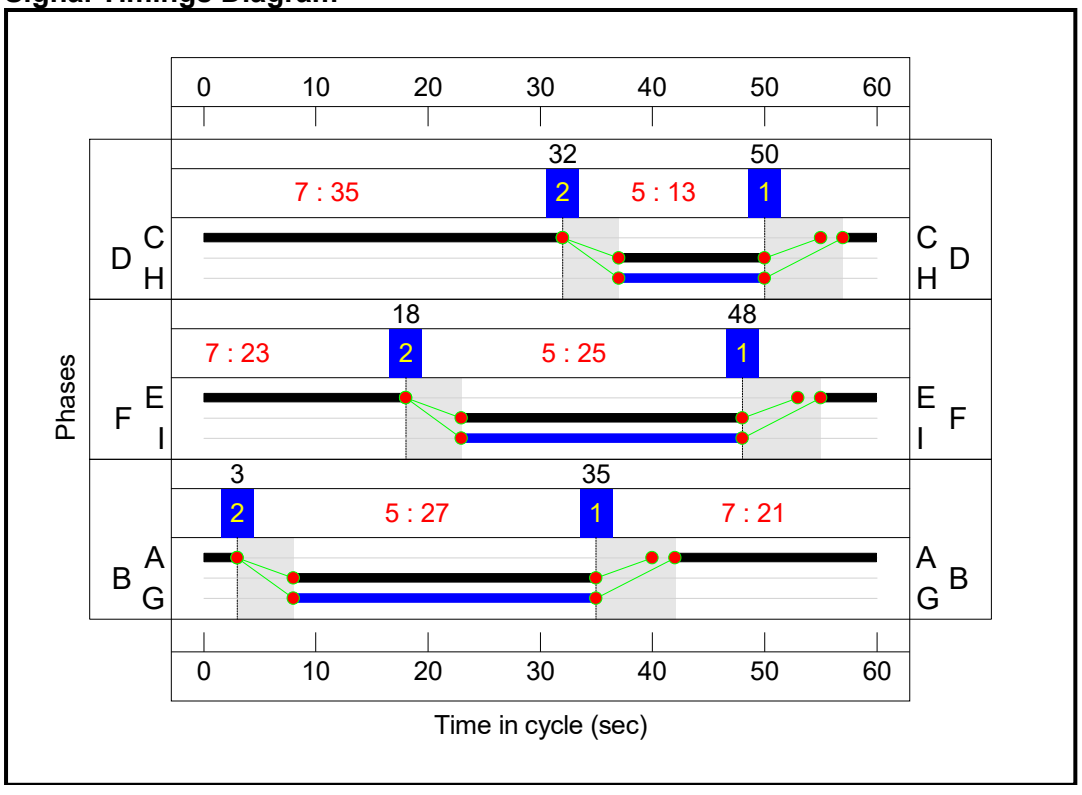


Basic Results Summary

Phase Intergreens Matrix

Terminating Phase \ Starting Phase	A	B	C	D	E	F	G	H	I
A	-	5	-	-	-	-	5	-	-
B	5	-	-	-	-	-	-	-	-
C	-	-	-	5	-	-	-	5	-
D	-	-	5	-	-	-	-	-	-
E	-	-	-	-	-	5	-	-	5
F	-	-	-	-	5	-	-	-	-
G	7	-	-	-	-	-	-	-	-
H	-	-	7	-	-	-	-	-	-
I	-	-	-	-	7	-	-	-	-

Signal Timings Diagram



Basic Results Summary

Traffic Flows, Actual

Actual Flow :

	Destination						
		A	B	C	D	E	Tot.
Origin	A	0	14	583	358	1046	2001
	B	4	0	3	23	123	153
	C	190	19	0	87	553	849
	D	197	12	188	0	29	426
	E	1248	61	1421	117	0	2847
	Tot.	1639	106	2195	585	1751	6276

Basic Results Summary

Item	Lane Description	Lane Type	Full Phase	Arrow Phase	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Deg Sat (%)	Mean Max Queue (pcu)	Capacity (pcu)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)
Network	-	-	-		-	-	-	-	**134.8%**	-	-	**550**	**0**	**0**	**533.2**	-
A1053 / A1085	-	-	-		-	-	-	-	**134.8%**	-	-	**550**	**0**	**0**	**533.2**	-
1/1	A1085 Trunk Road South Ahead Left	O	-		-	-	193	1997	60.4%	2.3	320	193	0	0	1.2	22.1
1/2	A1085 Trunk Road South Ahead	O	-		-	-	233	2015	43.5%	1.9	535	233	0	0	0.7	10.5
2/1	A1053 Left	U	C		35	-	1248	1947	106.8%	68.7	1168	-	-	-	53.1	153.0
2/2	A1053 Ahead	U	C		35	-	1599	2000	133.3%	234.8	1200	-	-	-	218.3	491.4
3/2+3/1	A1085 Trunk Road North Left Ahead	U	E		23	-	955	1955:1600	109.5 : 109.5%	61.8	450+422	-	-	-	53.4	201.3
3/3	A1085 Trunk Road North Ahead	U	E		23	-	1046	1940	134.8%	158.8	776	-	-	-	150.5	518.0
4/1	A1053 Greystone Road Ahead Left	U	A		21	-	392	1868	57.2%	5.9	685	-	-	-	2.3	21.3
4/2+4/3	A1053 Greystone Road Ahead	U	A		21	-	457	1940:1950	59.0 : 59.0%	5.8	656+119	-	-	-	2.6	20.3
5/1	Ahead	U	D		13	-	306	1800	72.7%	5.9	420	-	-	-	3.5	41.5
5/2	Right Ahead	U	D		13	-	304	1800	72.3%	5.8	420	-	-	-	3.2	38.4
6/1	Ahead Right	U	F		25	-	954	1800	98.8%	23.9	780	-	-	-	15.0	70.2
6/2	Right	U	F		25	-	864	1800	83.1%	13.2	780	-	-	-	4.6	25.3
7/1	Ahead	U	B		27	-	498	1800	52.1%	4.8	840	-	-	-	1.2	10.2
7/2	Right Ahead	U	B		27	-	598	1800	53.0%	3.2	840	-	-	-	0.7	5.7
7/3	Right	U	B		27	-	575	1700	54.0%	3.6	793	-	-	-	0.8	6.4
8/1	Ahead	U	-		-	-	903	1800	41.7%	0.4	1800	-	-	-	0.4	1.7
8/2	Right Ahead	U	-		-	-	961	1800	45.3%	2.9	1800	-	-	-	0.4	1.8

Basic Results Summary

8/3	Right	U	-		-	-	71	1800	3.9%	0.0	1800	-	-	-	0.0	1.0
13/1	Wilton site access Ahead Left	O	-		-	-	26	1993	26.4%	0.4	98	26	0	0	0.3	37.1
13/2	Wilton site access Ahead	O	-		-	-	127	2015	130.2%	22.8	98	98	0	0	18.5	523.1
15/1	Ahead	U	-		-	-	1310	1600	68.9%	9.1	1600	-	-	-	1.1	3.7
15/2	Right Ahead	U	-		-	-	1357	1600	68.7%	10.0	1600	-	-	-	1.2	4.0
15/3	Right	U	-		-	-	544	1600	25.2%	0.2	1600	-	-	-	0.2	1.5
15/4	Right	U	-		-	-	502	1600	23.3%	0.2	1600	-	-	-	0.2	1.5

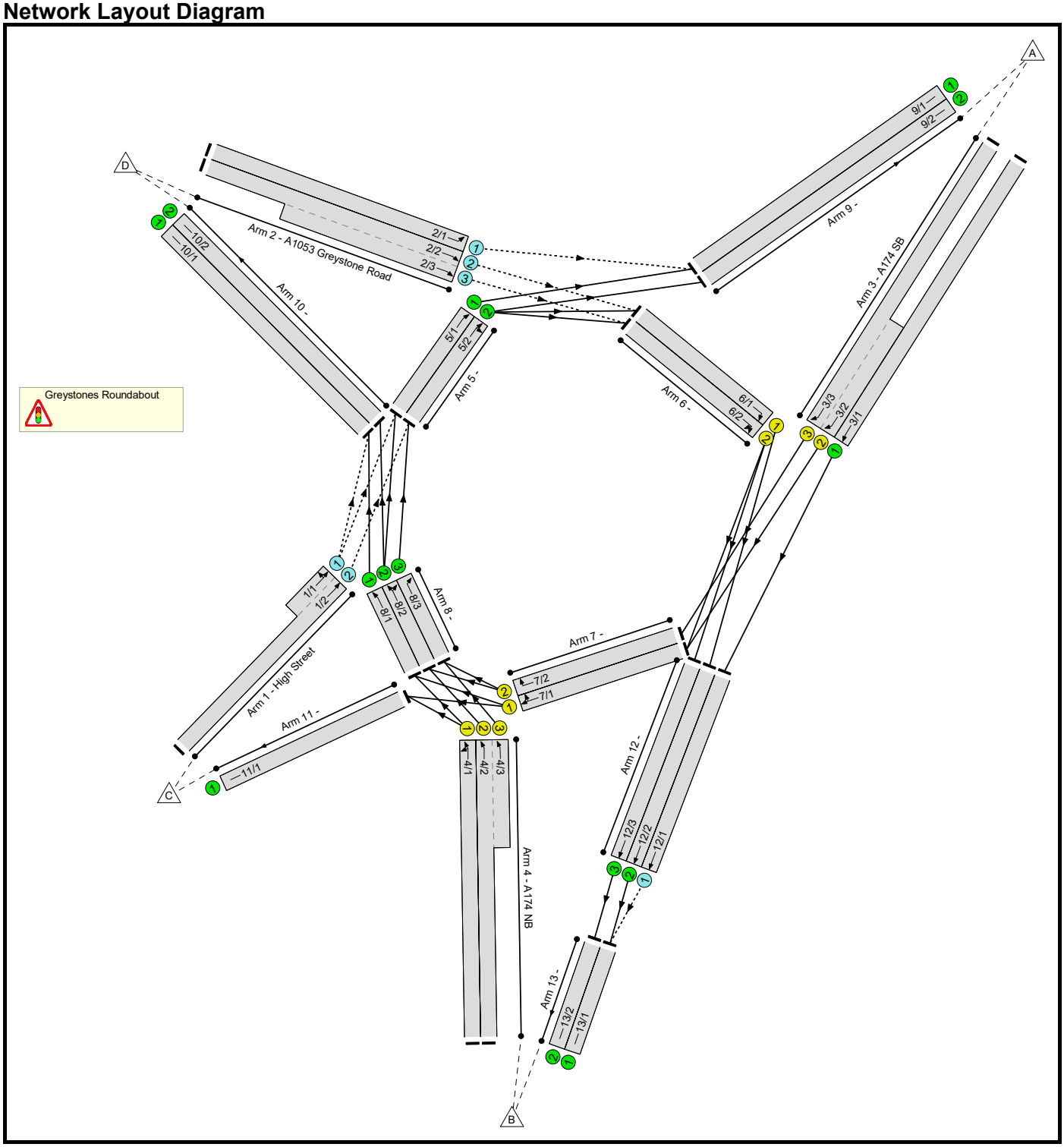
C1	Stream: 1 PRC for Signalled Lanes (%):	-48.1	Total Delay for Signalled Lanes (pcuHr):	278.09	Cycle Time (s): 60
C1	Stream: 2 PRC for Signalled Lanes (%):	-49.8	Total Delay for Signalled Lanes (pcuHr):	223.50	Cycle Time (s): 60
C1	Stream: 3 PRC for Signalled Lanes (%):	52.6	Total Delay for Signalled Lanes (pcuHr):	7.61	Cycle Time (s): 60
	PRC Over All Lanes (%):	-49.8	Total Delay Over All Lanes(pcuHr):	533.25	

Full Input Data And Results

User and Project Details

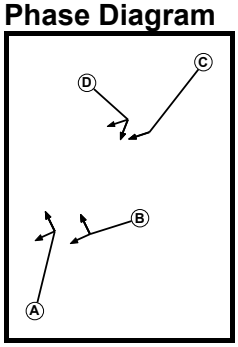
Project:	**Greystones Roundabout**
Title:	**Existing Layout**
Location:	

Network Layout Diagram



Full Input Data And Results

Phase Diagram



Phase Input Data

Phase Name	Phase Type	Stage Stream	Assoc. Phase	Street Min	Cont Min
A	Traffic	2		7	7
B	Traffic	2		7	7
C	Traffic	1		7	7
D	Traffic	1		7	7

Phase Intergreens Matrix

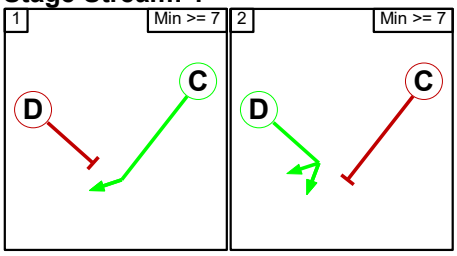
Terminating Phase \ Starting Phase	A	B	C	D
A	-	5	-	-
B	5	-	-	-
C	-	-	-	5
D	-	-	5	-

Phases in Stage

Stream	Stage No.	Phases in Stage
1	1	C
1	2	D
2	1	A
2	2	B

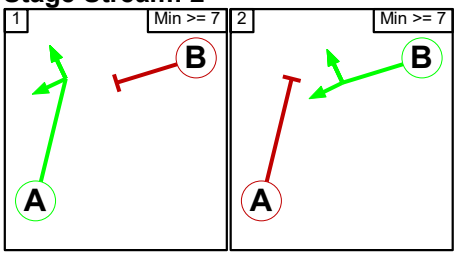
Stage Diagram

Stage Stream: 1



Full Input Data And Results

Stage Stream: 2



Phase Delays

Stage Stream: 1

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

Stage Stream: 2

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

Prohibited Stage Change

Stage Stream: 1

	To Stage		
		1	2
From Stage	1		5
	2	5	

Stage Stream: 2

	To Stage		
		1	2
From Stage	1		5
	2	5	

Full Input Data And Results

Traffic Flow Groups

Flow Group	Start Time	End Time	Duration	Formula
7: '2033 AM Base'	08:00	09:00	01:00	

Scenario 7: '2033 AM Base' (FG7: '2033 AM Base', Plan 1: 'Network Control Plan 1')

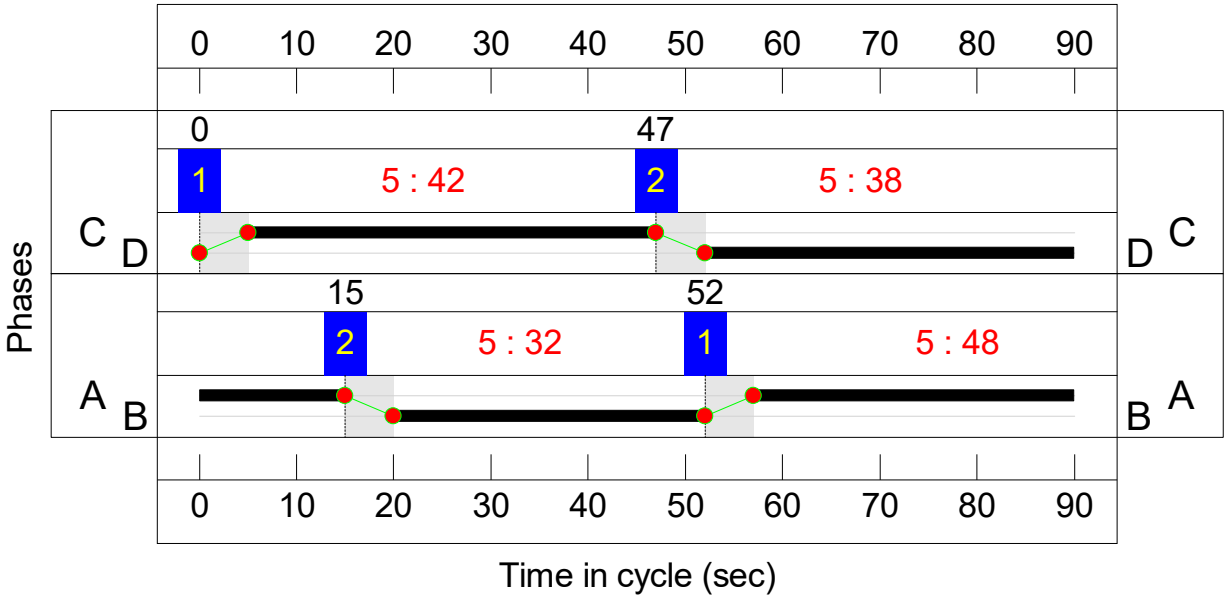
Traffic Flows, Desired

Desired Flow :

	Destination					
Origin		A	B	C	D	Tot.
	A	0	1309	122	923	2354
	B	1106	0	138	529	1773
	C	94	180	0	23	297
	D	262	270	6	0	538
	Tot.	1462	1759	266	1475	4962

Full Input Data And Results

Signal Timings Diagram



Basic Results Summary

Network Results

Item	Lane Description	Lane Type	Full Phase	Arrow Phase	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Deg Sat (%)	Mean Max Queue (pcu)	Capacity (pcu)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)
Network: As Existing	**-**	**-**	**-**		**-**	**-**	**-**	**-**	**94.5%**	**-**	**-**	**2717**	**0**	**0**	**40.2**	**-**
1/2+1/1	High Street Ahead Left	O	-		-	-	297	2015:1956	74.8 : 74.8%	4.8	366+31	594	0	0	2.2	27.2
2/1	A1053 Greystone Road Left	O	-		-	-	262	1975	53.6%	5.3	489	262	0	0	1.9	26.3
2/2+2/3	A1053 Greystone Road Ahead	O	-		-	-	276	1961:1902	46.4 : 46.4%	4.4	106+489	552	0	0	1.7	22.4
3/1	A174 SB Ahead	U	-		-	-	1309	1980	66.1%	1.0	1980	-	-	-	1.0	2.7
3/3+3/2	A174 SB Ahead	U	C		46	-	1045	1985:1985	70.8 : 70.8%	10.1	711+766	-	-	-	5.3	18.1
4/1	A174 NB Ahead Left	U	A		48	-	667	1876	65.3%	12.6	1021	-	-	-	3.6	19.5
4/2+4/3	A174 NB Ahead	U	A		48	-	1106	1903:1923	81.0 : 81.0%	12.7	750+615	-	-	-	6.2	20.1
5/1	Ahead	U	-		-	-	608	1800	33.8%	0.3	1800	-	-	-	0.3	1.5
5/2	Right Ahead	U	-		-	-	772	1800	42.9%	0.4	1800	-	-	-	0.4	1.7
6/1	Right	U	D		34	-	49	1800	7.0%	1.0	700	-	-	-	0.2	16.4
6/2	Right Right2	U	D		34	-	407	1800	58.1%	9.8	700	-	-	-	2.6	22.8
7/1	Right Ahead	U	B		32	-	548	2015	74.2%	13.4	739	-	-	-	3.2	20.8
7/2	Right	U	B		32	-	503	2015	68.1%	11.7	739	-	-	-	2.5	18.2
8/1	Ahead	U	-		-	-	949	1800	52.7%	0.6	1800	-	-	-	0.6	2.1
8/2	Right Ahead	U	-		-	-	1111	1800	61.7%	10.0	1800	-	-	-	0.9	2.9
8/3	Right	U	-		-	-	498	1800	27.7%	5.9	1800	-	-	-	0.2	1.5
12/1	Ahead	O	-		-	-	1309	1940	94.5%	20.3	1386	1309	0	0	7.4	20.3
12/2	Ahead	U	-		-	-	49	1940	2.5%	0.0	1940	-	-	-	0.0	1.0
12/3	Ahead	U	-		-	-	401	1940	20.7%	0.1	1940	-	-	-	0.1	1.2

Basic Results Summary

C1	Stream: 1	PRC for Signalled Lanes (%):	27.2	Total Delay for Signalled Lanes (pcuHr):	8.06	Cycle Time (s):	90
C1	Stream: 2	PRC for Signalled Lanes (%):	11.1	Total Delay for Signalled Lanes (pcuHr):	15.50	Cycle Time (s):	90
		PRC Over All Lanes (%):	-5.0	Total Delay Over All Lanes(pcuHr):	40.24		

Full Input Data And Results

Traffic Flow Groups

Flow Group	Start Time	End Time	Duration	Formula
8: '2033 PM Base'	17:00	18:00	01:00	

Scenario 8: '2033 PM Base' (FG8: '2033 PM Base', Plan 1: 'Network Control Plan 1')

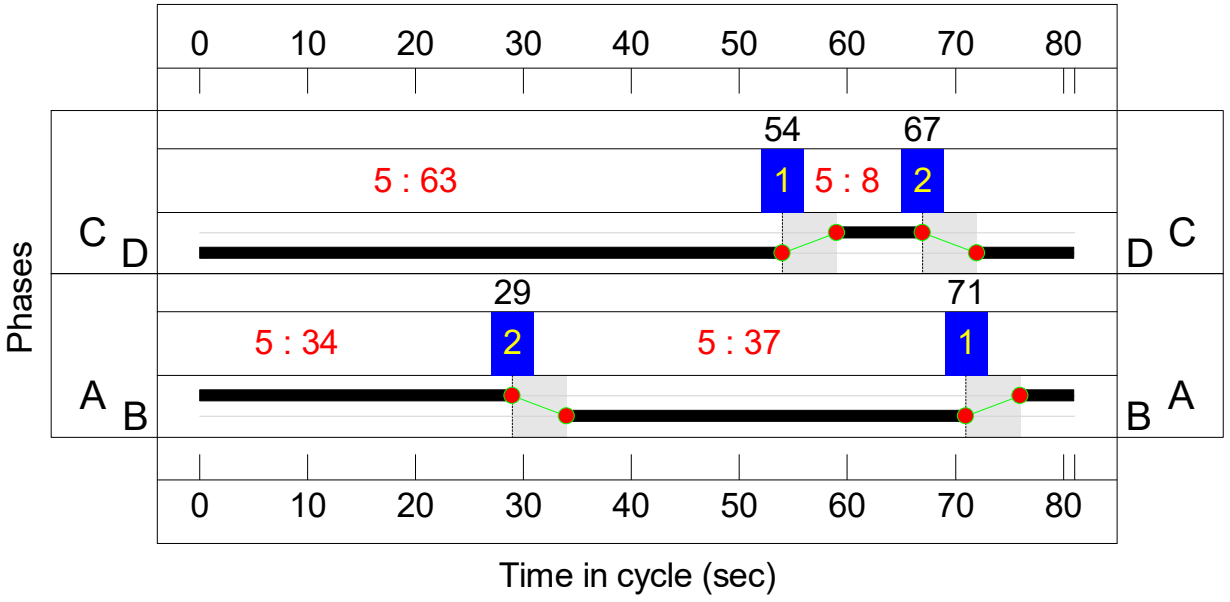
Traffic Flows, Desired

Desired Flow :

	Destination					
Origin		A	B	C	D	Tot.
	A	0	1278	132	256	1666
	B	1239	0	335	245	1819
	C	147	129	0	29	305
	D	759	439	14	0	1212
	Tot.	2145	1846	481	530	5002

Full Input Data And Results

Signal Timings Diagram



Basic Results Summary

Network Results

Item	Lane Description	Lane Type	Full Phase	Arrow Phase	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Deg Sat (%)	Mean Max Queue (pcu)	Capacity (pcu)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)
Network: As Existing	**-**	**-**	**-**		**-**	**-**	**-**	**-**	**125.3%**	**-**	**-**	**3400**	**0**	**0**	**255.7**	**-**
1/2+1/1	High Street Ahead Left	O	-		-	-	305	2015:1956	32.6 : 32.6%	2.8	848+89	610	0	0	0.5	5.9
2/1	A1053 Greystone Road Left	O	-		-	-	759	1975	125.3%	106.0	606	606	0	0	91.7	134.9
2/2+2/3	A1053 Greystone Road Ahead	O	-		-	-	453	1961:1902	64.4 : 64.4%	7.7	98+606	906	0	0	2.7	21.1
3/1	A174 SB Ahead	U	-		-	-	1278	1980	64.5%	0.9	1980	-	-	-	0.9	2.6
3/3+3/2	A174 SB Ahead	U	C		32	-	388	1985:1985	33.1 : 33.1%	3.7	569+605	-	-	-	2.4	22.3
4/1	A174 NB Ahead Left	U	A		35	-	580	1860	78.0%	14.3	744	-	-	-	5.5	34.3
4/2+4/3	A174 NB Ahead	U	A		35	-	1239	1903:1923	103.9 : 103.9%	75.9	626+375	-	-	-	142.0	112.7
5/1	Ahead	U	-		-	-	775	1800	34.8%	0.3	1800	-	-	-	0.3	1.5
5/2	Right Ahead	U	-		-	-	740	1800	36.1%	3.8	1800	-	-	-	0.3	1.6
6/1	Right	U	D		48	-	63	1800	6.4%	0.2	980	-	-	-	0.0	2.7
6/2	Right Right2	U	D		48	-	519	1800	53.0%	4.2	980	-	-	-	0.9	6.2
7/1	Right Ahead	U	B		45	-	214	2015	20.8%	4.6	1030	-	-	-	0.8	13.0
7/2	Right	U	B		45	-	188	2015	18.3%	4.2	1030	-	-	-	0.7	12.8
8/1	Ahead	U	-		-	-	313	1800	17.4%	0.1	1800	-	-	-	0.1	1.2
8/2	Right Ahead	U	-		-	-	963	1800	45.2%	8.4	1800	-	-	-	0.4	1.9
8/3	Right	U	-		-	-	464	1800	20.8%	4.2	1800	-	-	-	0.1	1.3
12/1	Ahead	O	-		-	-	1278	1940	93.3%	16.4	1370	1278	0	0	6.2	17.5
12/2	Ahead	U	-		-	-	63	1940	3.2%	0.0	1940	-	-	-	0.0	1.0
12/3	Ahead	U	-		-	-	505	1940	26.0%	0.2	1940	-	-	-	0.2	1.3

Basic Results Summary

C1	Stream: 1	PRC for Signalled Lanes (%):	69.9	Total Delay for Signalled Lanes (pcuHr):	3.35	Cycle Time (s):	90
C1	Stream: 2	PRC for Signalled Lanes (%):	-19.6	Total Delay for Signalled Lanes (pcuHr):	99.01	Cycle Time (s):	90
		PRC Over All Lanes (%):	-19.6	Total Delay Over All Lanes(pcuHr):	99.75		

Basic Results Summary

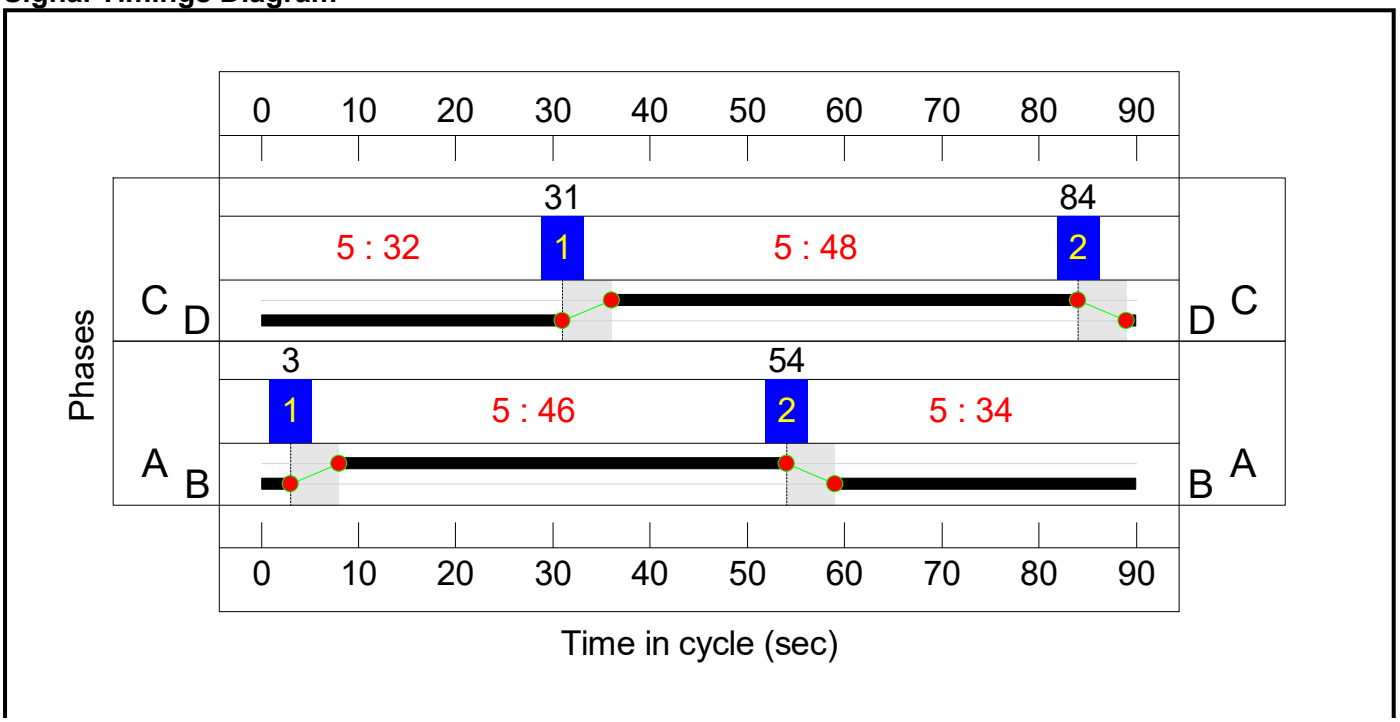
Scenario 3: '2033 AM Base+Dorman' (FG3: '2033 AM Base+Dorman', Plan 1: 'Network Control Plan 1')

Traffic Flows, Actual

Actual Flow :

		Destination				
		A	B	C	D	Tot.
Origin	A	0	1309	122	1031	2462
	B	1106	0	138	595	1839
	C	94	180	0	29	303
	D	315	322	10	0	647
	Tot.	1515	1811	270	1655	5251

Signal Timings Diagram



Basic Results Summary

Item	Lane Description	Lane Type	Full Phase	Arrow Phase	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Deg Sat (%)	Mean Max Queue (pcu)	Capacity (pcu)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)
Network: As Existing	**-**	**-**	**-**		**-**	**-**	**-**	**-**	**94.3%**	**-**	**-**	**2894**	**0**	**0**	**47.2**	**-**
Greystones Roundabout	**-**	**-**	**-**		**-**	**-**	**-**	**-**	**94.3%**	**-**	**-**	**2894**	**0**	**0**	**47.2**	**-**
1/2+1/1	High Street Ahead Left	O	-		-	-	303	2015:1976	82.2 : 82.2%	5.6	315+54	606	0	0	3.3	39.7
2/1	A1053 Greystone Road Left	O	-		-	-	315	1908	65.0%	7.2	485	315	0	0	2.7	31.2
2/2+2/3	A1053 Greystone Road Ahead	O	-		-	-	332	1935:1940	59.0 : 59.0%	6.3	78+485	664	0	0	2.4	26.4
3/1	A174 SB Ahead	U	-		-	-	1309	1980	66.1%	1.0	1980	-	-	-	1.0	2.7
3/3+3/2	A174 SB Ahead	U	C		48	-	1153	1985:1985	75.9 : 75.9%	11.2	730+789	-	-	-	5.8	18.0
4/1	A174 NB Ahead Left	U	A		46	-	719	1908	72.2%	15.1	996	-	-	-	4.6	22.9
4/2+4/3	A174 NB Ahead	U	A		46	-	1120	1921:1937	83.1 : 83.1%	14.0	721+627	-	-	-	6.9	22.3
5/1	Ahead	U	-		-	-	600	1800	33.3%	0.2	1800	-	-	-	0.2	1.5
5/2	Right Ahead	U	-		-	-	780	1800	43.3%	0.4	1800	-	-	-	0.4	1.8
6/1	Right	U	D		32	-	46	1800	7.0%	0.9	660	-	-	-	0.2	16.2
6/2	Right Right2	U	D		32	-	466	1800	70.6%	10.9	660	-	-	-	2.8	21.8
7/1	Right Ahead	U	B		34	-	609	2015	77.7%	15.9	784	-	-	-	4.2	24.8
7/2	Right	U	B		34	-	554	2015	70.7%	13.6	784	-	-	-	3.3	21.2
8/1	Ahead	U	-		-	-	1058	1800	58.8%	0.7	1800	-	-	-	0.7	2.4
8/2	Right Ahead	U	-		-	-	1153	1800	64.1%	12.1	1800	-	-	-	1.0	3.2
8/3	Right	U	-		-	-	521	1800	28.9%	7.4	1800	-	-	-	0.2	1.6
12/1	Ahead	O	-		-	-	1309	1940	94.3%	19.3	1389	1309	0	0	7.1	19.6
12/2	Ahead	U	-		-	-	46	1940	2.4%	0.0	1940	-	-	-	0.0	1.0

Basic Results Summary

12/3	Ahead	U	-		-	-	456	1940	23.5%	0.2	1940	-	-	-	0.2	1.2

C1	Stream: 1	PRC for Signalled Lanes (%):	18.6	Total Delay for Signalled Lanes (pcuHr):	8.81	Cycle Time (s):	90	
C1	Stream: 2	PRC for Signalled Lanes (%):	8.3	Total Delay for Signalled Lanes (pcuHr):	18.98	Cycle Time (s):	90	
		PRC Over All Lanes (%):	-4.7	Total Delay Over All Lanes(pcuHr):	47.18			

Basic Results Summary

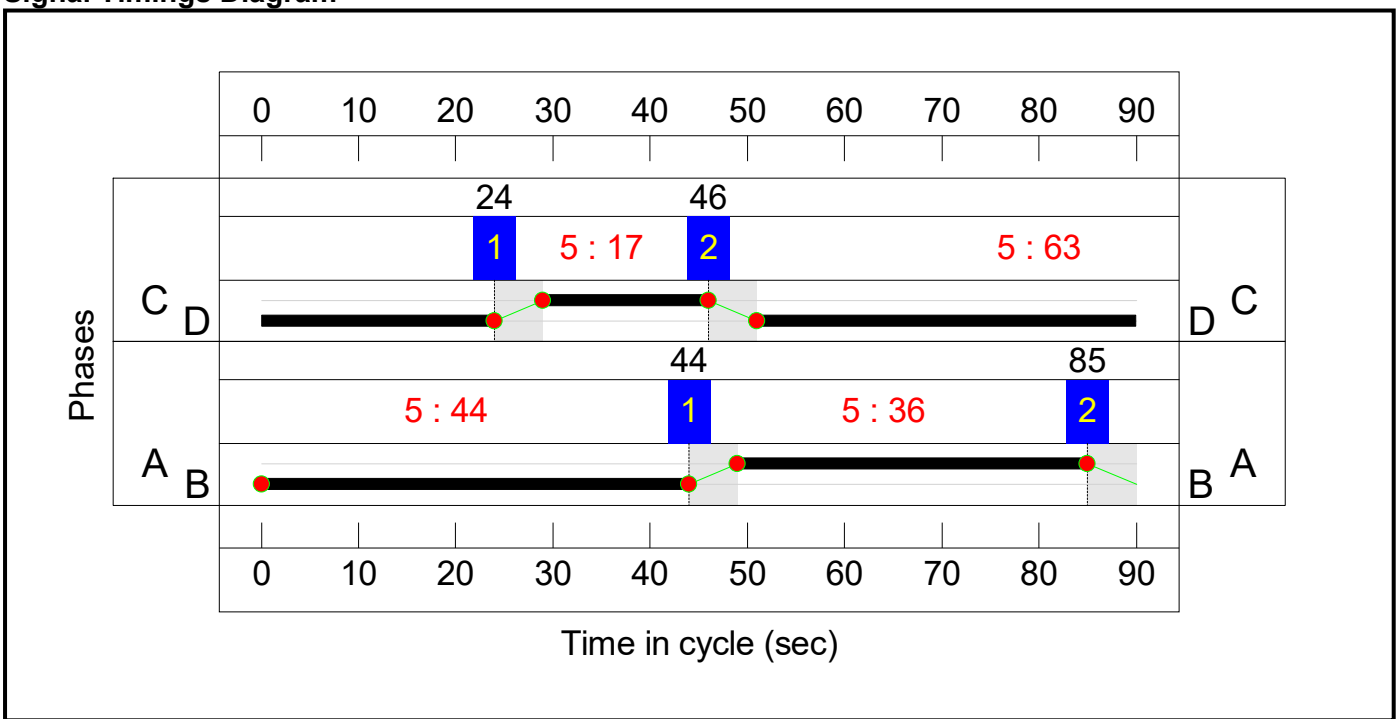
Scenario 4: '2033 PM Base+Dorman' (FG4: '2033 PM Base+Dorman', Plan 1: 'Network Control Plan 1')

Traffic Flows, Actual

Actual Flow :

	Destination					
Origin		A	B	C	D	Tot.
	A	0	1278	132	287	1697
	B	1239	0	335	277	1851
	C	147	129	0	32	308
	D	854	488	18	0	1360
	Tot.	2240	1895	485	596	5216

Signal Timings Diagram



Basic Results Summary

Item	Lane Description	Lane Type	Full Phase	Arrow Phase	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Deg Sat (%)	Mean Max Queue (pcu)	Capacity (pcu)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)
Network: As Existing	**-**	**-**	**-**		**-**	**-**	**-**	**-**	**143.0%**	**-**	**-**	**3508**	**0**	**0**	**386.1**	**-**
Greystones Roundabout	**-**	**-**	**-**		**-**	**-**	**-**	**-**	**143.0%**	**-**	**-**	**3508**	**0**	**0**	**386.1**	**-**
1/2+1/1	High Street Ahead Left	O	-		-	-	308	2015:1980	33.6 : 33.6%	2.6	756+161	616	0	0	0.6	6.8
2/1	A1053 Greystone Road Left	O	-		-	-	854	1908	141.8%	177.2	602	602	0	0	142.7	601.5
2/2+2/3	A1053 Greystone Road Ahead	O	-		-	-	506	1935:1940	67.4 : 67.4%	8.5	148+602	1012	0	0	3.1	21.9
3/1	A174 SB Ahead	U	-		-	-	1278	1980	64.5%	0.9	1980	-	-	-	0.9	2.6
3/3+3/2	A174 SB Ahead	U	C		17	-	419	1985:1985	70.0 : 70.0%	7.6	201+397	-	-	-	5.0	42.6
4/1	A174 NB Ahead Left	U	A		36	-	612	1908	78.0%	15.0	784	-	-	-	5.6	33.2
4/2+4/3	A174 NB Ahead	U	A		36	-	1239	1921:1937	143.0 : 143.0%	232.4	720+147	-	-	-	213.7	621.0
5/1	Ahead	U	-		-	-	1051	1800	41.2%	0.4	1800	-	-	-	0.4	1.7
5/2	Right Ahead	U	-		-	-	464	1800	22.3%	0.1	1800	-	-	-	0.1	1.3
6/1	Right	U	D		63	-	100	1800	7.8%	0.9	1280	-	-	-	0.2	6.3
6/2	Right Right2	U	D		63	-	535	1800	41.8%	10.2	1280	-	-	-	2.4	16.4
7/1	Right Ahead	U	B		44	-	296	2015	29.4%	1.7	1007	-	-	-	0.9	10.6
7/2	Right	U	B		44	-	141	2015	14.0%	0.4	1007	-	-	-	0.2	5.8
8/1	Ahead	U	-		-	-	423	1800	23.5%	0.2	1800	-	-	-	0.2	1.3
8/2	Right Ahead	U	-		-	-	1170	1800	47.8%	10.0	1800	-	-	-	0.5	2.1
8/3	Right	U	-		-	-	210	1800	8.2%	0.0	1800	-	-	-	0.0	1.1
12/1	Ahead	O	-		-	-	1278	1940	96.1%	19.8	1330	1278	0	0	9.4	26.5
12/2	Ahead	U	-		-	-	100	1940	5.2%	0.0	1940	-	-	-	0.0	1.0

Basic Results Summary

12/3	Ahead	U	-		-	-	517	1940	26.6%	0.2	1940	-	-	-	0.2	1.3

C1	Stream: 1	PRC for Signalled Lanes (%):	28.5	Total Delay for Signalled Lanes (pcuHr):	7.57	Cycle Time (s):	90	
C1	Stream: 2	PRC for Signalled Lanes (%):	-58.9	Total Delay for Signalled Lanes (pcuHr):	220.47	Cycle Time (s):	90	
		PRC Over All Lanes (%):	-58.9	Total Delay Over All Lanes(pcuHr):	386.11			

Basic Results Summary

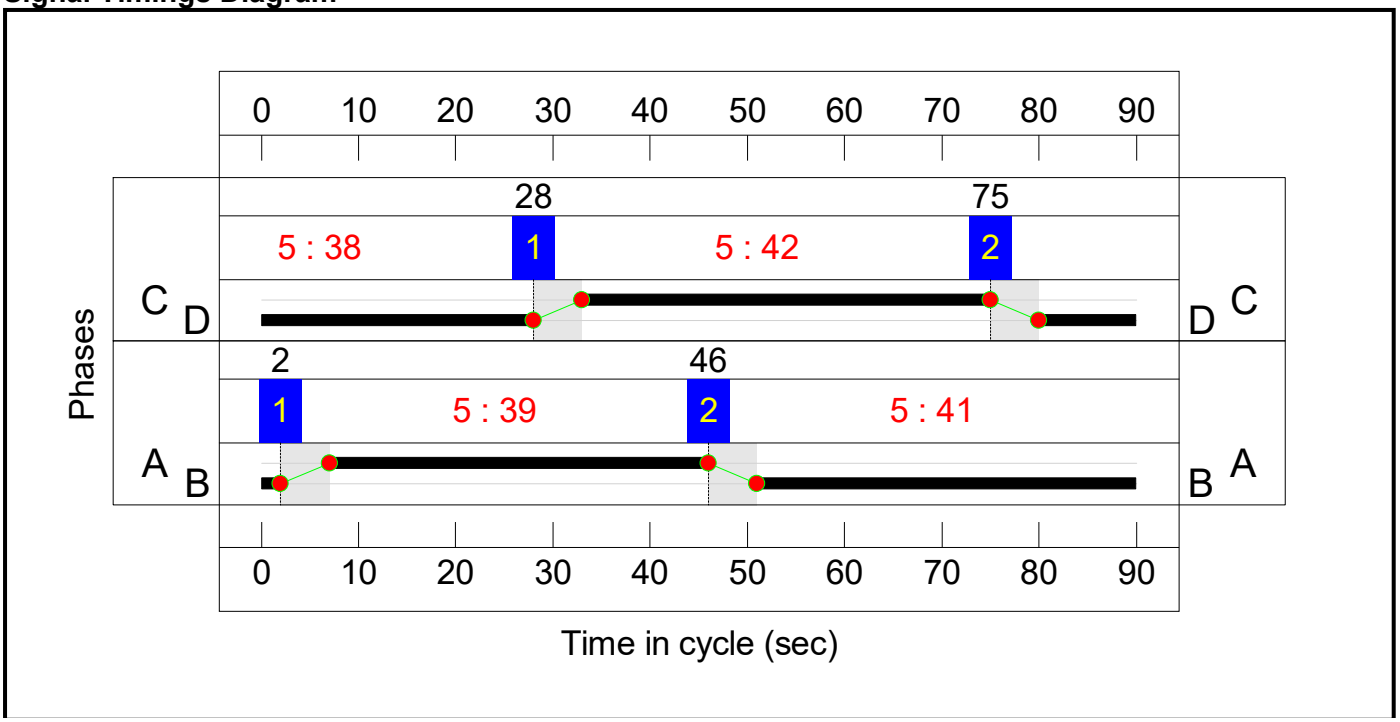
Scenario 7: '2033 AM Cumulative' (FG7: '2033 AM Cumulative', Plan 1: 'Network Control Plan 1')

Traffic Flows, Actual

Actual Flow :

Origin \ Destination	A	B	C	D	Tot.
A	0	1309	122	1618	3049
B	1106	0	138	944	2188
C	94	180	0	68	342
D	460	467	24	0	951
Tot.	1660	1956	284	2630	6530

Signal Timings Diagram



Basic Results Summary

Item	Lane Description	Lane Type	Full Phase	Arrow Phase	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Deg Sat (%)	Mean Max Queue (pcu)	Capacity (pcu)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)
Network: As Existing	**-**	**-**	**-**		**-**	**-**	**-**	**-**	**123.4%**	**-**	**-**	**3212**	**0**	**0**	**424.6**	**-**
Greystones Roundabout	**-**	**-**	**-**		**-**	**-**	**-**	**-**	**123.4%**	**-**	**-**	**3212**	**0**	**0**	**424.6**	**-**
1/2+1/1	High Street Ahead Left	O	-		-	-	342	2015:1965	122.9 : 122.9%	50.5	216+62	585	0	0	40.0	421.3
2/1	A1053 Greystone Road Left	O	-		-	-	460	1908	76.6%	11.1	601	460	0	0	4.1	32.2
2/2+2/3	A1053 Greystone Road Ahead	O	-		-	-	491	1935:1940	44.3 : 38.7%	4.9	601+581	982	0	0	2.4	18.0
3/1	A174 SB Ahead	U	-		-	-	1309	1980	66.1%	1.0	1980	-	-	-	1.0	2.7
3/3+3/2	A174 SB Ahead	U	C		42	-	1740	1985:1985	123.4 : 123.4%	212.5	715+695	-	-	-	188.8	390.7
4/1	A174 NB Ahead Left	U	A		39	-	902	1908	106.4%	57.6	848	-	-	-	42.2	168.5
4/2+4/3	A174 NB Ahead	U	A		39	-	1286	1921:1937	106.2 : 106.2%	72.8	574+637	-	-	-	55.6	155.5
5/1	Ahead	U	-		-	-	441	1800	23.1%	0.2	1800	-	-	-	0.2	1.3
5/2	Right Ahead	U	-		-	-	942	1800	47.4%	13.6	1800	-	-	-	0.7	2.8
6/1	Right	U	D		38	-	267	1800	34.2%	5.4	780	-	-	-	0.8	10.9
6/2	Right Right2	U	D		38	-	407	1800	47.8%	5.2	780	-	-	-	1.2	11.1
7/1	Right Ahead	U	B		41	-	885	2015	76.8%	19.2	940	-	-	-	3.9	19.2
7/2	Right	U	B		41	-	882	2015	76.0%	19.3	940	-	-	-	3.7	18.5
8/1	Ahead	U	-		-	-	1503	1800	73.2%	1.4	1800	-	-	-	1.4	3.7
8/2	Right Ahead	U	-		-	-	1492	1800	71.6%	17.5	1800	-	-	-	1.5	4.3
8/3	Right	U	-		-	-	676	1800	35.4%	9.4	1800	-	-	-	0.3	1.8
12/1	Ahead	O	-		-	-	1309	1940	110.5%	165.1	1185	1185	0	0	76.7	211.0
12/2	Ahead	U	-		-	-	267	1940	13.8%	0.1	1940	-	-	-	0.1	1.1

Basic Results Summary

12/3	Ahead	U	-		-	-	380	1940	17.9%	0.1	1940	-	-	-	0.1	1.1

C1	Stream: 1 PRC for Signalled Lanes (%):	-37.1	Total Delay for Signalled Lanes (pcuHr):	190.81	Cycle Time (s):	90
C1	Stream: 2 PRC for Signalled Lanes (%):	-18.2	Total Delay for Signalled Lanes (pcuHr):	105.31	Cycle Time (s):	90
	PRC Over All Lanes (%):	-37.1	Total Delay Over All Lanes(pcuHr):	424.62		

Basic Results Summary

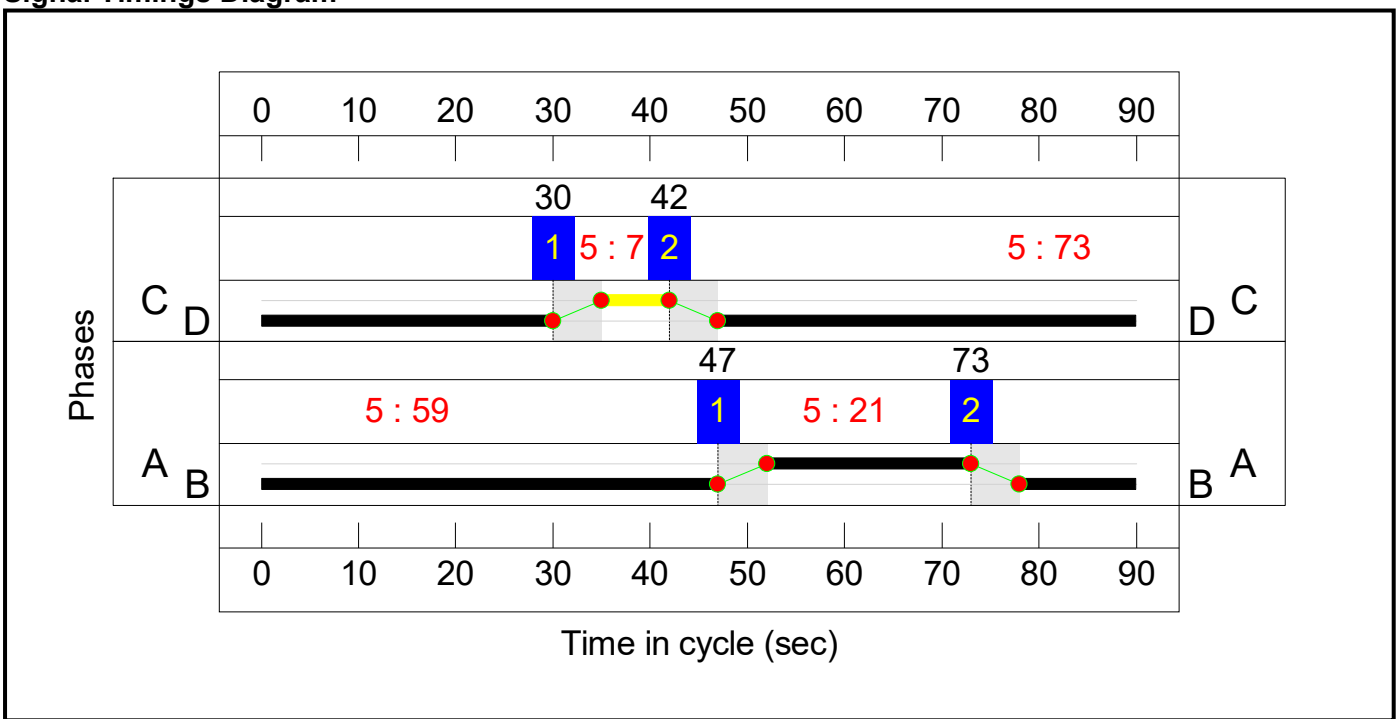
Scenario 8: '2033 PM Cumulative' (FG8: '2033 PM Cumulative', Plan 1: 'Network Control Plan 1')

Traffic Flows, Actual

Actual Flow :

		Destination				
		A	B	C	D	Tot.
Origin	A	0	1278	132	409	1819
	B	1239	0	335	401	1975
	C	147	129	0	43	319
	D	1374	775	54	0	2203
	Tot.	2760	2182	521	853	6316

Signal Timings Diagram



Basic Results Summary

Item	Lane Description	Lane Type	Full Phase	Arrow Phase	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Deg Sat (%)	Mean Max Queue (pcu)	Capacity (pcu)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)
Network: As Existing	**-**	**-**	**-**		**-**	**-**	**-**	**-**	**190.7%**	**-**	**-**	**3991**	**0**	**0**	**1141.7**	**-**
Greystones Roundabout	**-**	**-**	**-**		**-**	**-**	**-**	**-**	**190.7%**	**-**	**-**	**3991**	**0**	**0**	**1141.7**	**-**
1/2+1/1	High Street Ahead Left	O	-		-	-	319	2015:1985	25.9 : 25.9%	2.0	900+332	638	0	0	0.5	5.9
2/1	A1053 Greystone Road Left	O	-		-	-	1374	1908	190.7%	430.9	720	720	0	0	366.8	961.1
2/2+2/3	A1053 Greystone Road Ahead	O	-		-	-	829	1935:1940	59.6 : 55.5%	6.6	720+720	1658	0	0	2.4	10.6
3/1	A174 SB Ahead	U	-		-	-	1239	1980	62.6%	0.8	1980	-	-	-	0.8	2.4
3/3+3/2	A174 SB Ahead	U	C		7	-	580	1985:1985	163.8 : 164.9%	125.0	176+176	-	-	-	130.2	808.3
4/1	A174 NB Ahead Left	U	A		21	-	736	1908	157.8%	165.2	466	-	-	-	155.6	761.2
4/2+4/3	A174 NB Ahead	U	A		21	-	1239	1921:1937	189.6 : 189.6%	344.5	444+210	-	-	-	330.7	960.7
5/1	Ahead	U	-		-	-	884	1800	27.0%	0.2	1800	-	-	-	0.2	1.4
5/2	Right Ahead	U	-		-	-	707	1800	27.2%	2.2	1800	-	-	-	0.2	1.4
6/1	Right	U	D		73	-	434	1800	29.3%	2.8	1480	-	-	-	0.4	3.7
6/2	Right Right2	U	D		73	-	600	1800	38.5%	3.5	1480	-	-	-	0.6	3.9
7/1	Right Ahead	U	B		59	-	382	2015	18.8%	1.6	1343	-	-	-	0.4	6.3
7/2	Right	U	B		59	-	289	2015	13.1%	0.5	1343	-	-	-	0.2	4.4
8/1	Ahead	U	-		-	-	597	1800	20.7%	0.1	1800	-	-	-	0.1	1.3
8/2	Right Ahead	U	-		-	-	1054	1800	31.9%	8.8	1800	-	-	-	0.3	1.7
8/3	Right	U	-		-	-	474	1800	14.2%	3.2	1800	-	-	-	0.1	1.2
12/1	Ahead	O	-		-	-	1239	1940	127.1%	223.5	975	975	0	0	151.6	440.5
12/2	Ahead	U	-		-	-	434	1940	22.4%	0.1	1940	-	-	-	0.1	1.2

Basic Results Summary

12/3	Ahead	U	-		-	-	509	1940	25.5%	0.2	1940	-	-	-	0.2	1.2

C1	Stream: 1	PRC for Signalled Lanes (%):	-83.2	Total Delay for Signalled Lanes (pcuHr):	131.29	Cycle Time (s):	90
C1	Stream: 2	PRC for Signalled Lanes (%):	-110.7	Total Delay for Signalled Lanes (pcuHr):	486.94	Cycle Time (s):	90
		PRC Over All Lanes (%):	-111.9	Total Delay Over All Lanes(pcuHr):	1141.66		

Appendix G

A19 Journey Time Routes

G1 A19 Corridor

Figure G1: A19 North to A66 Eastbound

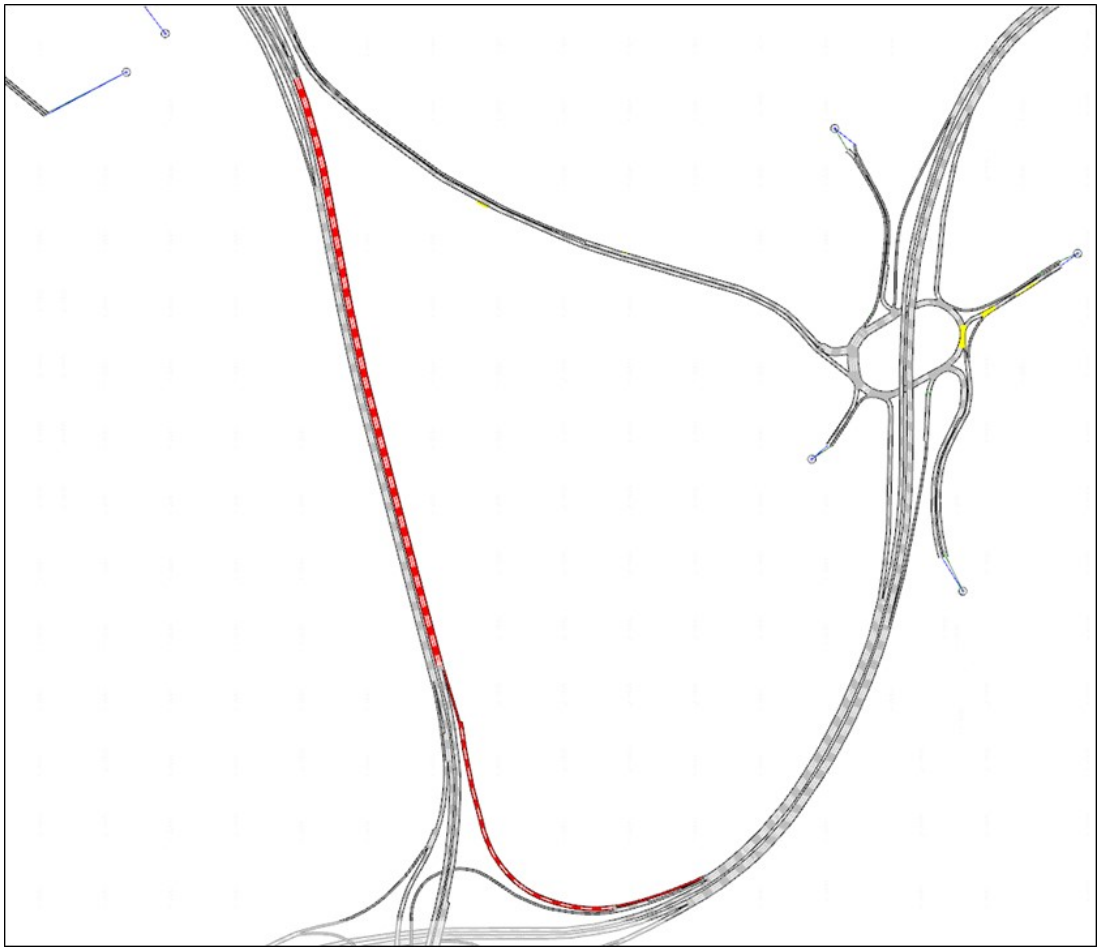


Figure G2: A19 South to A66 Eastbound

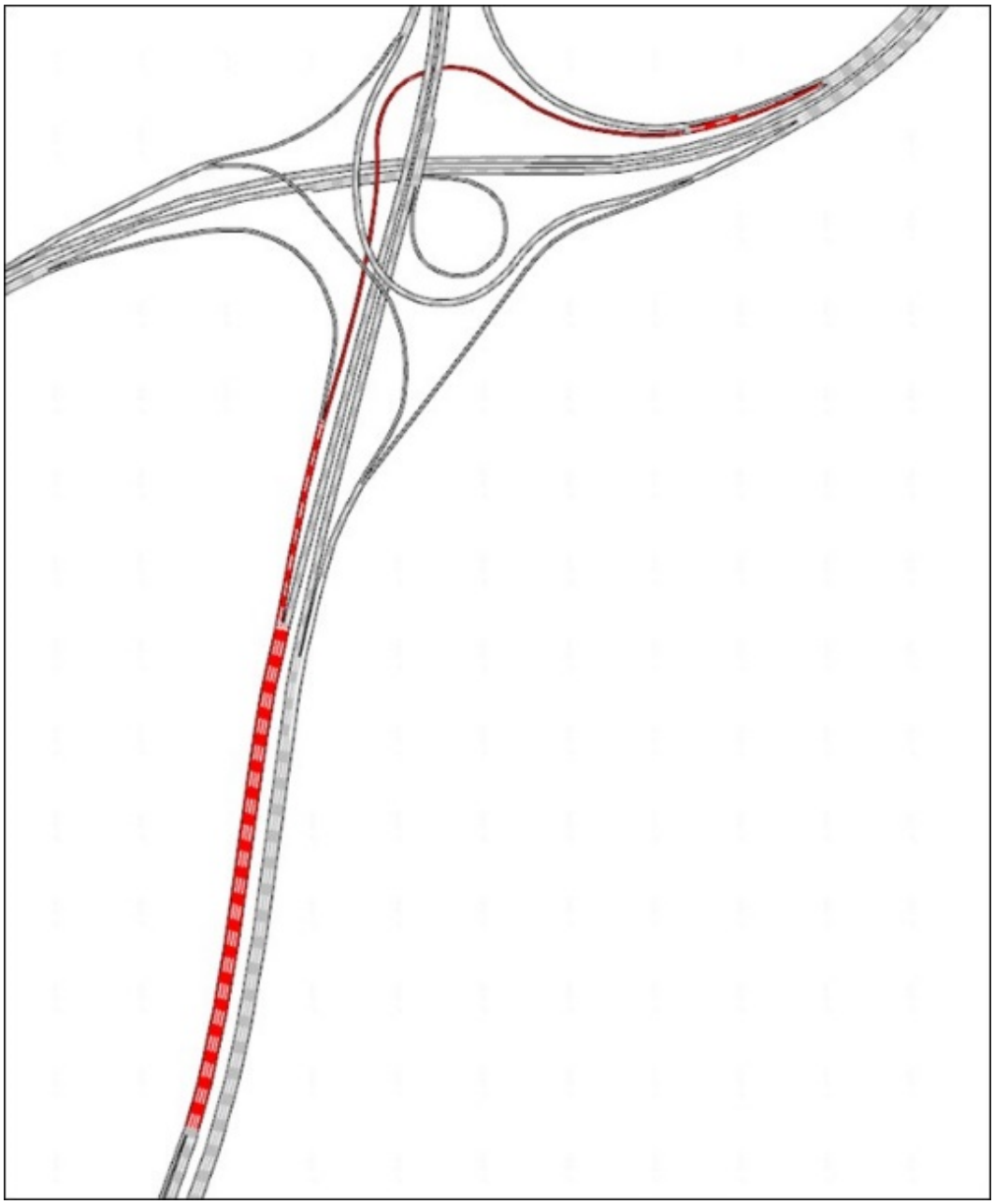


Figure G3: A66 Westbound to A19 North

Figure G4: A66 Westbound to A19 South

Appendix C2: Transport Assessment Scoping Note

South Tees Development Corporation

Teesworks

Transport Assessments - Scoping Report

001

Issue | 26 November 2020

Job number 602669-41

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ARUP

Contents

1 Introduction

1.1 Purpose of the Scoping Report

Arup has been commissioned by the South Tees Development Corporation (STDC) to develop a Transport Assessment (TA) and Framework Travel Plan in support of five separate outline planning applications for development on the South Tees Development Corporation (STDC) site, known as 'Teesworks'.

An outline planning application for each of the five sites will be submitted separately and there will be five TA's produced. However, rather than producing five Scoping Reports, this document provides details of all five sites and outlines the key principles of the assessments.

Arup will also undertake the traffic and transportation assessment of the Environmental Impact Assessment.

The purpose of this scoping report is to agree the methodology and main parameters of the assessment with Redcar and Cleveland Borough Council (RCBC), the local planning and highway authority, and Highways England (HE). A copy will also be sent to the neighbouring highway authority, Middlesbrough Council (MC).

Decision points throughout the document are provided in a text box

1.2 Development Sites

The five development sites are as follows:

Dorman Point

The development site is located in the south-western part of the Teesworks area and the proposed maximum floorspace is just under 140,000sqm. It is largely free of active use, although the former Torpedo Ladle Workshop is present in the southern part of the site. It is proposed that the site will provide general industrial (B2) use and storage and distribution facilities (B8), with ancillary office accommodation. The development is forecast to employ approximately 1,620 people when operational.

Lackenby

The development site is located in the southern part of the Teesworks area and lies between Dorman Point and the British Steel area. It provides just under 93,000sqm of floorspace and is currently occupied by buildings and structures associated with the former steelmaking facilities. It is proposed that the site will provide general industrial (B2) use and storage and distribution facilities (B8), with ancillary office accommodation. The development is forecast to employ approximately 1,080 people when operational.

The Foundry

The development site, providing a maximum floorspace of 464,515sqm, is located in the northern part of the Teesworks area and is largely vacant industrial land, sparsely occupied by building and structures associated with the former steel making complex. The development proposals for the site are that it will provide general industrial (B2) use and storage and distribution facilities (B8), with ancillary office accommodation. It is forecast that the site could employ approximately 5,401 people when operational.

Long Acres

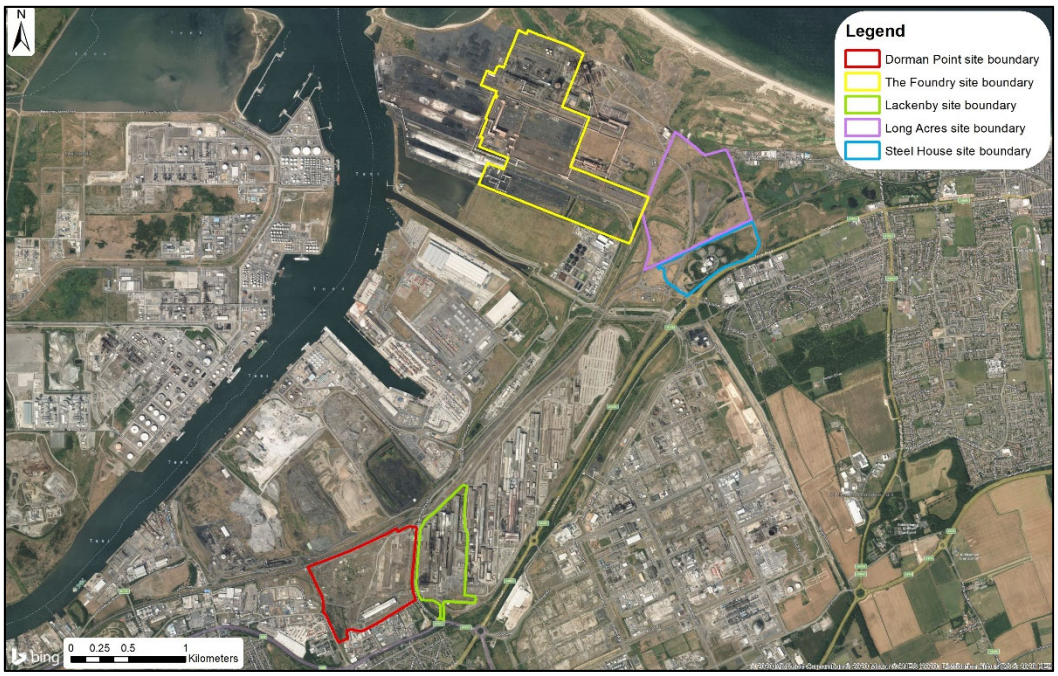
The development site is located between Steel House to the south and the Foundry to the north and provides just under 186,000sqm of floorspace. It is proposed that the site will provide general industrial (B2) use and storage and distribution facilities (B8), with ancillary office accommodation. The development is forecast to employ approximately 2,161 people when operational.

Steel House

The development site is bound to the south by the A1085 Trunk Road and is currently occupied by the Steel House office complex. It is proposed that the floor area, of around 16,000sqm, provides office and incubator space (use class E). It is forecast that the site could employ approximately 1,128 people when operational.

The location of the five sites is shown in **Figure 1**. The construction of the development sites will be phased, and all are expected to be operational by 2033.

Figure 1 Site Locations



2 Planning Policy Review

2.1 Literature Review

The TA for each of the five sites will address the relevant transport related policy documents as follows:

- National Planning Policy Framework (NPPF) 2019;
- Tees Valley Combined Authority Strategic Transport Plan 2020 - 2030;
- Redcar and Cleveland Local Plan 2018;
- Redcar and Cleveland Local Transport Plan 2011-2021;
- South Tees Regeneration Masterplan 2019; and
- South Tees Area Supplementary Planning Document (SPD) 2018.

It is proposed that the development considers relevant transport policies from the policy and guidance documents listed above. RCBC to advise if any other documents should be considered.

3 Baseline Conditions

The scope of each TA will include a full audit of available transport modes following the methodology outlined in this section.

3.1 Site Description and Location

This section of each TA will provide a high-level description of the characteristics of the site and the surrounding area.

3.2 Sustainable Transport Networks

A desktop audit of existing facilities and routes will be provided in this section of the TA. Information such as bus and rail routes, destinations and example journey times will be provided. For scheduled services, information such as frequencies and service times will be included.

3.3 Highway Network

This section of each TA will provide an overview of the main local roads and Strategic Road Network connecting the site to the wider area.

Due to current circumstances with the Covid 19 pandemic and lockdown measures, it is not possible for traffic surveys to be undertaken to inform the baseline condition assessment. To establish the baseline traffic flows, the following data sources have been utilised:

- Traffic data from HE North Regional Transport Model (NRTM);
- Traffic data from the Tees Valley Combined Authority (TVCA) Tees Valley Cube Model (TVM);
- Department for Transport traffic counts available online;
- WebTRIS (HE) online data;
- Traffic surveys collected on behalf of Capita in 2019 to construct a VISSIM model of the area for RCBC – permission to obtain a copy of these surveys was granted by RCBC, Capita and NETDC Ltd; and
- Survey data publicly available online from other local developments, including the planning application for the York Potash development (application number R/2013/0669/OOM).

Peak hour data from the two traffic models (NRTM and TVM) was input into two separate traffic flow diagrams for the study area. On both diagrams, any observed data was added above the links to enable a comparison to be made and determine which data source provided the most comparable base. The NRTM was found to be a comparable match against the baseline flows, and therefore the NRTM flows were predominantly used to inform the baseline, except for where observed data was available. All data has been adjusted to 2020 and 2033 (for operational year assessment) using NRTM growth.

The methodology described above was also used on application number R/2020/0357/OOM for development on the South Industrial Zone of the Teesworks site (referred to as 'South Bank').

3.4 Road Safety Analysis

To inform road safety considerations associated with the development proposals, a high-level review of five years' worth of accident data on the roads within the vicinity of each site will be undertaken.

Should any common factors pertaining to road traffic accidents be identified, suitable mitigation features may be considered as part of the development proposal.

This section seeks agreement that:

- The scope of the transport networks audit is acceptable;
- The methodology for establishing baseline traffic flows is acceptable; and
- The scope of the accident appraisal is adequate.

4 Development Proposals

This section of each TA will provide an overview of the proposed development, including details about site accesses and proposed transport provisions for the site.

4.1 Vehicular Access

The TA for each development site will provide details about the site access arrangements. It is anticipated at this stage that the development sites will be accessed as follows:

Dorman Point

The parameter plan shows four indicative access points into the Dorman Point site:

- One via a new roundabout junction on Eston Road, the works for which have planning permission (application number R/2020/0270/FFM);
- One at the north east corner of the site where an existing Teesworks internal road enters the site;
- One at the south east corner where an existing Teesworks internal road enters the site; and
- One potentially to be provided at the south west corner of the site at the Bessemer Gate entrance into the Bolckow Industrial Estate.

For the purpose of the assessment, the main vehicular access will be the new roundabout junction on Eston Road with all trips generated by the site using the roundabout to access the wider highway network.

Lackenby

It is proposed that the main vehicular access into the Lackenby site will be via a new fourth arm provided on the A66/Tees Dock Road roundabout into the site. All development trips will be assigned to this main access for the purpose of junction impact assessments. Access is expected to also be permitted via the internal Teesworks road network that connects to Dorman Point.

Long Acres, Foundary and Steel House

It is proposed that these sites access the public highway network via the Trunk Road Roundabout (also known as Steel House Roundabout).

4.2 Walking and Cycling Facilities

The TA for each of the five sites will provide information about the proposed walking and cycling facilities for each development and how these connect to the external network.

4.3 Public Transport Facilities

Details of existing public transport connections will be provided in each of the TA's.

4.4 Cycle Parking

High quality cycle parking is expected to be provided, in excess of the usual standards, in support of a more sustainable travel policy for the site.

4.5 Car Parking

As all five applications will be in outline, the internal site layouts have not yet been developed, and therefore the level of car parking provision is unknown. A transport strategy for the wider Teesworks site is currently in development but will limit car parking within the site to meet sustainability targets (including RCBC's ambition to be carbon neutral by 2030). It is subsequently anticipated that the internal layout, when developed, will support the strategy and limit car parking as far as reasonably possible.

This section seeks agreement on the transport proposals for the proposed development.

5 Trip Generation

5.1 Person Trips

The approach to trip generation will follow the same methodology as that agreed for the South Bank development (planning application number R/2020/0357/OOM). The methodology applies trip rates from the TRICS database based on employee numbers. TRICS is a recognised database widely used by transport professionals which predicts trip rates of developments based on survey information of comparable sites.

The industrial trip rates used in the South Bank assessment are shown in **Table 1**.

Table 1: Industrial Trip Rates

Trip rates/employee	AM Peak (08:00 – 09:00)			PM Peak (17:00 – 18:00)			Daily (7am – 7pm)		
	In	Out	Total	In	Out	Total	In	Out	Total
Person Trips	0.322	0.089	0.411	0.078	0.314	0.392	2.134	2.121	4.255
LGVs	0.029	0.022	0.051	0.01	0.016	0.026	0.294	0.287	0.581
HGVs	0.19	0.16	0.035	0.014	0.01	0.024	0.218	0.208	0.426

These were identified and agreed as comparable trip rates to apply to large scale industrial sites and will therefore be applied at Long Acres and the Foundry. However, during the consultation process for the South Bank planning application, Middlesbrough Council indicated that the trip rates that were applied on the TeesAMP development (planning application number 18/0308/FUL) should be applied at the Teesworks site. The TeesAMP trip rates are more applicable to smaller sized industrial sites and therefore could be applicable at both Dorman Point and Lackenby. These trip rates are shown in **Table 2** and will be applied at Dorman Point and Lackenby.

Table 2: TeesAMP Industrial Person Trip Rates

Trip rates/employee	AM Peak (08:00 – 09:00)			PM Peak (17:00 – 18:00)			Daily (7am – 7pm)		
	In	Out	Total	In	Out	Total	In	Out	Total
Trip Rates	0.475	0.245	0.720	0.175	0.425	0.60	3.434	3.435	6.869

The Steel House site is proposed for office type use (use class E) and therefore office trip rates have been obtained from TRICS and these are shown in **Table 3**.

Table 3: Office Trip Rates

Trip rates/employee	AM Peak (08:00 – 09:00)			PM Peak (17:00 – 18:00)			Daily (7am – 7pm)		
	In	Out	Total	In	Out	Total	In	Out	Total
Person Trips	0.317	0.023	0.340	0.025	0.317	0.342	1.370	1.311	2.681
LGVs	0.003	0.002	0.005	0	0.001	0.001	0.029	0.029	0.058
HGVs	0.001	0.001	0.002	0	0	0	0.002	0.002	0.004

The trip rate for service and delivery vehicle trips (light goods vehicles and heavy goods vehicles) has been shown to disaggregate the overall person trip rate and determine how many trips are likely to be made by commuters, versus service vehicle trips. No information is provided in the TeesAMP Transport Assessment regarding service vehicle trip rates. It is useful to distinguish service trips, particularly HGVs, to assist assessments into noise and air quality. Therefore, the proportion of LGV and HGV trips from the TRICS analysis will be applied to the trip rates from the TeesAmp assessment to distinguish service vehicle trips.

The resultant person trips for each site, excluding LGVs and HGVs, is summarised in **Table 4**.

Table 4: Person Trips by Site

Trip rates/employee	AM Peak (08:00 – 09:00)			PM Peak (17:00 – 18:00)			Daily (7am – 7pm)		
	In	Out	Total	In	Out	Total	In	Out	Total
Dorman Point	654	226	921	196	633	846	4,228	4,229	8,457
Lackenby	436	151	614	130	422	564	2,819	2,819	5,638
The Foundry	1,480	275	1,755	292	1,555	1,847	8,760	8,782	17,542
Long Acres	592	110	702	117	622	739	3,505	3,514	7,019
Steel House	353	23	376	28	356	385	1,510	1,444	2,954

All sites were previously occupied. However, as the development sites are currently vacant, it is proposed that the trip generation does not take into account previous or permitted uses and therefore the overall trip generation will not be discounted; all trips will be added to the network as new trips.

5.2 Trips by Mode

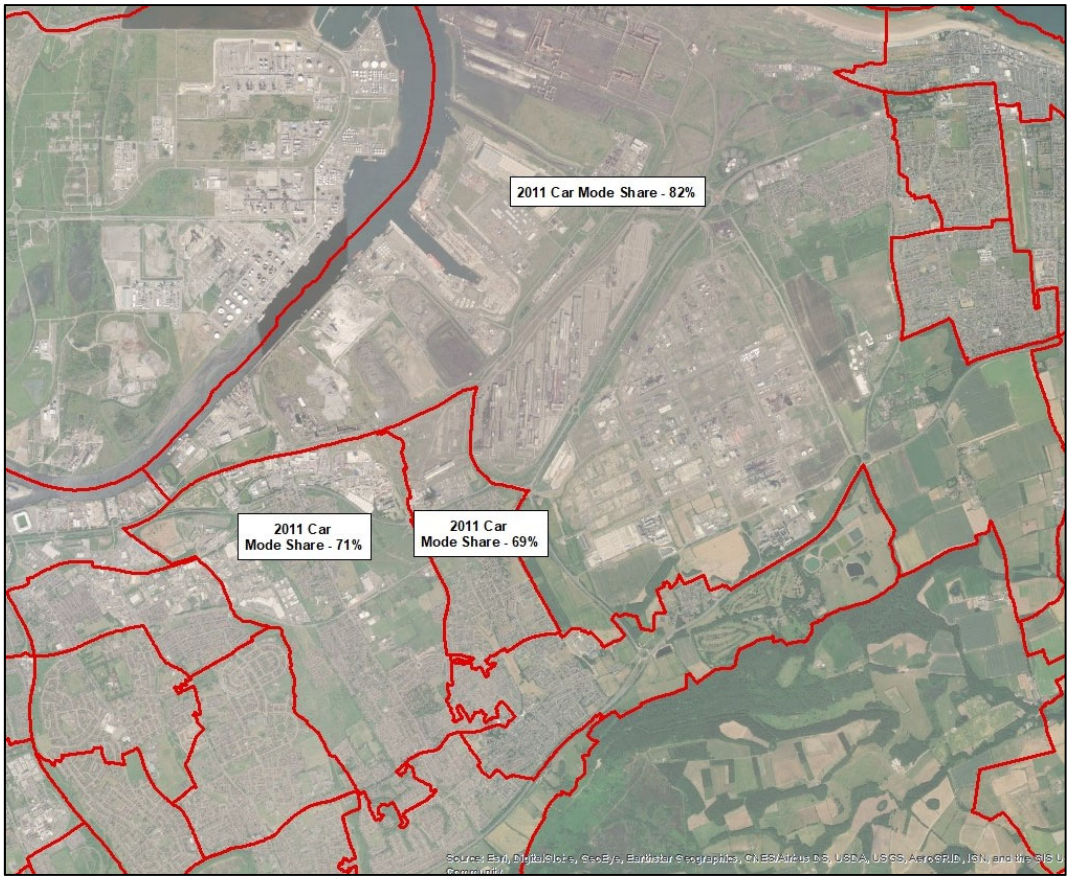
Having established a method for calculating the number of trips, the mode of transport for commuters has been informed by reviewing data from the 2011 UK Census Journey to Work dataset. The Teesworks area is split across two travel to work areas, Census zone E02002517 to the north and E02002523 to the south. Data regarding how people working in these areas travelled to work in 2011 is shown in **Table 5**.

Table 5 2011 Census Method of Journey to Work

Mode	2011 UK Census Northern Zone %	2011 UK Census Southern Zone %
Car Driver	82%	69%
Car Passenger	8%	8%
Bus	3%	5%
Bicycle	3%	2%
Walking	3%	13%
Motorcycle	1%	0%
Taxi	0%	2%

It can be seen that car mode share in 2011 varied between 82% and 69% and the areas this applies to is shown in **Figure 2**. The Dorman Point and Lackenby sites are located in the area where car mode share, in 2011, was 69% and the other sites are located to the north where travel to work, by car, was the higher 82% in 2011.

Figure 2 2011 Census Data – Car Mode Share



The transport strategy for the site will seek to reduce car mode share significantly. However, these earlier developments coming forward may not benefit from the longer-term strategy improvements proposed up to 2042.

It is proposed that measures will be implemented to support sustainable accessibility to the site, including a dedicated bus service that will connect the

local towns of Middlesbrough and Redcar to the development sites. The bus service, funded initially by the Teesworks development, will travel into the site to provide a service that connects directly to each of the five development sites. The provision of a bus service, alongside other travel planning measures, is considered to enable at least a 5% reduction in those travelling to the site by car when these sites are operational. It is therefore assumed that the maximum car mode share for Dorman Point and Lackenby be 64%, with the other sites having a car mode share of 77%. **Table 6** shows how the base and adjusted car mode share equates to commuter car trips in the AM peak hour for each site.

Table 6 Car Trips

	Base Car Mode Share			Adjusted Mode Share (-5%)		
Site	AM In	AM Out	Total	AM In	AM Out	Total
Dorman Point	451	156	635	419 (-33)	145 (-11)	590 (-46)
Lackenby	301	104	424	279 (-22)	97 (-8)	393 (-31)
The Foundry	1,214	226	1,439	1,138 (-76)	212 (-14)	1,350 (-88)
Long Acres	485	90	576	455 (-30)	85 (-5)	540 (-35)
Steel House	289	19	308	272 (-18)	17 (-2)	289 (-19)
Total	2,741	595	3,382	2,562 (-178)	555 (-40)	3,164 (-218)

It can be seen from **Table 6** that the travel planning measures must aim to remove around 200 trips from private cars in the morning peak hour onto more sustainable modes to achieve a 5% car mode share reduction.

5.3 Trip Distribution

Feedback received on the South Bank planning application (application number R/2020/0357/OOM) from HE indicated that consideration should be given to journey to work data from the UK Census (which indicates the origin and destination trips for commuters), as well as existing turning proportions on the highway network, to assign development traffic to the highway network.

For all five sites the trip distribution at the main access will be informed by Census data. It is proposed to distribute traffic on the remainder of the highway network using the turning proportions in the baseline traffic flow diagrams.

Traffic will be distributed as far west to the A19 corridor, south to the A174 corridor and east to the Trunk Road / Kirkleatham Lane junction. The site is bound by the River Tees to the north.

5.4 Cumulative Assessment and Future Growth

A cumulative assessment will be undertaken to consider the cumulative effects of all five developments, plus the South Bank development. This cumulative assessment of all STDC sites will be undertaken for a future year of 2033. Rather than review and extract traffic flows for the committed developments that have been identified, it is proposed to extract growth from Highways England's North Regional Transport Model (NRTM). This approach is considered to be

reasonable as it is underpinned by the National Trip End Model (NTEM) which informs TEMPro growth, as well as a full variable demand model, accounting for changing economic conditions and competing transport modes. Growth in the NRTM is controlled to NTEM at district level (as per TAG guidance) however individual developments are explicitly accounted for. This means that local trip end growth is calculated in a detailed way.

This scoping report seeks agreement on:

- The employee trip rate approach which applies large industrial site trip rates to the Long Acres and Foundry sites, and the TeesAMP trip rates to the Dorman Point and Lackenby sites. Office trip rates will be applied to the Steel House development;
- Applying 2011 Census mode share proportions to determine trips by mode, but reducing car mode by 5% to account for trips transferred onto the proposed bus service and other sustainable travel initiatives. This results in the assumed car mode share at Dorman Point and Lackenby of 64% and 77% at the other three sites;
- The approach to vehicular trip distribution; and
- The approach to use NRTM forecasts to growth traffic to 2033 which will be used to both assess the impact of each development in 2033, but also to assess the cumulative impact of all five sites being operational by 2033. The cumulative assessment will also include trips from the South Bank development.

6 Development Impact Assessment

6.1 Scope of Highway Impact Assessment

6.1.1 Local Junction Assessments

A number of junctions have been identified on the surrounding network where the development trips could have an impact. **Table 7** lists the junctions that will be assessed for each development.

Table 7 Junctions Impact Assessments

Site	Type	Dorman Point	Lackenby	Foundry	Long Acres	Steel House
A66/Old Station Road roundabout	ARCADY	X	X			
A66/Eston Road	LINSIG	X	X			
A66/Normanby Road	LINSIG	X	X			
A66/Tees Dock Road roundabout	ARCADY	X	X			
A66/Trunk Road/A1053 Greystones Road	LINSIG	X	X	X	X	X
Eston Road roundabout	ARCADY	X	X			
Greystones roundabout	LINSIG	X	X	X	X	X
Steel House roundabout	ARCADY			X	X	X
Trunk Road/Kirkleatham Lane	LINSIG			X	X	X

The junction assessments will be undertaken for the following scenarios for both the AM and PM peak hour:

- 2033 Base;
- 2033 Base + 1 development site (x5);
- 2033 Base + all five developments + South Bank development (cumulative assessment).

6.1.2 Strategic Highway Assessment

As requested by HE for the South Bank development, the scope of the traffic assessment will extend to include the A19 corridor. Jacobs has provided a copy of the 2015 New Tees Crossing AIMSUN Model so that the impact of trips from

the Teesworks sites on the A19 can be assessed. The impact of each development site, and the cumulative scenarios, will be undertaken.

6.2 Environmental Impact Assessment

A traffic and transportation assessment will be included in the Environmental Statement (ES) for each development. The Environmental Impact Assessment (EIA) will be carried out in accordance with the EIA Regulations and guidance contained in relevant publications including:

- Environmental Impact Assessment: A Guide to Procedures (Department of the Environment, Transport and the Regions (DETR), 2000); and
- Guidelines for Environmental Impact Assessment (Institute of Environmental Management & Assessment (IEMA), 2004).

In accordance with the IEMA Guidelines, it is proposed that the following conditions on the transport network within the study area be assessed during the operational phase (2033 with development) for each site:

- Severance (change in traffic flows);
- Driver and bus user delay (derived from the junction assessments);
- Pedestrian and cyclist amenity (change in traffic flows on local routes used by pedestrians and cyclists); and
- Accidents and safety (following a review of existing conditions, a judgement will be made as to whether the proposed development will result in any changes to highway safety).

Construction details are not yet finalised and as such, construction traffic will not be included in the scope of the traffic and transportation assessment of the EIA. A framework Construction Environmental Management Plan (CEMP) will be prepared and will form part of the embedded mitigation of the development. The CEMP will identify that a Construction Traffic Management Plan (CTMP) will be implemented either at site level or for each development phase. The CTMP will identify any necessary mitigation to minimise the impact of construction traffic on the transport networks.

This section of the scoping report seeks agreement on:

- The scope of the junction impact assessments for the TA's;
- The junction assessment scenarios; and
- The scope of the EIA assessment.

7 Travel Plan

7.1 Overview

All of the proposed developments are located within the Teesworks site and subsequently will be encompassed into the Transport Strategy and benefit from the measures that will be delivered to serve the wider site. The Transport Strategy is still under development but is expected to include ambitious targets to reduce car use and recommend measures that significantly improve the accessibility of the site by public transport, walking and cycling.

However, as these sites will be developed in advance of the strategy being adopted, a Travel Plan Framework for each site will be outlined in the TA, detailing measures that will be applied in advance of the wider strategy coming forward, but also outlining how the site will be incorporated into the wider masterplan in due course.

7.2 Bus Service

A key recommendation arising from the Transport Strategy is the need to provide a bus service that travels within the site. The scale of the site means that the location of the public bus stops are well outside the generally accepted 400m walking distance between a bus stop and a destination.

It is therefore anticipated that the TA's will recommend that to provide an attractive alternative to private car travel to the site, a bus service will be required. Further details of this will be provided in the Travel Plan Framework.

RCBC to confirm that this application can be incorporated into the wider STDC Transport Strategy and that a Travel Plan Framework, which outlines the measures that occupiers could introduce prior to more wide-ranging measures coming forward, will be sufficient to support each planning application.

8 Conclusions and Next Steps

This Scoping Report has considered the potential impact of five proposed development sites on the Teesworks site. It has outlined what is proposed to be covered by the Transport Assessment and Environmental Statement that will be submitted as part of the planning application for each of the proposed developments.

Arup would be grateful if RCBC, MC and HE could respond in writing to confirm that the methodology proposed in this report is acceptable. Should there be any significant issues with regards to the scope, an online meeting is requested at the earliest convenience.

Appendix C3: Consultation Responses

South Tees Development Corporation: Teesworks – Response to "Transport Assessments – Scoping Report"

PREPARED FOR:	Chris Bell / Sunny Ali (Highways England)
PREPARED BY:	Gavin Nicholson (CH2M)
DATE:	14th December 2020
PROJECT NUMBER:	679066.AA.20.18.12
SITE/ DOCUMENT REF:	DevTV0062/TM001
REVIEWED / APPROVED BY:	Jonathan Parsons (CH2M)

Introduction

CH2M has been commissioned by Highways England to provide a review of the document titled "South Tees Development Corporation: Teesworks, Transport Assessments – Scoping Report" prepared by Arup on behalf of the South Tees Development Corporation and dated 26th November 2020 [the Scoping Report].

The single Scoping Report seeks to set the scope for five separate Transport Assessments [TAs] which will support the five outline planning applications for development within the South Tees Development Corporation [STDC] site.

The STDC site is located on the south bank of the River Tees, between Redcar town centre to the east and Middlesbrough town centre to the west. The site location, indicating each of the five sites that will require a TA, is shown in Figure 1, extracted from the Scoping Report.

The consultation with Highways England at this stage of the process should be welcomed as early engagement enables the assessment to be aligned to Highways England's requirements. A summary and conclusion are provided at the end of this Technical Memorandum [TM].

Figure 1 – Location of application sites

(Extract from the Scoping Report)

According to the Scoping Report, it is expected that the proposed outline planning applications will be for the level of development identified in Table 1.

Table 1 – Application sites information

Application site	Floorspace (sqm)	Land Use	Approximate operational jobs
Dorman Point	140,000	B2 / B8 with ancillary office	1,620
Lackenby	93,000	B2 / B8 with ancillary office	1,080
The Foundry	464,515	B2 / B8 with ancillary office	5,401
Long Acres	186,000	B2 / B8 with ancillary office	2,161
Steel House	16,000	Office and incubator space (use class E)	1,128
Total	**899,515**	**-**	**11,390**

All of the development sites are expected to be operational by 2033.

Background

For background, it is important to note that Highways England has recently been consulted on an application for an initial element of development within the STDC site – the Southern Industrial Zone. This development (located north of the Dorna Point site (indicated by the red boundary in Figure 1 above) was for a plot of approximately 418,000sqm of B2 / B8 floorspace with ancillary office development, expecting to accommodate 3,870 employees. Highways England were able to accept the development following a period of dialogue and provision of appropriate assessment at the SRN.

Technical Memorandum structure

This TM:

- Firstly, considers the technical elements of the Scoping Note in order to enable a response to be made to that; and
- Then considers the fit of these development aspirations with the wider strategy for the site (Local Plan policy, SPD, Masterplan) to ensure that the sites are being brought forward in a manner that fits this wider context.

Scoping Report review

This TM mirrors the structure of the Scoping Report and specifically aims to focus on the elements of the Scoping Report that are of interest to Highways England and seeks to provide a response to all the decision points identified by Arup.

Baseline conditions

Highway network

The Scoping Report sets out that the TAs will provide an overview of the local road and the SRN connecting the site to the wider area. It is identified that due to current (Covid-19) conditions, it is not possible for traffic surveys to be undertaken to inform the baseline assessment. This situation is recognised by CH2M.

As with the Southern Industrial Zone scoping, the elements of the SRN that are required to be assessed should be informed by the trip assignment analysis and with a view to the absolute level of impact (noting that percentage impacts will not be considered as an indicator). Information in relation to the full assignment of trips should be presented early in the process (prior to completion of the TAs), in order for agreement to the study area to be reached and to inform other elements of the TAs. Highways England consider that the starting point to identifying the need for assessment is based on an impact exceeding 30 two-way trips at a junction on the SRN.

Upon definition of the study area (based on the impact analysis), CH2M recommend that a fully defined approach of reflecting typical traffic conditions is established including sourcing all available traffic data (traffic count companies and Highways England).

With regard to growth and future operational scenarios, CH2M recommend that scenarios mirroring those ultimately agreed as part of the Southern Industrial Zone assessment would be reasonable.

Road safety analysis

The Scoping Report proposes that a high-level review of five years' worth of accident data within the vicinity of the site is to be undertaken.

This approach is accepted but the review will also need to cover any SRN geography that is needed to be included in the study area.

Development proposals

Vehicular access points

The Scoping Report identifies that each TA will provide details about the site access arrangements. While these access points will all be located on the local road network and subject to local highway authority review, information should be available to ensure that Highways England can be satisfied that:

- The trip distribution and assignment analyses pay appropriate cognisance to the access points and the routes which vehicles would traverse the networks; and
- Any operational consequences at the local road network that have the potential to cause subsequent operational issues at the SRN are fully detailed.

Car parking

It is identified that, given the five applications will be in outline form, the level of parking provision is unknown at this stage. While the scale of parking is generally a matter for the local highway authority to satisfy itself with, the level of parking has the potential to influence the trip generation and the sustainability credentials of the site, Highways England will need to be subject to consultation on the reserved matters applications that seek to define the level of parking.

Trip generation

Person trips

The Scoping Report identifies that the trip rates are based on:

- For the large scale industrial sites (Long Acres and the Foundry) the application of the trip rates used in the South Industrial Zone assessment;
- For the smaller sized industrial sites (Dorman Point and Lackenby), the application of trip rates from the TeesAMP development (application ref 18/0308/FUL); and
- For the office based site (Steel House), office trip rates from TRICS have been used.

CH2M has undertaken a review of this information and make the following comments (on the basis that the planning application will be specific in relation to the scale and mix of development proposed):

- Long Acres and the Foundry

  It can be confirmed that the trip rates utilised are those agreed as part of the Southern Industrial Zone assessment and these can therefore be accepted.

- Dorman Point and Lackenby

  The use of the TeesAMP trip rates for these elements of the development are accepted.

- Steel House

  The TRICS assessment and parameters used have not been provided to enable validation of the office trip rates and these should be provided to enable these to be agreed.

Trips by mode

Journey to Work data has been used to infer the proportion of highway trips based on Census zones E02002517 and E02002523 for the northern and southern parts of the site respectively. This is considered a reasonable approach by CH2M.

It is identified that it is proposed that measures will be implemented to support sustainable accessibility to the site. On the basis of these measures, it is identified in the Scoping Report that this will enable at least a 5% reduction in travel to the site by car and therefore it is assumed that the number of car trips could be reduced by 5%.

The Scoping Reports does not suggest whether the base car mode share trips or the adjusted (-5%) car trips will be utilised within the operational assessments in the TAs. Should it be proposed that the latter, there will be a requirement for:

1) Clarification in relation to how the measures being proposed transpire into the defined 5% reduction – how has the 5% reduction been quantified;

2) A detailed commitment to the identified initiatives, secured through appropriate planning conditions requiring measures to be in place prior to occupation; and

3) Potential need for consideration of fallback positions within the Travel Plan in the event that the sustainable measure targets have not been achieved.

Vehicular trip distribution

The Scoping Report proposes that vehicular trip distribution is to be based on (i) at the site access, journey to work distribution trips from the Census data and (ii) existing turning proportions on the highway network.

As discussed through the Southern Industrial Zone application, the use of existing turning proportions to distribute development traffic is not considered acceptable. CH2M therefore recommends that the trip distribution analysis is founded on Census data and that the analysis be provided in spreadsheet form to enable checking and validation.

While initial extents of the trip distribution analysis are provided, noting that Highways England consider that the starting point to identifying the need for assessment is based on an impact exceeding 30 two-way trips at a junction, the trip distribution analysis should extend to cover all potential elements fitting this criteria.

Cumulative Assessment and Future Growth

The Scoping Report identifies that a cumulative assessment of all five proposed developments alongside the Southern Industrial Zone will be undertaken. This assessment is welcomed by CH2M.

With a view to consideration of other committed developments and other background growth calculations, CH2M consider that the forecasts utilised as part of the ultimately agreed analysis for the Southern Industrial Zone is utilised rather than create a variant set of analyses that require further development, checking and validation.

The provision of the information in spreadsheet form (including all component elements) will enable a review to be undertaken.

Development Impact Assessment

Scope of Highway Impact Assessment

With regards to the SRN, it is identified in the Scoping Report that elements of the network that will be assessed will mirror those ultimately assessed as part of the agreed Southern Industrial Zone assessments. As identified above, the study area will need to be agreed on the basis of the trip assignments determined from the earlier elements of the analysis.

At this time, it is not possible to validate the areas of the network that require assessment (Highways England consider that the starting point to identifying the need for assessment is based on an impact exceeding 30 two-way trips at a junction) and these should be clarified prior to the undertaking of any operational assessment.

In addition, the assessment of a 2033 future year assessment is welcomed by CH2M, although it will need to be ensured that validated base models are utilised in assessments.

Environmental Impact Assessment

Given the scale of development, there is the potential that there could be significant construction impacts. It may be necessary for the Construction Traffic Management Plan [CTMP] to be conditioned until a clear view on construction impacts (construction trip impacts and potential abnormal loads) is known.

Travel Plan

The Scoping Report outlines that a Travel Plan framework for each site will be prepared. Whilst it would have been welcomed for the transport strategy for the wider STDC site to have set the strategic sustainable transport framework for the site, in terms of the Travel Plans, as discussed earlier, it will need to be considered that:

1) Clarification in relation to how the measures being proposed transpire into the defined 5% reduction – how has the 5% reduction been quantified;
2) A detailed commitment to the identified initiatives, secured through appropriate planning conditions requiring measures to be in place prior to occupation; and
3) Potential need for consideration of fallback positions within the Travel Plan in the event that the sustainable measure targets have not been achieved.

CH2M would welcome these points being considered as the assessment moves forward.

Fit of sites with wider strategies

The site forms parts of the wider STDC site. Whilst reference to the STDC Transport Strategy is made, it is fully recognised that these sites are coming forward in advance of the Transport Strategy having been completed:

- The Scoping Report acknowledges:
  - Within section 4.5 (relating to car parking) that *"A transport strategy for the wider Teesworks site is currently in development but will limit car parking within the site to meet sustainability targets) … It is subsequently anticipated that the internal layout, when developed, will support the strategy and limit car parking as far as reasonably possible."*
  - Within section 5.2 (relating to trips by mode) that *"The transport strategy for the site will seek to reduce car mode share significantly. However, these earlier developments coming forward may not benefit from the longer-term strategy improvements proposed up to 2042."*
- As part of discussions relating to the Southern Industrial Zone site, Arup identified *"The transport strategy for the wider STDC site will be looking at a longer-term horizon in terms of future year assessments. The impact of the wider STDC site up to a final year scenario, expected to be circa 2040, will be assessed by undertaking strategic modelling of the surrounding highway network."*

Bringing such a scale of site forward in advance of a fully defined Transport Strategy is considered by CH2M to be somewhat of a concern to Highways England as this restricts the ability to bring them forward in a strategically-planned manner.

Rewinding a little back to the Local Plan, the Supplementary Planning Document [SPD], the site Masterplan and the Transport Strategy, the following summary is provided with a view to the current position:

Redcar and Cleveland Local Plan (Adopted May 2018)

Local Plan provisions

In relation to development:

- Policy LS4 (South Tees Spatial Strategy) (which includes the STDC) identifies that Redcar and Cleveland Council [the Council] will:
  - (p) "support improvements to the strategic and local road network to support economic growth"

  - Para 3.27 identifies that a Master Plan is being prepared and this will help guide development of this area, including infrastructure improvements.

- Policy ED6 (Promoting Economic Growth) identifies that:
  - Land and buildings within existing industrial estates and business parks, as shown on the policies map, will continue to be developed and safeguarded for employment uses."
  - Specialist uses, such as heavy processing industries and port logistics, will be focussed in the following areas, with 405 hectares of additional land available over the plan period. In these areas proposals falling within Use Classes B1, B2, B8 and suitable employment related sui-generis uses will be supported.
    - ED6.2 Land at South Tees 184 hectares.
    - ED6.4 South Tees Industrial Estates and Business Parks 3.5 hectares

In relation to Infrastructure:

- Para 1.112 identifies that the Council will work with organisations to ensure the infrastructure is delivered when required.
- Para 1.113 identifies the Tees Valley Strategic Infrastructure Plan as setting out the current barriers to growth and priorities for improving infrastructure across Tees Valley.
- Para 1.114 identifies that there are plans to deliver improvements to rail and road infrastructure.
- Para 1.124 identifies that it is important to ensure that the borough's road infrastructure will have the capacity to cope with the expected increase in traffic levels over the life of the Local Plan.
- Para 1.125 states that "Improving transport links will require continued, proactive joint working with …the Highways Agency … with the overall aim of establishing a high quality, safe, secure and reliable network …"

In relation to Transport:

- Para 9.7 identifies the key objectives of the transport strategy component of the Local Plan, including - improve access and connectivity to and from Teesport and the surrounding South Tees area
- Policy TA1 (Transport and New Development) identifies:
  - The Council and its partners will ensure that the transport requirements of new development, commensurate to the scale and type of development, are taken into account…
- Para 9.8 recognises the borough has particular congestion hotspots at the SRN including the A19, A174 and A66 and that new infrastructure may be needed to tackle these congested areas.
- Para 9.17 indicates that the Council follows the requirements of the Guidance on Transport Assessment as the standards for when TS, TA and TPs are required.
- Policy TA2 (Improving Accessibility Within and Beyond the Borough) identifies that the Council will work together with …. Developers and transport providers. This will include:
  - (f) working with Highways England to improve capacity to the A66, A1053 and A174, particularly Greystones roundabout.
  - (k) working with the Tees Valley Combined Authority and Highways England to deliver capacity improvements to the Strategic Road Network including across the sub-region including improvements to the A19, A1085 and A689 to improve access to key development sites, all providing indirect benefits to Redcar and Cleveland;

  - (m) supporting proposals being prepared by Tees Valley Combined Authority and Highways England to deliver improvements to the A66 and A174 road links to the A19 and beyond to the A1/A1(M), providing appropriate access to the strategic highway network from South Tees, to reduce bottlenecks and maintain highway capacity;
  - Where necessary, developers may be required to fund transport improvement schemes through Section 106 agreements where infrastructure provision and capacity would be affected or could constrain new development.

- Para 9.25 states that Redcar and Cleveland benefits from good highways provision catering for heavy vehicles and industrial uses. Linkages between the South Tees, Greater Eston and Redcar and the strategic highway network on the A66, A174 and A19 make the area highly accessible and attractive to industry, business and commuters. It is imperative that this operational benefit over other areas, where capacity is more limited, is not detrimentally affected by any development proposals. It will be essential that improvements and enhancements to the borough's infrastructure continue in order to facilitate local economic development and growth. The Council will continue to work strategically with its neighbouring local authorities and the LEP to maximise on funding opportunities via the Government. The Local Plan is being developed in parallel with the sub-regional Strategic Economic Plan and the Local Growth Fund and is ensuring consistency of objectives. We will also work proactively with the private sector to secure developer contributions to ensure the highway network advantage is maintained and enhanced wherever possible.

The development principles establish that:

- Policy SD4 (General Development Principles) identifies that in assessing suitability, development will be permitted where it:
  - a) meets the requirements of the locational policy and accords with other Local Plan policies and designations
  - g) will have access to adequate infrastructure … to serve the development
  - p) provide suitable and safe vehicular access
- Policy SD5 (Developer Contributions) identifies that the Council may secure developer contributions in order to fund necessary infrastructure.

Highways England position

The joint position statement between Highways England and the Council noted that the development in the Local Plan is unlikely to have a significant impact on the SRN and the package of measures proposed are acceptable to both Highways England and the Council in ensuring that the SRN can support the growth aspirations identified in the Local Plan.

The proposed schemes are promoted through the Local Plan in Policy TA3 and the supporting Infrastructure Delivery Plan, specifically identifying improvements to the A19, A1053, A66 and A174; while recognising that further work is required to specifically identify the phasing of the improvements and the quantum of development that can be accommodated on the SRN prior to the improvements being required.

It was noted that applications for development will be managed on an individual basis.

South Tees Area Supplementary Planning Document [SPD] (Adopted May 2018)

During the consultation on the SPD, Highways England noted general support, but that it should be delivered in accordance with Local Plan Policy TA2 and the Infrastructure Delivery Plan and that there

was a need to ensure that the implications at the SRN are understood and addressed in line with the package of SRN improvements detailed within the Local Plan and Tees Valley AAP.

In summary, the SPD:

- Seeks to guide and inform future planning applications in the area and used as a material consideration in determining planning applications.
- Identifies requirements and provides a broad strategy to deliver supporting infrastructure.
- Commits to the development of a Transport Strategy.
- Seeks the creation of up to 20,000 new jobs.
- Contributions relevant to the nature and scale of the development may be sought, including … in order to fund necessary infrastructure … required as a consequence of development and in accordance with Local Plan policy SD5.
- Seek to improve and enhance the transport infrastructure serving the South Tees Area, as supported by Local Plan Policy LS4.
- All new development proposals shall be in accordance with Local Plan Policies SD4 and TA1 and will be required to have access to adequate infrastructure to meet their transport requirements.
- Other highways infrastructure proposals will be delivered in line with emerging development priorities and funding availability and will be identified through the Transport Strategy for the Area.
- The Council, working in partnership with the STDC, the Tees Valley Combined Authority and other infrastructure providers will actively seek public sector funding to support infrastructure development in line with the SPD. Necessary off-site infrastructure contributions would be sought through Section 106 planning obligations or through the use of 'Grampian' planning conditions. Obligations could include physical works or contributions towards highway measures to mitigate the transport impacts of the development.
- It is intended that the SPD will be reviewed with a view to the preparation of the technical supporting documents (including the transport strategy).

South Tees Regeneration Master Plan (November 2019)

The South Tees Regeneration Masterplan identifies:

- The Tees Valley's key road transport assets include the strategic growth corridor of the A19, the A1(M), linking North and South, and the A66, providing Trans-Pennine East to West connectivity. Few areas of the UK are better served by road services.
- Centrally placed within the Tees Valley, the STDC area has excellent road transport connections. The A66 East-West route commences at the STDC boundary, and the nearby A174 Parkway provides direct access to the A19. Both the A66 and A19 provide direct connectivity to the A1(M) North-South route, which in turn affords access to the M62 strategic Trans-Pennine road corridor.
- To support the proposed major development of South Tees, coupled with the ambitions of TVCA in it's delivery of the Strategic Economic Plan, there will be a need to improve the area's transport connectivity.
- Notwithstanding the STDC's excellent transport connections, there are some wider connectivity barriers, including significant pressure points on the A19 and on the road network accessing the A1(M) and A19.
- The future redevelopment of the STDC area for industrial use will need to consider and address Transport infrastructure requirements.

- Consideration will be given to the impact on the local highway network of the planned major increases in development traffic that will ensue as the proposals for the regeneration programme begin to be realised, so that junction capacities are not adversely impacted and that the current favourable position the South Tees area benefits from is not compromised. The requirements for Transport Appraisals to assess transport impacts, particularly highways, will be given due attention as the development proposals begin to be fleshed-out.
- Next steps: STDC will continue to develop key thematic delivery strategies, as discussed within the South Tees Area SPD, including Transport.

Transport Strategy

Highways England has engaged in the process of the transport strategy development with the last dialogue in April 2020. A Phase 1 Report was produced outlining modelling to be undertaken in Phase 2, but Phase 2 has not been forthcoming to date.

As part of work in reviewing the STDC South Industrial Zone application, it was identified that the next Steering Group meeting would be being arranged in due course.

As part of the initial review of that application scoping, CH2M identified *"The South Tees Regeneration Master Plan states that "consideration will be given to the impact on the local highway network of the planned major increases in development traffic that will ensue as the proposals for the regeneration programme begin to be realised, so that junction capacities are not adversely impacted and the current favourable position the South Tees area benefits from is not compromised. The requirements for Transport Appraisals to assess transport impacts, particularly highways, will be given due attention as the development proposals begin to be fleshed-out".* With this in mind, CH2M recommend that a view of the full site impacts is provided, either in the Scoping Report itself or alongside it, so that a view can be gained.

Wider Strategies - considerations

The Scoping Report acknowledges:

- Within section 4.5 (relating to car parking) that *"A transport strategy for the wider Teesworks site is currently in development but will limit car parking within the site to meet sustainability targets) … It is subsequently anticipated that the internal layout, when developed, will support the strategy and limit car parking as far as reasonably possible."*
- Within section 5.2 (relating to trips by mode) that *"The transport strategy for the site will seek to reduce car mode share significantly. However, these earlier developments coming forward may not benefit from the longer-term strategy improvements proposed up to 2042."*

As part of discussions relating to the Southern Industrial Zone site, Arup identified *"The transport strategy for the wider STDC site will be looking at a longer-term horizon in terms of future year assessments. The impact of the wider STDC site up to a final year scenario, expected to be circa 2040, will be assessed by undertaking strategic modelling of the surrounding highway network."*

With a view to this, the following comments are made:

- The requirement for consideration of the impact on infrastructure, and the need to work with Highways England in relation to the SRN, is clear throughout the documents.
- The very fact that there is a location-specific SPD, a Masterplan, and a requirement for a Transport Strategy, highlights the need for a strategic approach to this site. It is disappointing that this is not flowing through the work undertaken. Dealing with the sites on an application by application basis may lead to a point whereby later applications on the site / other developments in the area may need infrastructure measures to enable them, due to these developments having consumed the available capacity. Similarly, the competitive advantage that the area has with regard to the

strategic connectivity may be diminished if the impacts are not considered in a more strategic manner.

- The SPD has committed to the production of the Transport Strategy, but this is still forthcoming. Priorities and funding availability for highways infrastructure is suggested as being identified through the Transport Strategy.
- The SPD points towards the creation of 20,000 jobs. The five applications under current consideration, along with the Southern Industrial Zone application, amount to an estimated 15,260 jobs. This is a significant (over 75%) proportion of the sites' aspirations that are coming forward in the absence of any form of strategic approach to transport.
- The SPD identifies that it would be reviewed 12-18 months post adoption to take account of the various technical documents including the Transport Strategy. Having been adopted in mid-2018 this review being informed by the Transport Strategy (amongst others) would have been expected to have happened by now.
- The Masterplan identifies that there is a need to improve the area's transport connectivity to support the proposed major development in South Tees.

Summary and Conclusion

The following table lists all the items that were highlighted in the Scoping Report as decision points and Highways England's response.

Table 2 – Scoping Report Decision Points

Scoping Report Section	Decision point (as defined in Scoping Report)	Highways England response	Suggested Action
2. Planning Policy Review	Documents proposed for planning review	Acceptable	No action
3. Baseline Conditions	Scope of transport networks	Comments made	Definition of the study area, based on the SRN criteria, should be provided early in the process to provide clarity of network to be assessed. At this point the establishment of the baseline position at the SRN should be confirmed. Growth and future operational scenarios should match that considered during the review of the Southern Industrial Zone.
	Methodology for establishing baseline traffic flows	Comments made	At the point of having established the study area, the baseline position at the SRN should be confirmed. Growth and future operational scenarios should match that considered during the review of the Southern Industrial Zone.

Scoping Report Section	Decision point (as defined in Scoping Report)	Highways England response	Suggested Action
	Scope of the accident appraisal	Comments made	Needs to cover extents of SRN geography.
4. Development Proposals	Transport Proposals	Comments made	Access points will need to be considered in as far as they influence definition of SRN impacts.
5. Trip Generation	Trip rates	Comments made	Information supporting the derivation of the office trip rates is required in order to verify their use.
	Mode share proportions	Comments made	The use of Census data is supported. Further information in relation to a proposed 5% reduction would be required in order for this to be accepted.
	Proposed trip distribution	Comments made	Census data distribution is accepted, but assessment using existing turning proportions is not accepted. The analysis should extend as far as is required to ensure appropriate consideration of the SRN.
	Approach to growth forecast	Comments made	The approach should mirror that ultimately used in the Southern Industrial Zone assessment.
6. Development Impact Assessment	Scope of highways impact assessment	Comments made	The starting point for identifying the need of assessment at the SRN is based on an impact exceeding 30 two way trips at a junction
	Junction assessment scenarios	Acceptable	
	Scope of the EIA	Acceptable	The CTMP will need to be conditioned until a clear view on construction impacts is known.

In the wider sense, an update on the Transport Strategy and how the intentions of the wider policies are being secured needs to be questioned. While Highways England need to respond to these planning applications on their own merits, the strategies were put in a place for a reason and without them, a significant proportion of this large employment site is likely to come forward in a manner that is not consistent with the ambitions of the wider strategies.

Finally, with regard the applications currently subject to review, CH2M would promote that these are progressed through proactive collaboration between the parties. While noting that all development applications have time pressures with a view to gaining approval, the discussions allied with the Southern Industrial Zone application involved significant pressure to get things resolved. These timescales did not seem to fit with (i) the scale of development being proposed or (ii) the lack of initial

appetite to give appropriate consideration to the SRN. This should be avoided as part of these applications, which themselves are of a significant nature.

From:
To:
Subject: [External] RE: TA Scoping Report for Teesworks
Date: 30 November 2020 14:54:27

Thanks for sharing the draft scoping report.
Collective thoughts from Tony & myself are below.
Please do get in touch if anything needed.
Thanks

Comments so far.

- The Local Transport Plan has been partially replaced by the Tees Valley Strategic Transport Plan and will be fully replaced when the Local Implementation Plan is adopted in 2021.
- Focus should also include how pedestrians, cyclists and public transport users will access each site upon first occupation (we recommend footway & cycleway links on both sides of each internal road from 3m shared surfaces on minor roads up to 2m+2m segregated facilities on the major links). But connectivity may not be along the same alignments as general road access & will connect directly to adjacent residential areas &
- early (temporary) internal connectivity between sites before the masterplan infrastructure is in place needs to be resolved before first occupation. The operation of financially viable and attractive bus services for users will be difficult if the sites are effectively served by a series of dead end roads from the A66 or A1085.
- Dorman Point site – access direct to Tees Dock Road should also be considered for this site. Possibly via the Grangetown Station Road corridor?
- Re-opening of Redcar British Steel Railway Station should be programmed at first occupation of Foundry, Long Acres & Steel House sites.
- Charging point infrastructure for electric vehicles needs to be integral to each car park/or distributed through each site. Solar farms using building roofs should be considered.
- Hydrogen filling stations will be initially provided at Eston Road and Teesport by TVCA, but more hydrogen infrastructure may be required.
- A Teesworks wide travel plan should be developed based on the evidence contained in the Transport Study & best practice. This should establish core principles/actions that developers will be required to sign up to with additional measures introduced as required by each business. Appointing a Travel Plan Co-ordinator for the Teesworks site with a delivery budget before first occupation would be preferable.

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