Riverside Energy Park

Statement of Common Ground Transport for London (Draft)

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CORY
RIVERSIDE ENERGY

Riverside Energy Park Belvedere

Statement of Common Ground between the Applicant and Transport for London

[~~June~~ August 2019]

Revision	Date	Description
Draft	June 2019	Draft for discussion
Revised Draft	August 2019	Amended draft post TfL review + Applicant's response

1 Introduction

1.1 Purpose of this Statement of Common Ground

1.1.1 This Statement of Common Ground (SOCG) has been prepared by Cory Environmental Holdings Limited (trading as Cory Riverside Energy ('the Applicant')) and Transport for London ('TfL'). For the purposes of this SOCG, the Applicant and TfL will jointly be referred to as 'the Parties'.

1.1.2 The Applicant has applied to the Secretary of State under the Planning Act 2008 for powers to construct, operate and maintain an integrated Energy Park, to be known as Riverside Energy Park (REP) (the 'Application'). The principal elements of REP comprise complementary energy generating development and an associated Electrical Connection (together referred to as the 'Proposed Development').

1.1.3 Preparation of this SOCG has been informed by discussions between the Parties. The purpose of this SOCG is to set out agreed factual information about the Aapplication ~~for the Proposed Development (the 'Application')~~to provide information to facilitate an efficient examination process.

1.1.4 This SOCG covers the following topics/issues:

- Transport; ~~and~~
- Draft DCO articles and requirements; ~~,~~and
- Other considerations.~~]~~

1.1.5 TfL ~~makes no~~ comments only in respect of ~~all other~~ topics identified in Chapter 6 Transport of the **Environmental Statement** (**ES**) (**6.1**, ~~,~~ to ~~**6.4**,~~ **APP-04338** to ~~**APP-100**~~, and Appendix B.1, the Transport Assessment (TA) to the ES (6.3, APP-066) and subsequent revisions thereof to those documents and associated Appendices submitted in the course of the Examination.~~) and~~ Associated with those documents, TfL comments on the Transport Planning aspects of the draft Development Consent Order (dDCO) (3.1,Rev3 and the Outline Code of Construction Practice) (CoCP) (7.5, Rev3) and amendments thereof submitted in the course of the Examination.~~other~~ Application documents. Appendix B.1, the TA to the ES, includes Appendix L the Outline Construction Traffic Management Plan (CTMP) and Appendix F, the Outline Operational Worker Travel Plan. TfL comments on those documents, where they are relevant to TfL's jurisdiction and include amendments to those documents submitted in the course of the Examination.

~~1.1.5~~1.1.6 Only documents referenced above, within this SoCG, are commented on by TfL.

~~1.1.6~~1.1.7 Overall, this SOCG is intended to give a clear position of the state and extent of agreement between the Parties at the date on which this SOCG is signed and submitted to the Secretary of State.

~~1.1.7~~1.1.8 All defined terms and abbreviations, if not defined or explained in this SOCG, are defined or explained in the **Project Glossary** (**1.6, APP-006**).

1.2 The Application

1.2.1 The Application was submitted on 16 November 2018 and accepted by the Secretary of State on 14 December 2018. The Application was accompanied by an ES.

~~1.2.2 The Parties agree that the ES forms the full and complete Environmental Impact Assessment (EIA) for the purposes of the Infrastructure Planning (Environmental Impact Assessment)~~

Commented [TdL1]: This should include things like 2.3 Access and PROW maps, 2.2 works plans, 2.1 land plans, 2.4 layout, 2.6 circulation plan, 3.1 dDCO, 5.1 consultation report, 7.3 D&A statement,7.5 CoCP,

Commented [NA2R1]: Text amended to show what TfL does comment on.

Commented [TdL3]: Please can we add in specific references to the documents submitted relevant to transport? So mentioning the specific transport chapter in the ES, the appended TA and CTMP?

Commented [NA4R3]: Now referenced at para 1.1.5.

~~Regulations 2017 (the EIA Regulations) and it is further agreed that the ES contains sufficient environmental information to enable the Secretary of State to make his determination.~~

1.3 The Examination

1.3.1 An examination (the 'Examination') of the Application is to be held pursuant to Chapter 4 of Part 6 of the Planning Act 2008 (the 'Act') and the Infrastructure Planning (Examination Procedures) Rules 2010 (the 'EP Rules').

1.3.2 A Preliminary Meeting, pursuant to Rule 7 of the EP Rules, was held on 10 April 2019, following which the Examination commenced, with the Issue Specific Hearing on Environmental matters on 05 June 2019 and Issue Specific Hearing on the dDCO on 06 June 2019.

~~1.3.2~~1.3.3 Subsequent Hearings and submission deadlines are set out in the PINS Examination timetable with the Examination due to close on 09 October 2019.

1.4 Description of the Proposed Development

1.4.1 The Proposed Development comprises REP and the associated Electrical Connection. These are described in turn, together with the anticipated REP operations, below. **Chapter 3 Project and Site Description** of the ES **(6.1, REP2-013)** provides further details of the Proposed Development, which is the subject of the Examination.

REP

1.4.2 REP would be constructed on land immediately adjacent to Cory's existing Riverside Resource Recovery Facility ('RRRF'), within the London Borough of Bexley ('LBB') ~~and would complement the operation of the existing facility~~. It would comprise an integrated range of technologies, including: waste energy recovery; anaerobic digestion; solar panels; and battery storage. The main elements of REP would be as follows:

- **Energy Recovery Facility (ERF)**: to provide thermal treatment of Commercial and Industrial residual (non-recyclable) waste with the potential for treatment of (non-recyclable) Municipal Solid Waste;
- **Anaerobic Digestion facility**: to process food and green waste. Outputs from the Anaerobic Digestion facility would be transferred off-site for use in the agricultural sector as fertiliser or as an alternative, where appropriate, used as a fuel in the ERF to generate electricity;
- **Solar Photovoltaic Installation**: to generate electricity. Installed across a wide extent of the roof of the Main REP building;
- **Battery Storage**: to store and supply additional power to the local distribution network at times of peak electrical demand. This facility would be integrated into the Main REP building; and
- **On Site Combined Heat and Power (CHP) Infrastructure**: to provide an opportunity for local district heating for nearby residential developments and businesses. REP would be CHP Enabled with necessary on site infrastructure included within the REP site.

Electrical Connection

1.4.3 REP would be connected to the electricity distribution network via a new 132 kilovolt (kV) underground electricity cable connection. The route options for the Electrical Connection at the time of submission are shown in the **Works Plans (2.2, APP-008)** and were updated to a single route in Revision 1 at Deadline 2 (**2.2, REP2-004**).

Commented [T5]: We do not agree fully with this statement at this stage. As stated previously TfL feel that more information should be submitted on construction traffic impacts (quantifiable impacts) to determine the construction impact of this scheme. Please remove statement.

Commented [T6]: The Environmental ISH and DCO ISH in June should be added in here.

Commented [NA7R6]: added

Commented [TdL8]: Under review.

Commented [NA9R8]: Text added

Commented [TdL10]: Please remove and stick to factual description.

Commented [NA11R10]: Deletion agreed.

1.4.4 Further investigatory trial holes in March 2019 informed the selection of a single overall Electrical Connection route, which the Applicant has submitted along with the explanatory report, '**Electrical Connection Progress Report**', at Deadline 2 (**REP2-058**).

1.4.5 The Electrical Connection connects into the existing National Grid Littlebrook substation, south east of the REP site, in Dartford. The Electrical Connection is located within the LBB and Dartford Borough, and would run from a new substation proposed to be constructed within the REP site.

2 Matters agreed between the Parties

2.1 Introduction

2.1.1 The Parties are agreed on the points set out in this section (**Section 2**).

2.2 Transport

2.2.1 The scope of the assessment of transport impacts is defined within **Section 6.1**, **Chapter 6 Transport** of the **Environmental Statement** (**ES) (6.1, REP2-017)**. This description of the topic is an appropriate basis upon which to produce the ES Chapter and the associated **Transport Assessment** (**TA**) (**Appendix B.1** of the **ES** (**6.3, APP-066**)). This has been supplemented with an explanation of the method of understanding and minimising the interface between the construction of the Electrical Connection and effects on local bus services, contained within the Outline CTMP (to be submitted to the Examination at Deadline 5). Adjustments to the dDCO have been made and submitted to the Examination at Deadline 4 which specify the term 'jetty outage' and the timeframe for operations under that scenario.

Commented [TdL12]: Given outstanding issues on construction impact assessment, assessment of cumulative impacts of RRF and REP during jetty outage, etc. we cannot agree this now.

Commented [NA13R12]: Text reinstated and supplemented to identify the progress on these points.

Legislation, Policy Context, Guidance and Standards

2.2.2 The policy context, legislation, guidance and standards considered in the assessment of transport impacts are noted in **Chapter 2 Regulatory and Policy Background** of the **ES (6.1, APP-039)**, **Section 6.2, Chapter 6 Transport** of the **ES (6.1, REP2-017)** ~~and~~ **Chapter 3** of the **TA** (**Appendix B.1** of the **ES (6.3, APP-066)**).

2.2.3 The policy context, legislation, guidance and standards considered to inform the Transport Assessment are appropriate.

Consultation and Record of Engagement undertaken

2.2.4 Consultation undertaken with regards to transport impacts is summarised in **Section 6.3, Chapter 6 Transport** of the **ES (6.1, REP2-017)**.

2.2.5 The summary of consultation presented is correct so far as it provides an accurate record of consultation with TfL on transport at the time of submission. Further meetings have been held with TfL on:

2.2.6 ~~-~~09 October 2018 – discussing the principle of the submission, the scope and methodology of the assessment being adopted for the construction phase, the operations phase and eventual ~~the~~ demolition. The meeting concluded that the operational phase effects would be Negligible, and the construction phase effects would be analysed as the submission developed;

2.2.7 ~~-~~18 January 2019 – was framed around a schedule of points which had been derived from earlier correspondence - ~~-~~with a number of technical points being resolved prior to the meeting. A primary point discussed was the likely sensitivity of network operations on Picardy Manorway to variations in the profile of construction and operational workforce commuting. Technical analysis provided at the meeting demonstrated that the network was able to operate within theoretical capacity irrespective of cumulative alignment with the network peak and that construction workforce commuting would happen largely outside the network peak periods. TfL acknowledged that the details of the management of network effects would be finalised through the agreement of CTMPs for the works;

2.2.8 ~~-~~13 March 2019 – considered the Relevant Representation submitted by TfL. The meeting considered matters relating to the construction phase of the Proposed Development, having agreed that the operational phase effects would be Negligible. Technical information was presented by the Applicant to respond to the points raised by TfL relating to the general

operation of the network around the Bexley Road roundabout and James Watt Way junction. The applicant confirmed a commitment to reduce the number of on-site vehicle parking spaces and the profile of workforce commuting outside the network peak period; and

2.2.9 ~~-~~31 May 2019 – progressed discussions on the effects on the network of the construction phase, including the construction of the Electrical Connection. The Applicant confirmed the selection of the Electrical Connection route and amendments to Requirements 8, 13 and 14 within the dDCO. Adjustments to the Outline CTMP (as Revision 1) were noted. The Applicant presented further information relating to the operation of the network as set out at technical notes TN009 'Further Appraisal of Construction Traffic Impacts on A2016/A206 Corridor (1)', attached as Appendix A to this SoCG, and also submitted to the Examination at Deadline 2 at **Appendix G** of the **Applicant's Response to Relevant Representations (REP2-054)** and TN013 'TN13 Traffic Flows on A2016 Bronze Age Way and A206 Queens Road/ Northend Road Interface with Electrical Connection Construction Works' attached as Appendix B to this SoCG, and also submitted at Deadline 2 at **Appendix F** of the **Applicant's Response to Relevant Representations (REP2-054).**

~~2.2.5~~2.2.10 Notes of those meetings are included at Appendix C to this SoCG.

Reasonable Worst-Case Parameters Used for Assessment

Construction Phase – REP Site and Electrical Connection

~~2.2.6~~2.2.11 It is agreed that reducing on-site parking during construction from 552 spaces as stated in **Section 6.4, Chapter 6 Transport** of the **ES (6.1, REP2-017)** to a maximum of 275 parking spaces secured in the CTMP will reduce construction worker travel impacts during the construction phase to an acceptable level (within the construction working hours set out in the outline CoCP).

~~2.2.7~~2.2.12 In addition, it is agreed that the construction workforce would not all work to the same hours. Arrivals and departures would occur across a longer time period before and after the shift start times than was assumed within the worst case assessment in the **Chapter 6 Transport** of the **ES (6.1, REP2-017)** and the **TA** (**Appendix B.1** of the **ES (6.3, APP-066)**). The construction working day will be set out in the final form ~~Outline Code of Construction Practice (~~CoCP~~)~~, which must be substantially in accordance with the Outline CoCP (**7.5, Rev 2; REP3-012**). The CoCP is secured by Requirement 11 of Schedule 2 to the draft **Development Consent Order** (**dDCO**) (**3.1, Rev 2, REP3-003**). This would reduce the impact of construction workforce travel on the peak periods on the transport network to an acceptable level when complemented by the committed cap of 275 parking spaces within the Main Works Construction Compound.

~~2.2.8~~2.2.13 Two technical notes have been prepared and submitted to the Examination at Deadline 2. The first '*Further Appraisal of Construction Traffic Impacts on A2016/A206 Corridor*' attached as Appendix A to this SoCG, and also submitted at Deadline 2 at **Appendix G** of the **Applicant's Response to Relevant Representations (REP2-054)**, The second, '*Traffic flows on A2016 Bronze Age Way and A206 Queens Road/Northend Road - Interface with Electrical Connection Construction Works*', is attached as Appendix B to this SoCG, and also submitted at Deadline 2 at **Appendix F** of the **Applicant's Response to Relevant Representations (REP2-054)**. Those documents provide sufficient evidence that: the management of construction related traffic; control of working hours; reduction in construction worker parking; and complementary mitigation would give rise to the **Minor Adverse** or **Negligible** level of traffic impact on the Strategic Road Network which is deemed **Not Significant** within the ES (as stated at **Section 6.12.2**, **Chapter 6 Transport** of the ES (**6.1, REP2-017**)).

~~2.2.9~~2.2.14 The updated **Outline ~~Construction Traffic Management Plan (CTMP)~~ (6.3, Rev 2, REP3-011)**, submitted at Deadline 3 has been updated to reflect the above points regarding: construction workforce travel; and parking provision and management. The ~~CTMP~~/CTMPs ~~is~~/are secured by Requirement 13 of the dDCO (**3.1, Rev 2, REP3-003**). The CTMPs must be

Commented [TdL14]: Please can we add in a chronology/table about the meetings including main issues discussed?

Commented [NA15R14]: Headlines added

Commented [T16]: This is only the case in combination with the commitment to a 07:00-19:00 workday, which would push most worker traffic out of the AM and PM peaks.

Commented [NA17R16]: The CTMP sets out that workforce day and this is further contained in the CoCP.

Commented [T18]: We would like to reiterate that the combination of the two measures outlined in 2.2.6 and 2.2.7 are what make this likely to be acceptable. Please amend wording to reflect this.

Commented [NA19R18]: Text added

Commented [T20]: It should be noted this only refers to the vehicles going to and from the REP and does not include the Electrical Connection construction works which would likely affect the highway. Please add this note or remove statement from matters agreed.

Commented [NA21R20]: The second technical note Appendix B to this SoCG gives evidence to the interface between the Electrical Connection and the network. It notes how the effects on the highway would be minimal outside peak periods and that contractor mitigation would seek to minimise impacts during peak periods. Working through the CTMP the Electrical Connection contractor will continue to seek ways to minimise the effects on the road network. This is captured in the CTMP and in further amendments to be made for D5 – explaining the methodology to review effects on local buses.

Commented [T22]: CTMPs, as there will likely be multiple for the different phases of construction.

Commented [NA23R22]: Text adjusted through document

substantially in accordance with the **Outline CTMP (6.3, Rev 2, REP3-011)** or subsequent agreed revisions thereof. The ~~CTMP/~~CTMPs must be approved by the LBB in consultation with TfL in respect of ~~streets~~ sections of the public highway directly affected by the construction or REP or the Electrical Connection within the London Borough of Bexley. With the exception of a method to understand effects on local bus services, yet to be agreed between TfL and the Applicant, TfL is satisfied with the **Outline CTMP (6.3, Rev 2, REP3-011)**.

~~2.2.10~~2.2.15 Text has been added to the **Outline CTMP** at Deadline 2 (**6.3, Rev1, REP2-064**) and Deadline 3 (**6.3, Rev 2, REP3-011**). The following show the changes made, relevant to TfL, with new or amended text in *italics* and deleted text shown as ~~strikethrough~~:

Deadline 2

- new paragraph 3.3.4: "*In practice the construction of REP requires a wide range of construction trades and labour; and design and management personnel. The Principal Contractor's workforce is expected to work a typical single shift. There will, however, also be a range of specialist contractors' teams employed during the construction programme who will have differing work requirements across different hours. This will spread the arrival and departure profile of commuting across a number of hours – reducing the impact on the operation of the transport network. The detail of this spread of workforce would not be known until: the main contractor has been appointed; their programme confirmed; and the labour force and specialist sub-contractors appointed. The appropriate CTMP would provide further detail on the spread of workforce and the anticipated working hours.*"

- amended paragraph 5.3.1: "Vehicle parking would be provided during construction for up to ~~552~~ *275* cars and vans……."

- amended paragraph 5.3.2, 5.3.3 and 5.3.4: "The strategy for maintaining and managing the parking stock would be developed for the CTMP for that stage. This could include a system of permits to guide who can park within the area and to limit off-site parking. *Permits could be issued on a 'needs' basis, which would be defined in consultation with LBB as the LHA. The criterion could include:*

    - *functional need - based on personal mobility or carer requirements;*
    - *a proven need due to poor access to suitable environmentally sensitive forms of transport – such as home location or required working hours;*
    - *trade requirements – such as the need to carry tools or specialist equipment;*
    - *electric vehicle or suitable environmentally friendly transport use;*
    - *group transport – such as crew buses or high occupancy car sharing; or*
    - *temporary specialist personnel – who may not have access to local accommodation."*

- new paragraph 5.3.3: "*Personnel would be required to apply for a permit, and that application would be assessed on an individual basis and could be granted on a temporary basis or subject to review."*

- new paragraph 5.3.4: "*The Applicant has no wish to provide workforce parking unless a requirement can be shown. The Applicant will confirm with the appointed Principal Contractor the quantum of parking to be provided (to a ceiling of 275 spaces) which would be phased during the construction programme to reflect an appropriately high level of restraint to car-based travel."*

Commented [TdL24]: As noted in Deadline 2 submission TfL should be consulted at any time construction would likely affect the operation of a TfL bus service, even if the actual construction activity is not physically on LBB highway.

Commented [NA25R24]: Minor adjustments made to TfL proposed text.

Commented [T26]: TfL would like to see a specific assessment methodology committed to in the Outline CTMP to be used by the applicant to quantify construction impacts on bus performance. Please remove this statement from matters agreed.

Commented [NA27R26]: Deleted text reinstated with additional text to capture the 'exception'.

- new paragraph 5.3.5: "*The parking allocation on site will have an allocation of approximately 5-10 parking spaces for visitors to the worksite. The number of parking spaces for mobility impaired car occupants will be determined at the time of preparing the detailed CTMP but could be in the order of 3-5% - depending on the expected demand."*

- amended paragraph 6.1.2: "The impact of construction related traffic is considered in the Transport Assessment and shows that there will be some residual impacts primarily due to workforce movements. This peak impact would be temporary during the busiest construction period. *The Applicant continues to engage with TfL and other stakeholders on the refinement of analysing construction workforce travel. The outline Workforce Travel Plan, at Section 9.7 of this document, provides a framework for the mitigation which would be used to minimise the impact of commuting and other worker related travel. The Workforce Travel Plan would be included with the CTMP and be agreed with the LHA and LPA, in consultation with TfL where appropriate*. ~~and during morning and afternoon arrivals~~"

- amended paragraph 9.7.4 (d): "*Determine applications for construction worker parking permits for on-site parking and maintain a database of those allocated permits and the justification – assessed on criteria based around those outlined at paragraph 5.3.2*";

Deadline 3

- include reference at paragraphs 1.1.3, 1.1.4, 2.4.4, 3.1.1 and 3.1.2 to ~~the~~ allow for pre-commencement activities within the CTMPs **(6.3, Rev2, REP3-011)**.

Operational Phase

2.2.1 The reasonable worst-case (100% by road) and nominal (25% by road) parameters used for the assessment of transport impacts are presented in **Section 6.4, Chapter 6 Transport** of the **ES (6.1, REP2-017).**

2.2.2 This is supplemented by evidence as to the operation of the road network under a theoretical jetty outage scenario, as presented at Deadline 3 in '**Temporary Jetty Outage Review (Simultaneous Operations - Riverside Resource Recovery Facility and Riverside Energy Park)**' **(8.02.31)** and the cap on Heavy Commercial Vehicle visits to REP, as secured by Requirement 14 of the dDCO, TfL considers that t~~T~~he parameters used for assessment are considered appropriate for the robust assessment of potential transport impacts arising from the operation of the Proposed Development.

Decommissioning Phase

2.2.3 Any decommissioning phase is assumed to be of a similar or shorter duration to construction and therefore effects are considered to be of a similar level to that during the construction phase. The Construction Phase headings below therefore also capture potential decommissioning.

Assessment Methodology and Significance Criteria

Construction and Operational Phases

2.2.4 The methodology for the assessment of transport impact is presented in **Section 6.5, Chapter 6 Transport** of the **ES (6.1, REP2-017)** and is supplemented by two technical notes submitted to the Examination at Deadline 2:

a. '*Further Appraisal of Construction Traffic Impacts on A2016/A206 Corridor*' attached as Appendix A to this SoCG, and also submitted at Deadline 2 at **Appendix G** of the **Applicant's Response to Relevant Representations (REP2-054)**;

Commented [TdL28]: This is correct for the parts of the highway network within the REP's surrounding area. However as highlighted in GLA submissions there are still outstanding assessments to be done including jetty outage impacts of REP and RRRF combined which would occur during operation. Further clarification provided in Chapter 3 of this document.

Commented [NA29R28]: Text reinstated on the basis that the Applicant submitted an appraisal of the cumulative jetty outage at Deadline 3, titled '**Temporary Jetty Outage Review (Simultaneous Operations - Riverside Resource Recovery Facility and Riverside Energy Park)**' **(8.02.31)**. That evidence demonstrates that the effect on the local road network of a cumulative operation during a jetty outage would be Not Significant.

Commented [TdL30]: Though the ES does set out the theoretical impacts of the REP on transport capacity in the area in a nominal 25% by road scenario, insufficient measures are proposed to ensure the REP does not exceed this 25%. As explained TfL would expect the REP to use the river as much as feasible and would expect it to operate better than the existing RRRF which is understood to operate at a maximum 25% by road.

Commented [NA31R30]: Text reinstated reflecting Requirement 14 which provides a cap on the number of HCVs on the highway network - recognising TfL's proposed cap. The Applicant is also now proposing a cap on the tonnage of waste moved by road.

Commented [TdL32]: No problem with this.

Commented [NA33R32]: This is therefore agreed.

b. '*Traffic flows on A2016 Bronze Age Way and A206 Queens Road/Northend Road - Interface with Electrical Connection Construction Works*', is attached as Appendix B to this SoCG, and also submitted at Deadline 2 at **Appendix F** of the **Applicant's Response to Relevant Representations (REP2-054)**.

2.2.5 TfL has sufficient evidence to understand that the effects on the Strategic Road Network within the vicinity of the REP site would be **Not Significant**, when supported by the mitigation processes that are set out in the Outline CTMP (**6.3, Rev 2, REP3-011**) and agreed revisions, thereof. TfL and the Applicant will work to achieve an agreed method of understanding the effects on local bus services during the construction of the Electrical Connection. The revised Outline CTMP (**6.3, Rev 3**), submitted at Deadline 5 includes the structure for a method to understand the interface between local buses and the construction of the Electrical Connection.

~~2.2.5 The assessment methodology, including the supplementary evidence, is considered appropriate.~~

2.2.6 The cumulative assessment methodology for transport is presented in **Section 4.10, Chapter 4 ES Assessment Methodology** of the ES **(6.1, APP-041)** when supplemented by the evidence provided to the Examination at Deadline 3 in '**Temporary Jetty Outage Review (Simultaneous Operations - Riverside Resource Recovery Facility and Riverside Energy Park)' (8.02.31)**. The cumulative assessment methodology is considered appropriate.

Assumptions and Limitations

Construction and Operational Phases

2.2.7 Assumptions made with regards to transport are summarised in **Section 6.6, Chapter 6 Transport** of the ES **(6.1, REP2-017).**

~~The assumptions presented are considered appropriate.~~

Baseline Conditions and Receptors

Construction and Operational Phases

2.2.8 The baseline conditions and receptors for transport are presented in **Section 6.7, Chapter 6 Transport** of the **ES (6.1, REP2-017)**.

2.2.9 The baseline conditions and receptors presented are considered appropriate.

Embedded Mitigation

Construction and Operational Phases

2.2.10 The embedded mitigation which is that designed to be an inherent part of the scheme for which development consent is sought or which would be undertaken to meet existing legislative requirements for potential transport effects and is set out in **Section 6.8, Chapter 6 Transport** of the **ES (6.1, REP2-017)**.

2.2.11 The embedded mitigation is considered appropriate and adequate, in terms of its nature and scale, to address potential transport effects from the construction of the REP site, with the exclusion of the construction of the Electrical Connection, subject to the amendments made to the updated **Outline CTMP**, submitted at Deadline 3 (**6.3, Rev 2, REP3-011**) as set out at the "Reasonable Worst-Case Parameters Used for Assessment" section above. TfL and the Applicant will work to achieve an agreed method of understanding the effects on local bus services during the construction of the Electrical Connection to be secured in the Outline CTMP.

Commented [T34]: We do not agree with this. As stated in Deadline 3 submissions GLA/TfL want to see a realistic methodology for the assessment of quantifiable impacts on buses. If this cannot be agreed, then modelling may be required. Please remove from matters agreed.

Commented [NA35R34]: We will continue to work with TfL to conclude an approach to minimise effects on the local bus network during the construction of the Electrical Connection. The Applicant does not propose any further assessment work. Text added to allow for the agreement on the effects associated with the construction of REP

Commented [T36]: Agreed in principle, however we would like to note this does not include the cumulative impact of a jetty outage which would affect the REP and RRRF and that a assessment for the effects of this should still be undertaken.

Commented [NA37R36]: Text reinstated and adjusted to reflect the supplementary evidence submitted at Deadline 3.

Commented [TdL38]: This is too broad for us to agree to at this stage, given that the section is a single paragraph referencing 'any assumption' in the ES. Would be happy to agree to specific assumptions if listed.

Commented [NA39R38]: These assumptions form the basis for the appraisal of impacts on transport associated with the Proposed Development. TfL has not questioned this section of the ES in previous representations. The Applicant would wish to understand which assumptions are not considered appropriate?

Commented [T40]: Agreed. Receptors are in line with EIMA standards.

Commented [NA41R40]: Point agreed as drafted.

Commented [T42]: We do not fully agree with this. Though we do agree that all embedded mitigation listed will help mitigate the traffic impacts of the development, these embedded mitigation elements alone will not fully mitigate the impact of construction of the Electrical Connection. TfL and bus operating companies will likely need to divert buses and increase frequencies on routes to help mitigate the effects of construction and an assessment method to determine this delay has not been agreed. Please remove from matters agreed.

Commented [NA43R42]: Text reinstated and adapted to exclude the construction of the Electrical Connection.

Assessment of Likely Effects

Construction Phase

2.2.12 The assessment of effects during construction and decommissioning for transport is presented in **Section 6.9, Chapter 6 Transport** of the **ES (6.1, REP2-017)**. That assessment is supplemented by evidence and appraisals provided through two technical notes submitted to the Examination at Deadline 2. The first. '*Further Appraisal of Construction Traffic Impacts on A2016/A206 Corridor*' is attached as Appendix A to this SoCG, and which was also submitted at Deadline 2 at **Appendix G** of the **Applicant's Response to Relevant Representations (REP2-054)**. The second, '*Traffic flows on A2016 Bronze Age Way and A206 Queens Road/Northend Road - Interface with Electrical Connection Construction Works*', is attached as Appendix B to this SoCG, and was also submitted at Deadline 2 at **Appendix F** of the **Applicant's Response to Relevant Representations (REP2-054)**. ~~.~~

2.2.13 The assessment of effects during construction of the REP site and decommissioning presented is considered appropriate, subject to the amendments made to the updated **Outline CTMP** (**6.3, Rev 2, REP3-011**) as set out at the "Reasonable Worst-Case Parameters Used for Assessment" section above. The final CTMP would be approved by the local planning authority in consultation with TfL for works which affect roads within the London Borough of Bexley, as secured through **Requirement 13** of the **dDCO** (**3.1, Rev2, REP3-003**). TfL and the Applicant will work to achieve an agreed method of understanding the potential effects on local bus services during the construction of the Electrical Connection. The ~~CTMP/~~CTMPs will mitigate the likely impacts on the local ~~bus services on roads affected by the~~Strategic Road Network during construction of the ~~Electrical Connection~~REP site. ~~Where appropriate, the roadworks associated with the construction of the Electrical Connection will be specifically managed to minimise delays and disruption to local bus services.~~ Whilst appropriate assumptions have been used in the ES and TA, it is acknowledged that the contractor has not yet been appointed, as is usual at this stage. Once the precise construction schedule is known (i.e. once the contractor has been appointed), the CTMPs will set out the approach to understand those effects on the local ~~bus services~~Strategic Road Network.

Operational Phase

2.2.14 The assessment of effects during operation for transport is presented in **Section 6.9, Chapter 6 Transport** of the **ES (6.1, REP2-017)**. The assessment of effects during operation presented is considered appropriate when supplemented by the evidence provided to the Examination at Deadline 3 in '**Temporary Jetty Outage Review (Simultaneous Operations - Riverside Resource Recovery Facility and Riverside Energy Park)**' **(8.02.31)**.

Cumulative Assessment

Construction and Operational Phases

2.2.15 The assessment of cumulative effects for transport is presented in **Section 6.10, Chapter 6 Transport** of the **ES (6.1, REP2-017)**.

2.2.16 The cumulative effects from transport are not intended to be assessed separately as they are inherently included within the growth factors applied to the **TA** (**Appendix B.1** of the **ES (6.3, APP-066))**.

2.2.17 The cumulative effects presented are considered appropriate.

Further Mitigation and Enhancement

Construction and Operational Phases

Commented [T44]: We do not agree with this as the effects of the electrical connection at junctions along its route on local traffic, including buses, has not been assessed. An assessment showing the effect of arm and lane closures at junctions along the Electrical Connection route on bus delay in a quantifiable way should be included in the CTMP.

Commented [NA45R44]: Text reinstated and amended to reflect emerging approach to effects on local bus service.

Commented [T46]: The appointment of a contractor is not required for the determination of an assessment approach to bus impacts. This assessment approach should be agreed prior to determination of the DCO. Please remove paragraph from matters agreed.

Commented [NA47R46]: Text reinstated and amended to refer only to the construction of the REP site and exclude the Electrical Connection.

Commented [T48]: The only outstanding issue on this from a transport perspective is the cumulative assessment of a jetty outage to include traffic from the RRRF as well as REP, as currently the REP jetty outage traffic has been assessed in isolation. However, we do not agree this is appropriate at this stage. Please remove.

Commented [NA49R48]: Text reinstated and amended to include reference to the evidence submitted at Deadline 3 on the cumulative jetty outage scenario.

Commented [T50]: Agreed as committed development forms part of the transport assessment already.

Commented [NA51R50]: Text agreed as drafted.

2.2.18 The consideration of further mitigation and enhancement measures for transport are presented in **Section 6.11, Chapter 6 Transport** of the **ES (6.1, REP2-017)**.

2.2.19 **Requirement 13** of the **dDCO** (**3.1, Rev 2, REP3-003**) secures ~~a~~ CTMPs to detail the construction tasks, processes and programmes to be undertaken for each works package, including pre-commencement phases. The CTMPs would be substantially in accordance with the framework provided by the updated **Outline CTMP** (**6.3, Rev 2, REP3-011**). TfL will be a consultee to the CTMPs for sections of the public highway~~roads~~ affected within the London Borough of Bexley. TfL and the Applicant will work to achieve an agreed method of understanding the potential effects on local bus services during the construction of the Electrical Connection to be secured in the Outline CTMP.

2.2.20 **Requirement 14** of the **dDCO** (**3.1, Rev 2, REP-003**) sets out caps on the number of Heavy Commercial Vehicle movements into and from REP for the ERF and the Anaerobic Digestion plant during normal operations and under the scenario of a jetty outage. It is agreed that the framework for vehicle movements set out at Requirement 14 is appropriate.

2.2.21 **Requirement 15** of the **dDCO** (**3.1, Rev 2, REP-003**) secures the preparation and implementation of an Operational Worker Travel Plan to accompany the operation of REP. That Operational Worker Travel Plan would be substantially in accordance with the **outline Operational Worker Travel Plan** provided at **Appendix M** to **Appendix B.1** (**Transport Assessment**) of the **ES** (**6.3, APP-066**).

2.2.22 The text of the above Requirements, showing amendments made at Deadline 3, are copied at Appendix ~~C~~ D to this SoCG.

~~2.2.23 The consideration of further mitigation and enhancement measures are appropriate.~~

Residual Effects and Monitoring

Construction and Operational Phases

~~2.2.24~~2.2.23 The summary of residual effects and monitoring for transport is presented in **Section 6.12, Chapter 6 Transport** of the **ES (6.1, REP2-017)**.

~~2.2.25~~2.2.24 **Appendix M** of **Appendix B.1** (**Transport Assessment**) of the **ES** (**6.3, APP-066**) is an Outline Operational Worker Travel Plan. That document sets out the process for engagement and monitoring of effects. The Operational Worker Travel Plan would be secured through **Requirement 15** of the **dDCO** (**3.1, Rev 2**, **REP-003**). The Requirement identifies that TfL would be a consultee to the approval of the Operational Worker Travel Plan.

2.2.25 A schedule of mitigation and monitoring is presented in **Chapter 17 Schedule of Mitigation and Monitoring** of the **ES (6.1, APP-054)**.

2.2.26 The **Outline CTMP** (**6.3, Rev 2, REP3-011**) would inform the development of CTMPs for the construction works, associated with the REP site. Those documents would set out the mitigation processes during the construction of the REP site, such that residual impacts would be Minor Adverse to Negligible and be Not Significant. This excludes TfL's acceptance of the effects on the local Strategic Road Network of the construction works for the Electrical Connection. TfL and the Applicant will work to achieve an agreed method of understanding the effects on local bus services during the construction of the Electrical Connection to be secured in the Outline CTMP.

2.2.27 The summary of residual effects and monitoring is appropriate, with the exception of effects on the local bus services, ~~which~~ remain to be concluded between TfL and the Applicant.

Commented [TdL52]: They should be fully in accordance.

Commented [NA53R52]: Text reinstated. The documents would accord with the outline CTMP as consented by the SoS. The use of "substantially" allows all parties to make minor modifications to the document to reflect adjustments through design stages. The documents would still be agreed with the local planning authority, in consultation with TfL, without being unreasonably rejected. This is the drafting that is provided for in Requirement 13 in the dDCO and is standard drafting that has been accepted by the SoS on numerous DCOs.

Commented [T54]: As previously discussed TfL welcome the CTMP in principle, but would need to see an agreed assessment methodology for the delays to buses to be included here so that this is committed as part of the DCO. Furthermore, TfL should be consulted on all sections of construction that could affect bus services even if these do not occur in Bexley.

Commented [NA55R54]: Text added to reflect the on-going progress towards an agreed process.

Commented [T56]: We do not agree with this as set out in the GLA's Deadline 3 submission. Please remove.

Commented [NA57R56]: Text reinstated to reflect that Requirement 14 has been amended at Deadline 3 to reflect the cumulative cap for the ERF and Anaerobic Digestion facility; to remove the use of any surplus HCV movements at RRRF; and providing a definition as to the term "jetty outage". The 90 HCV in / 90 HCV out cap under normal operations is within the cap proposed by TfL, when taking account of the cumulative operations at the ERF and Anaerobic Digestion facility.

Commented [T58]: We do not agree with this. Please remove from matters agreed.

Commented [NA59R58]: Text reinstated and adjusted to capture agreement with the exception of Electrical Connection construction effects.

2.3 Draft Development Consent Order (dDCO)

~~2.3.1~~ The Parties are agreed on the wording of the operative provisions of the **dDCO** (Articles 1 – 43) (**3.1, Rev 2**, **REP-003**), except those set out in **Section 3** below.

2.3.1

~~2.3.2~~ The Parties are agreed on the wording of the requirements contained in Schedule 2 of the **dDCO** (**3.1, Rev 2**, **REP-003**) and the procedure for the discharge of requirements contained in Schedule 12 of the **dDCO** (**3.1, Rev 2**, **REP-003**) , except those set out in **Section 3** below.

Commented [TdL60]: Due to outstanding issues, please remove.

Commented [T61]: No this is not the case. GLA/TfL have outstanding issues as highlighted at Deadline 3 and Deadline 4. Please remove from matters agreed.

Commented [NA62R61]: This section should remain, subject to the exclusion of Requirements that we understand are not agreed by TfL.

This SoCG should solely cover the outstanding issues that TfL has. We have amended the wording to suit.

3 Matters yet to be agreed between the Parties

3.1 Introduction

~~The Parties confirm that there are no remaining areas under discussion between the Parties.~~

3.1.1 The following section sets out areas where agreement between the Parties has not been reached up until this point.

3.2 Electrical Connection Construction

3.2.1 As set out at Deadline 3, TfL has requestsed ~~additional assessment commitment for buses in a quantifiable way~~a method to understand the likely effects on local ~~to determine delay of~~ bus services ~~at any junctions~~along the route of the Electrical Connection that would likely be affected by the Electrical Connection construction ~~if this would necessitate a temporary lane or arm closure~~. This ~~assessment~~ methodology ~~should be~~is to be secured in the Outline CTMP ~~(Ref.)~~ and for each full CTMP prepared for each phase of construction~~, the contractor, Bexley and TfL should agree whether the assessment is required based on the expected effect of construction on the capacity of the junction(s) included in that phase of construction~~. The Applicant and TfL will continue to discuss this mechanism which is currently not agreed.

3.2.2 Whilst it is agreed that there is no legal entitlement to compensation for disruption to bus services, TfL considers that the Applicant should be required to enter into a planning obligation (through a Section 106) to mitigate the impact of the proposed development, including the mitigation of the development's construction impacts. The Applicant does not agree that this is necessary or reasonable.

~~TfL would request monetary compensation for bus delay by the applicant to mitigate impact of construction. Whilst it notes the Applicant's position nevertheless it is considered that where additional costs can be directly attributed to a specific development, as would be the case here, the developer must mitigate this impact through a planning obligation and TfL is seeking a financial contribution to cover the cost of additional bus services and diversions.~~

~~3.2 Operational Phase~~

~~Operational Phase~~

~~The GLA has highlighted the need for~~

~~Jetty Outage~~

3.2.3 There is currently no provision in place in Requirement 14 that caps the number of days that a jetty outage may occur. The GLA objects as this would enable the Applicant to stop using the river to bring in waste altogether once a jetty outage occurs. TfL request additional wording to be included in Requirement 14 that caps the length of a jetty outage to ensure that the Applicant would not be able to have waste brought in by road indefinitely , unless an extension of time is agreed with the LPA and TfL on provision of evidence of reasonable endeavours to fix the jetty.

3.2.4 The Applicant's ES has not assessed the combined traffic impact of the REP and RRRF in the event of a jetty outage. It is TfL's position that this should be assessed in order to determine whether the current jetty outage provision in Requirement 14 is sufficient to avoid a detrimental impact on the local highway network in the event of a jetty outage.

Commented [T63]: Please remove.

Commented [NA64]: The Applicant will work with TfL to establish a method of understanding the effects of the Electrical Connection construction on local buses but does not agree to a system of further assessment.

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Commented [NA65]: The Applicant does not agree that there is a legal basis on which to provide financial contributions to bus service disruption. There is no entitlement to compensation if a business, including bus services, is affected by road works undertaken by statutory undertakers or the highway authority – the circumstances in this case are no different. Therefore, Arriva/TfL could not make a claim against the Applicant or UKPN. The Outline CTMP proposes mitigation measures to reduce the effect of the construction of the Electrical Connection on the local Strategic Road Network. Together with design and alignment refinements to be proposed by the Electrical Connection contractor, these will minimise the effects of the construction period within proportional to the project.

Commented [NA66]: The Applicant has no commercial imperative to continue road based movement of waste longer than necessary but does not agree that an arbitrary timeframe should be included at Requirement 14 to define a jetty outage. The period over which an outage would extend would depend on many factors which cannot be determined.

These have been reduced to succinct points – an SoCG should not repeat all the arguments.

Formatted: Numbered Paragraph, Left, Indent: Left: 0 cm, Tab stops: Not at 2 cm

3.3 Draft Development Consent Order (dDCO)

3.3.1 ~~TfL are looking to include a requirement for all road-based transport to be zero-emission as set out in GLA submission for Deadline 2, 3 and 4.~~ TfL seeks a requirement for all road-based transport to be zero-emission. The Applicant disagrees with this approach and has included proposals in the Outline CTMP for heavy duty engined vehicles to be compliant with the prevailing emissions standards for the area in which those vehicles are operating.

Requirement 13

3.3.2 A method of assessing effects of construction on buses, to be set out in the Outline CTMP is required by TfL. This has not yet been agreed between TfL and the Applicant.

3.3.3 TfL considers that it should be consulted on all construction activities that would be expected to have an impact on bus operations, regardless of where the works are located. The Applicant does not agree with this since it considers that the ability for TfL to respond to any approval consultation by Dartford Borough Council is sufficient and that normal Streetworks procedures will apply.

~~TfL is generally agreed with the provisions in the outline CTMP, however as raised at Deadline 2 and Deadline 3; the lack of a clear assessment of effects of construction on buses is an issue that should be addressed before TfL can agree to Requirement 13.~~

~~TfL should be consulted on all construction activities that would be expected to have an impact on bus operations, including construction on junctions adjacent to bus routes, even if the construction activity does not occur within Bexley.~~

Requirement 14

3.3.4 TfL requires a cap of approximately 10% (equating to 32 vehicles per day) on waste by road to the ERF due to the undesirable effect from a higher proportion of the waste being transported by road and on the basis that there would be little or no waste input from Bexley. The Applicant has included a cap of 240,000 tonnes per annum in respect of waste by road. The Applicant does not agree with the proposed 10% cap and considers that the EIA has shown that 100% by road is acceptable and that no such cap is required.

3.3.5 TfL requires a cap on the length of any jetty outage as this would allow the Applicant to stop using the river to bring in waste altogether once a jetty outage occurs. The Applicant does not agree that this is appropriate since a jetty outage would be exceptional, the timescales to restart jetty operations would be unknown and the Applicant's entire commercial imperative is river focussed. As such, there is no incentive on the Applicant to prolong a jetty outage for longer than is strictly necessary.

~~As noted in the documents submitted at Deadline 3, the GLA is concerned that the restriction on movements by road as currently worded in Requirement 14 would let the Applicant use larger size HGV vehicles to deliver waste to the REP. This would have the undesirable effect that a higher proportion of the waste would be transported by road. Therefore, at Deadline 3 the GLA stated that a provision should be included in the requirement to limit the volume of waste delivered by road to 200,000 tpa, which would be approximately 25% of the ERF's maximum waste throughput and approximately 30% of the ERF's nominal scenario waste throughput (655,000 tpa), therefore still allowing for some contingency.~~

~~However, upon review of the Deadline 3 submission made by the London Borough of Bexley, the GLA understands that the proposed REP facility would have little to no waste input from Bexley as this demand is handled by the existing RRRf, and therefore would have more opportunity to have waste brought in via the river. Therefore, TfL agrees with the London Borough of Bexley that the amount of waste brought to the proposed EfW plant by road should be limited to 10% of the nominal expected throughput of the proposed plant (65,500 tpa).~~

Commented [NA67]: These points have been covered by representations to the Examination and have therefore been simplified in this Statement of Common Ground to focus on matters agreed/disagreed. The points of agreement or points yet to be agreed included in these paragraphs are covered elsewhere in this SoCG.

Commented [NA68]: This is incorrect and we assume can be agreed as such with TfL. The LBB position is based on the municipal waste contract for Bexley, however the plant will be focussed on Commercial and Industrial waste with the ability to accept municipal waste. We have simplified this whole section for the Inspector.

~~TfL would request the daily vehicle cap in dDCO Requirement 14 to be reduced to 32 vehicles per day, which is approximately 10% of the 321 vehicles per day the Applicant states would be generated by the ERF in a 100% by road scenario.~~

~~As raised at Deadline 4, TfL are concerned that there is currently no provision in place in Requirement 14 that caps the number of days that a jetty outage may occur. TfL and the GLA object. to this as this would enable the Applicant to stop using the river to bring in waste altogether once a jetty outage occurs. TfL therefore considers that additional wording should be included in Requirement 14 that caps the length of a jetty outage to ensure that the Applicant would not be able to have waste brought in by road indefinitely, unless an extension of time is agreed with the LPA and TfL on provision of evidence of reasonable endeavours to fix the jetty.~~

~~Requirement 14 specifically references only HGVs delivering waste "from the street known as Norman Road" in paragraphs 1, 2, and 4b. TfL seeks to remove this wording, as any new access arrangements not directly from Norman Road would negate the cap in Requirement 14. Furthermore, Requirement 14 does not need this specification.~~

Commented [NA69]: Addressed in the latest DCO

~~TfL and the GLA seek an amendment to Requirement 14 that would:~~

~~3.2.1~~ ~~include a cap on the amount of waste that can be imported from outside London. This will ensure that the REP would process predominantly residual commercial and industrial waste produced within London to meet the Mayor's 100 per cent net waste self-sufficiency by 2026 target as set out in the GLA's LIR section 7. The cap should be set at a minimum of 15% of total waste to be managed at the ERF~~

Commented [GR70]: Waste self sufficiency is not a TfL matter

Commented [NA71]: Waste self sufficiency is not a TfL matter

3.3.6 TfL request a tonnage cap on waste to be handled by the ERF to ensure that the development is operated generally in accordance with the EIA. The Applicant disagrees with this on the basis that waste tonnage is an inappropriate means of controlling effects and that appropriate control of operational traffic effects is provided through Requirement 14.

~~cap the total amount of waste that the proposed ERF will manage. This is to ensure that the development is operated generally in accordance with the environment impact assessed in the Applicant's support documents~~

~~that the proposed ERF would process only waste transported to it from a riparian waste transfer station in Greater London and the Port of Tilbury, other than the waste specified in Requirement 14 or any other relevant Requirements. This is to ensure maximum the use of river transport to the REP, and to limit the amount of waste transported by road and the associated adverse impacts on traffic and on air pollution.~~

Commented [NA72]: Unclear – other than waste in Requirement 14?

~~Requirement 15~~

~~TfL should be consulted on all construction activities that would be expected to have an impact on bus operations, including construction on junctions adjacent to bus routes, even if the construction activity does not occur within Bexley. TfL should therefore also be consulted on operational worker travel plans for construction these sections of the highway network even if they are not within Bexley.~~

Commented [NA73]: This is an operational plan and therefore does not cover construction. Additionally, this relates to works 1-5 only which are all within Bexley so TfL will be consulted on all regardless in accordance with the wording of the Requirement.

~~Articles~~

~~The definition of each article has not been agreed as of yet. For example; TfL agree with LBB that the jetty outage definition in Article 2 should be changed.~~

Commented [NA74]: Please set out which Articles are agreed or disagreed

~~**Other Considerations**~~

Commented [TdL75]: Put in as a placeholder at this stage.

~~3.2.2~~

4 Confirmation of Agreement

This SOCG is prepared jointly and agreed by the Parties:

Signed for and on behalf of the Applicant	.....
Date:	.....
Signed for and on behalf of Transport for London	.....
Date:	.....

Appendix A – Technical Note - Further Appraisal of Construction Traffic Impacts on A2016/A206 Corridor

TECHNICAL NOTE

Subject: **Further Appraisal of Construction Traffic Impacts on A2016/A206 Corridor**

Executive Summary

i. This technical note has been prepared on behalf of Cory Environmental Holdings Limited (the Applicant), trading as Cory Riverside Energy for Riverside Energy Park, in response to technical matters raised by TfL during engagement and in their Relevant Representation.

ii. Information and evidence are set out in relation to the predicted construction phase of Riverside Energy Park and the Electrical Connection and:

- provide a review of the flow characteristics at key junctions on the construction route for Riverside Energy Park;
- explore the possible temporary impacts of the peak construction period of Riverside Energy Park; and
- identify measures which would be delivered through a Construction Traffic Management Plan or Plans, secured through **Requirement 13** of **Schedule 2** of the **draft Development Consent Order (3.1, Rev1)**, to reduce the potential impacts of Riverside Energy Park's construction phase in relation to the highway network performance.

iii. Associated assumptions from the **Transport Assessment, Appendix B.1** of the **Environmental Statement (6.3, Rev1)** are captured and the technical note considers the volume of traffic along the A2016/A206 corridor at the point of the Erith Roundabout and James Watt Way junctions during the morning and evening network peak periods.

iv. The predicted cumulative peak traffic flows for Riverside Energy Park construction workforce and other construction vehicles for Month 13 of the construction programme are set out and distributed across the highway network as indicated within the **Transport Assessment, Appendix B.1** of the **Environmental Statement (6.3, APP-066).**

v. Further to negotiations with TfL, the Applicant is proposing to reduce on-site parking from 552 parking spaces to a maximum of 275 parking spaces. This significantly reduces the projected number of people commuting by car and has a consequential reduction on the flows on the network.

vi. The information in this technical note shows that the traffic associated with REP during that Month 13 would be applied to the road network prior to the morning peak period and after the evening peak. The cumulative level of flow during those periods, taking into account mitigation through the implementation of a Construction Traffic Management Plan or Plans, would be lower than the existing or projected network peak periods.

vii. It is concluded that the reduction in on-site parking; the focus of workforce commuting outside of the network peak periods; and the implementation of Construction Traffic Management Plans during the construction phase would minimise the impact of the construction phase traffic such that the level of impact would be Minor Adverse or Small (in accordance with significance criteria within Table 6.13 of **Chapter 6 Transport** of the **Environmental Statement (6.1, Rev1)**) which would be Not Significant.

viii. This technical note complements technical note reference TN013 "Traffic flows on A2016 Bronze Age Way and A206 Queens Road/Northend Road - Interface with Electrical Connection Construction Works" which reviews the anticipated impacts of the construction of the Electrical Connection on the operation of the A2016/A206 corridor. That note concludes that with mitigation through a proposed CTMP secured as **Requirement 13** of **Schedule 2** of the **draft Development Consent Order (3.1, Rev1),** the impact on the SRN would be at most Minor Adverse

1. Introduction

1.1. This technical note has been prepared on behalf of Cory Environmental Holdings Limited (trading as Cory Riverside Energy (Cory or "the Applicant")) for Riverside Energy Park (REP), in response to technical matters raised by TfL at meetings held on 22 October 2018, 18 January 2019, 08 February 2019 and 13 March 2019, and related correspondence during that period and within the TfL Relevant Representation (RR) submitted on 12 February 2019.

1.2. TfL states in its RR that: "…*given the robust trip generation forecast for the operational phase, TfL considers that the operational traffic impact of the proposed development is unlikely to result in a detrimental impact on the SRN."*

1.3. The RR goes on to state that:

> "*The traffic impact of the construction of REP is expected to be significant. TfL concludes that insufficient assessment has been undertaken to provide a realistic estimate of the impact of construction on the junctions along the SRN and therefore on bus services as well, and would therefore object to the current construction proposals. Additional modelling needs to be undertaken to show the impact of construction and mitigation measures must be secured through appropriate legal mechanisms to mitigate the impact*.

> *The impact of the Electrical Connection construction has not been sufficiently assessed through the TA or CTMP as currently the route has not been chosen, it is unclear how long construction of each section would take and therefore how long lanes would need to be closed and where they would need to be closed. The impact of the lane closures has not been assessed and therefore it cannot be determined if this impact is acceptable at this stage. However, given TfL's understanding of the existing traffic congestion along the A2016, TfL have significant concerns which have not been alleviated. It is noted that TfL would prefer the Electrical Connection to be constructed away from the SRN, as this would reduce the potential for strategic traffic impacts."*

1.4. This technical note, therefore, sets out information and evidence relating to the predicted construction phase of REP and the Electrical Connection and:

- provides a review of the flow characteristics at key junctions on the construction route for REP;
- explores the possible temporary impacts of the peak construction period of REP; and
- identifies measures which would be delivered through a Construction Traffic Management Plan (CTMP), secured through **Requirement 13** of **Schedule 2** of the **draft Development Consent Order (dDCO) (3.1, Rev1),** to reduce the potential impacts of REP's construction phase in relation to the highway network performance – including reference to a similar type of proposal at North London Heat and Power Project and the Silvertown Tunnel proposals – which is not directly comparable in project type but has been granted through the DCO process and with which TfL are familiar.

1.5. From video footage recorded as part of the traffic survey counts, it is understood that moderate levels of queueing and congestion are present at the following two junctions during the AM and PM peak hours:

- Erith Roundabout
- A206 Queens Road/ James Watt Way

- *Plate 1: Erith Roundabout 2018 AM Peak Period – Bexley Road (west)*

- *Plate 2: James Watt Way junction 2018 AM Peak Period – A206 (camera facing southbound)*

1.6. In contrast, the three junctions near the REP site on A2016 Picardy Manorway – namely A2016/ Clydesdale Way/ Yarnton Way roundabout, A2016/ Norman Road and A2016/ Anderson Way/ B253 – currently operate with a significant amount of spare capacity. This is shown in **Section 6** of the **Transport Assessment** (TA), **Appendix B.1** of the **ES (6.3 APP-066)**. Furthermore, as shown in TN007 – Construction Phase Sensitivity Test (dated 23/01/19, issued to TfL on 28/01/19), attached as Appendix A to this note, these three junctions on A2016 Picardy Manorway are expected to operate with spare capacity as assessed during the peak period of construction for REP, and based on the robust assumptions adopted within the **TA, Appendix B.1** of the **ES (6.3, APP-066)** for Month 13 (i.e. the highest level of cumulative workforce and construction traffic, anticipated to be during 2022).

1.7. The junctions on Picardy Manorway are priority roundabouts and there is no control linkage to the Erith Roundabout (i.e. the junction of Bronze Age Way (A2016)/Bexley Road/Queens Road) or the Queens Road (A206)/James Watt Way traffic signals. The Erith Roundabout is 2.3km from the Picardy Manorway/Anderson Way junction and there is no evidence of interaction between the operation of these junctions. Consequently, this technical note focuses on Erith Roundabout and A206 Queens Road/ James Watt Way during the above peak construction phase for REP.

2. REP TA Assumptions

2.1. The detailed assumptions and methodology relating to the REP construction phase trip generation have been set out in **Section 4** of the **TA, Appendix B.1** of the **ES (6.3, APP-066)**. The information provided in the **TA, Appendix B.1** of the **ES (6.3, APP-066)** focuses on a robust reasonable worst-case scenario based on the provisional construction information available at the time of writing.

2.2. A summary of the assumptions used in the **TA, Appendix B.1** of the **ES (6.3, APP-066)** to derive the construction trip generation is set out below:

- The construction phase traffic consists of construction material trips, construction worker trips and also trips associated with the construction of the Electrical Connection. The construction worker traffic assumes a majority of arrivals would occur during the AM network peak and departures during the PM network peak periods;
- A conservative prediction of 1,097 construction workers are projected during Month 13 of the construction programme, which represents the peak period of construction;
- The parking provision during Month 13 is stated to be 552 parking spaces at the construction compound – as a peak provision;
- A car driver mode share of 50% is assumed during Month 13 based on: the level of parking provision; the characteristics of London-based construction worker travel patterns; and measures to promote travel by sustainable modes, which would be promoted through CTMP/CTMPs for the works;

- As part of the reasonable worst case assessment, as expressed at paragraph 4.3.5 of the **TA, Appendix B.1** of the **ES (6.3, APP-066)** the construction workers are assumed to work between 08:00 – 18:00 on a single shift and there would be no turnover of parking spaces; and
- Census 2011 data were used to determine the car driver distribution for construction workers.

2.3. Based on the assumptions adopted within the **TA, Appendix B.1** of the **ES (6.3, APP-066)**, the quantum of construction peak hour traffic during Month 13 of the construction programme at Erith Roundabout and A206 Queens Road/ James Watt Way is shown below in Table 1. Columns 2 and 3 of Table 1 are the traffic flows for the peak period construction workforce and construction materials associated with the construction of REP. Column 4 of Table 1 is the combined predicted workforce and construction vehicle movements associated the construction of the Electrical Connection at Month 13. As a robust working assumption within the **TA, Appendix B.1** of the **ES (6.3, APP-066)**, this traffic has been assigned to the network during the hour preceding the start of the daily construction working period and the hour following the end of the daily construction working period.

Table 1:Transport Assessment Construction Peak Hour Traffic Movements (Vehicles)

Junction	REP Construction Worker	REP Construction Material	Electrical Connection Route	Total Movements
Erith Roundabout	256	4	10	270
A206 Queens Road/ James Watt Way	196	4	11	211

2.4. As shown in Table 1, the majority of construction traffic during the assessed hours is associated with construction worker trips.

3. Existing Flow Profiles

3.1. This section provides a review of the traffic profile during the AM and PM peak periods for Erith Roundabout and A206 Queens Road/ James Watt Way based on the traffic surveys undertaken in April and May 2018.

Erith Roundabout

3.2. The hourly total junction flows, given in 15-minute increments, is shown in Table 2 (with the peak hour shown in bold) and the profile of the volume of traffic as it builds and diminishes is illustrated in Figures 1 and 2 below.

Table 2: Erith Roundabout 2018 Total Junction Movements (Vehicles)

AM Peak Period	Total Junction Movements	PM Peak Period	Total Junction Movements
06:00 - 07:00	2460	16:00 - 17:00	3407
06:15 - 07:15	2617	16:15 - 17:15	3485
06:30 - 07:30	2757	16:30 - 17:30	3655
06:45 - 07:45	2960	16:45 - 17:45	3689
07:00 - 08:00	3099	**17:00 - 18:00**	**3690**
07:15 - 08:15	3223	17:15 - 18:15	3648
07:30 - 08:30	3329	17:30 - 18:30	3479
07:45 - 08:45	3357	17:45 - 18:45	3334
08:00 - 09:00	**3360**	18:00 - 19:00	3258
08:15 - 09:15	3314		
08:30 - 09:30	3222		
08:45 - 09:45	3133		
09:00 - 10:00	3008		

Figure 1:Erith Roundabout 2018 AM Peak Period Flow Profile

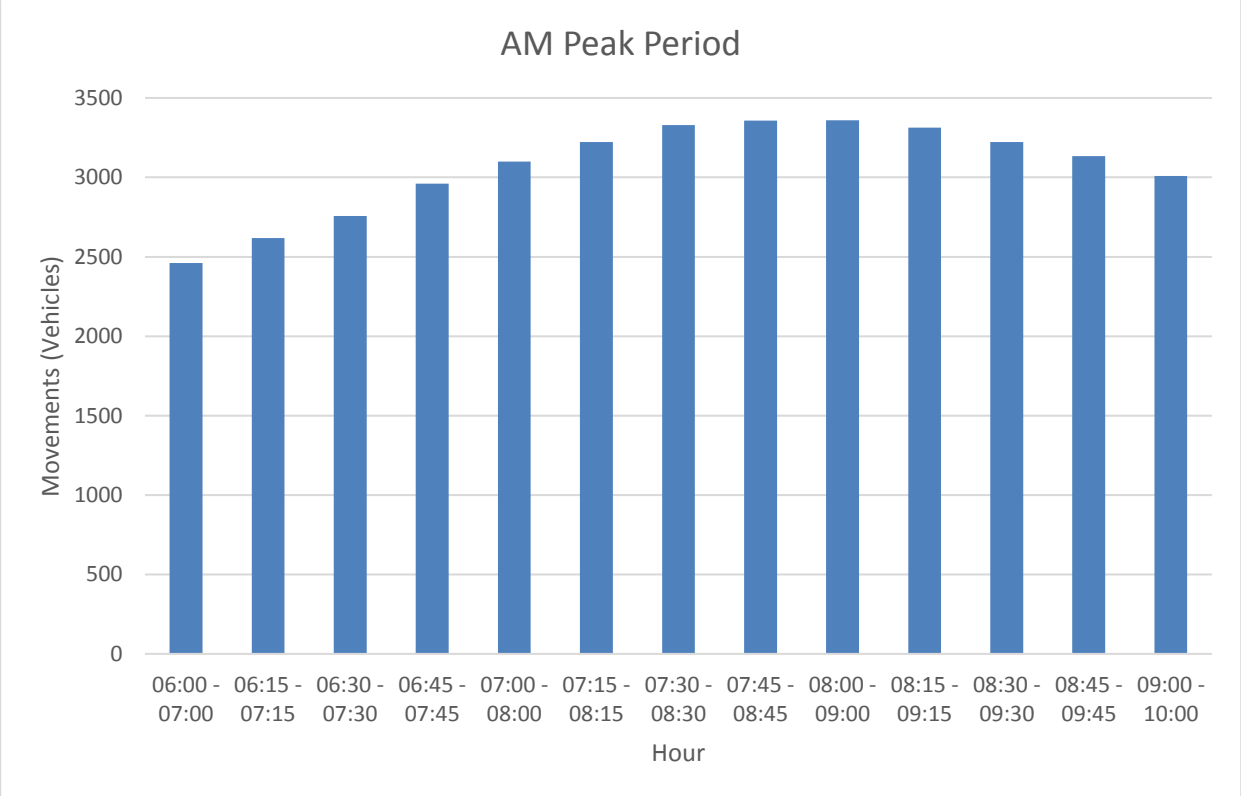
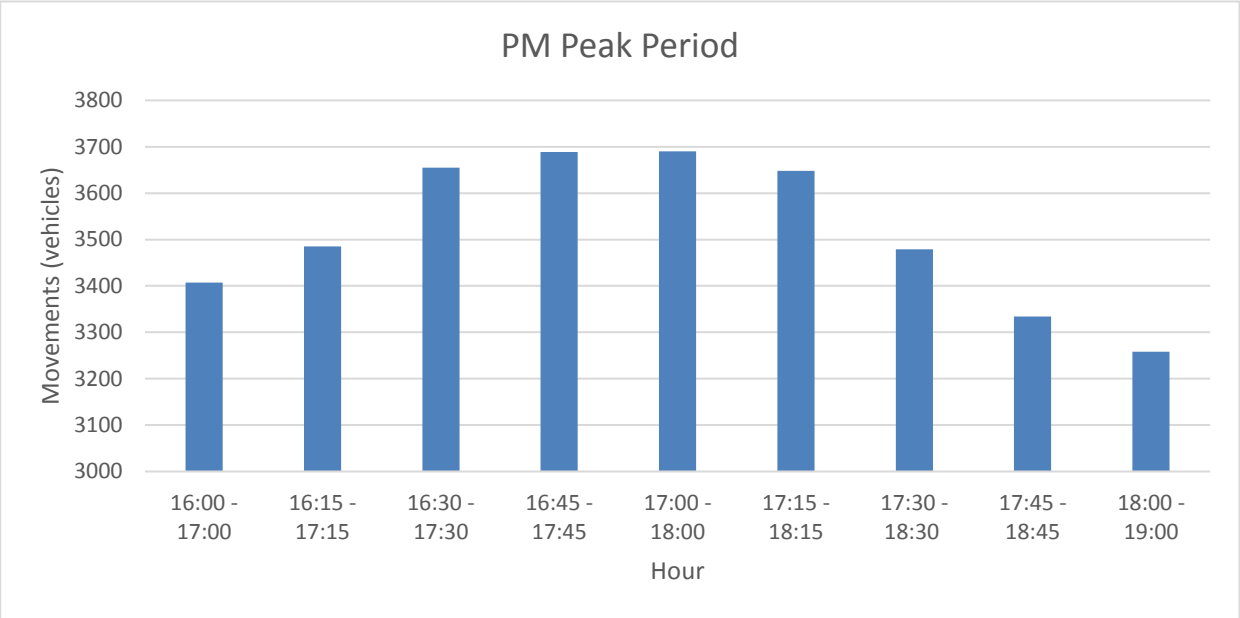


Figure 2:Erith Roundabout 2018 PM Peak Period Flow Profile



3.3. As indicated above, the observed AM and PM peak hours for Erith Roundabout are between 08:00-09:00 and 17:00-18:00 respectively. Overall, it is evident that the junction flows have a single peak in the AM and PM peak hours and flows are significantly lower prior to 08:00 and after 17:30.

3.4. The difference in flow between the AM peak hour of 08:00-09:00 and the 06:00-07:00 hour is 900 vehicles (26.8% reduction).

3.5. The difference in flow between the PM peak hour of 17:00-18:00 and the 18:00-19:00 hour is 432 vehicles (11.7% reduction).

A206 Queens Road/ James Watt Way

3.6. The hourly total junction flows, given in 15-minute increments, are shown in Table 3 (with the peak hour shown in bold) and the profile of the volume of traffic as it builds and diminishes is illustrated in Figures 3 and 4 below.

Table 3: A206 Queens Road/ James Watt Way 2018 Total Junction Movements (Vehicles)

AM Peak Period	Total Junction Movements	PM Peak Period	Total Junction Movements
06:00 - 07:00	2434	16:00 - 17:00	3305
06:15 - 07:15	2600	16:15 - 17:15	3275
06:30 - 07:30	2675	**16:30 - 17:30**	**3307**
06:45 - 07:45	2682	16:45 - 17:45	3248
07:00 - 08:00	2764	17:00 - 18:00	3215
07:15 - 08:15	2809	17:15 - 18:15	3154
07:30 - 08:30	**2859**	17:30 - 18:30	3022
07:45 - 08:45	2852	17:45 - 18:45	2935

AM Peak Period	Total Junction Movements	PM Peak Period	Total Junction Movements
08:00 - 09:00	2800	18:00 - 19:00	2888
08:15 - 09:15	2794		
08:30 - 09:30	2754		
08:45 - 09:45	2820		
09:00 - 10:00	2829		

Figure 3: A206 Queens Road/ James Watt Way 2018 AM Peak Period Flow Profile

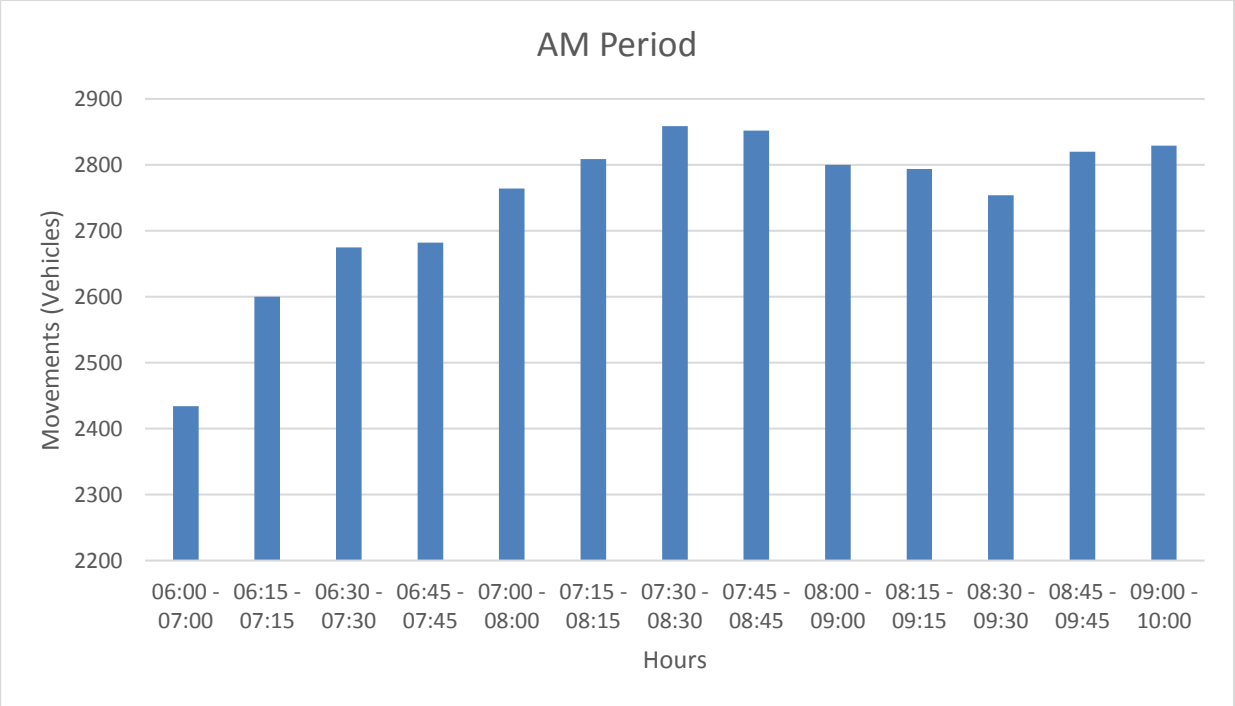
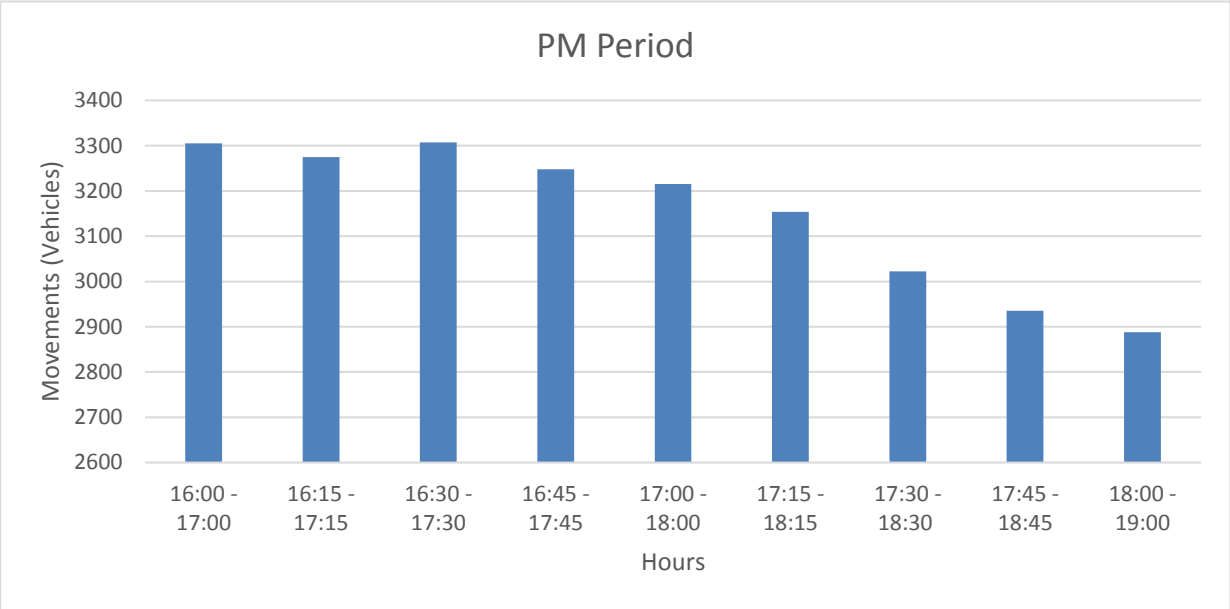


Figure 4: A206 Queens Road/ James Watt Way 2018 PM Peak Period Flow Profile



3.7. As indicated above, the observed AM and PM peak hours for A206 Queens Road/ James Watt Way are between 07:30-08:30 and 16:30-17:30 respectively. Similar to Erith Roundabout, the total junction flows increase significantly between the start of the survey at 06:00 to the AM peak hour and reduce significantly between the PM peak hour and 19:00 at the end of the survey period.

3.8. The difference in flow between the AM peak hour of 07:30-08:30 and 06:00-07:00 is 425 vehicles (a 14.9% reduction).

3.9. The difference in flow between the PM peak hour of 16:30-17:30 and 18:00-19:00 is 419 vehicles (a 12.7% reduction).

3.10. This section of the note provides observed information on the profile of traffic volumes during the peak hour periods at the junctions of A2016 Erith Roundabout and at the traffic signal junction of A206 James Watt Way. The information was collected in April and May 2018 to inform the development of **Chapter 6 Transport** of the **ES (6.1, Rev1)** and the **TA**, **Appendix B.1** of the **ES (6.3 APP-066)**. The data show that each junction has a peaked profile in both the morning and evening.

4. Construction Programme and Workforce

4.1. The indicative programme, described at **Section 3.5 Construction and Commissioning** of **Chapter 3 Project and Site Description (6.1, Rev1),** is used within **Chapter 6 Transport** of the **ES (6.1, Rev1)** and the **TA¸ Appendix B.1** of the **ES (6.3, APP-066)** to inform the conservative predictions of construction phase impact. That programme has been informed by the construction phase of the Riverside Resource Recovery Facility (RRRF) and the knowledge and experience of similar projects constructed in the UK and globally by the preferred Principal Contractor, HZI. The CTMP/CTMPs, to be developed and agreed in line with **Requirement 13** of **Schedule 2** of the **dDCO (3.1, Rev1)** will confirm the detailed programme and the tasks to be carried out during each period of works and the associated workforce projections. The anticipated transport impact mitigation processes and initiatives to be adopted to minimise the impact of induced transport and travel from the construction of REP and the Electrical Connection are illustrated through the updated Outline CTMP (Rev 1), as submitted at deadline 2, which supersedes the **Outline CTMP**, **Appendix L** of the **TA**, **Appendix B.1** of the **ES (6.3, APP-066)**. **Paragraph 3.5.5. Chapter 3 Project and Site Description (6.1, Rev1)** states that REP would be constructed over a 36-month programme with the cumulative peak of construction material movement and workforce numbers occurring at Month 13 of that programme.

4.2. Aligned with the indicative construction programme, the estimates of the REP construction workforce, including the associated Electrical Connection, are based on the global 'worst case' experience of HZI and in the UK that of the anticipated Electrical Connection contractor, UKPN.

4.3. The specific type and nature of this construction project depends upon the Principal Contractor employing an array of specialist contractors and sub-contractors; skilled and semi-skilled labour. Tasks within the programme for a project of this type and scale can require different teams of personnel, with some teams having only a short-term involvement in the project.

4.4. HZI advises that it envisages employing over 100 different types of trade, from accountants, administrators and agents to supervisors, surveyors and welders. It is estimated that there will be an average workforce of 837 FTEs during the construction phase (**ES Chapter 14 Socio-economics – 6.1, Rev1**) with a peak of 1,097. At the peak construction period it is anticipated that between 65% and 75% of the workforce will be labour with the remaining being management, design and administration staff.

4.5. In light of the anticipated workforce numbers, at the Applicant's request and having regard to TfL's RR, HZI has been asked to review the proposed Main Temporary Construction Compound, on Norman Road, with a view to determining the 'minimum' appropriate and practicable quantum of parking which could be accommodated on site whilst retaining sufficient space for complementary storage, welfare, circulation and operational space. Taking this, and the review of specific staff requirements, it is concluded that in the region of 275 vehicle parking spaces could be provided (significantly reduced from the previously assessed 552 spaces). Suitable access to the compound would be retained for construction vehicle movements for plant, materials and equipment deliveries. The Applicant is incentivised to minimise parking provision in the interests of finance and land requirements.

4.6. A reduced ceiling of 275 vehicle parking spaces equates to just over 30% of average workforce projection, reducing to 25% at the peak level. This reflects: the size and form of the proposed Main Temporary Construction Compound, as identified in the **Works Plans** (**2.2, Rev1**); the likely mix of trades and workforce during the construction peak period; and robust discussions between the Applicant and the Preferred Contractor.

4.7. It should be noted that the smaller 700,000 tonnes per annum North London Heat and Power Project (NLH&PP) provided at least 225 car and van parking spaces with an undefined number of additional spaces at a neighbouring compound, and 45 large vehicle parking spaces (shuttle buses and crew buses). The TA prepared for the **NLH&PP DCO (Application ref. EN010071, APP-030)** states that the projected peak workforce at NLH&PP was 550 workers. This gives a workforce parking provision of approximately 41% (excluding the unquantified additional parking spaces on the neighbouring compound). A significantly higher ratio of spaces to workers than is proposed for the construction of REP. REP is also a more complex project involving the integration of several different power relation technologies including ERF, anaerobic digestion, battery storage and solar.

4.8. An HZI ERF project in the North of England has provided in excess of 350 workforce parking spaces.

4.9. The commitment in this section of the note caps on-site workforce parking at 275 spaces and is informed by a pragmatic review of the proposed Main Temporary Construction Compounds and the experiences of the preferred Principal Contractor on similar projects. **Section 5** below sets out the measures to be taken to enable construction work travel to occur within the limit on car parking proposed.

5. Possible Mitigation Measures

5.1. The Main Temporary Construction Compound is judged to have a rating of PTAL1a/1b, with Picardy Manorway being PTAL2 and Belvedere Station PTAL3. With the opening of the Elizabeth Line to Abbey Wood, currently expected to be during 2020/21, connectivity in the immediate area and region will be significantly increased once opened. The Applicant would work with the Principal Contractor, key sub-contractors, London Borough of Bexley and TfL to explore opportunities to promote and facilitate commuting by environmentally friendly means. Progress in this matter would be captured in the agreed CTMP for the respective works.

5.2. Reflecting the level of accessibility to the compound and the likely working pattern of much of the workforce it is considered essential that an allowance for access by private car is made as REP is not in a city centre location and public transport would not be available or feasible for all employees.

5.3. The proposal to provide a maximum of 275 parking spaces is considered to be an appropriate quantum whilst continuing to expect a large proportion of the workforce to travel by public transport, walking or cycling.

5.4. The CTMP, secured through **Requirement 13** of **Schedule 2** of the **dDCO (3.1, Rev1)**, would include possible control measures to reduce peak period vehicle flows associated with the construction of REP in relation to the highway network performance. These initiatives, captured within the updated Outline CTMP (Rev 1), as submitted at deadline 2, which supersedes the **Outline CTMP**, **Appendix L** of the **TA**, **Appendix B.1** of the **ES (6.3, APP-066),** could comprise the following:

- Reduction in the car-driver mode share for the construction workers through measures such as a reduced car parking provision – phased to reflect the prevailing quantum and make-up of workforce;
- Minimising commuting movements during the AM and PM peak hours – by scheduling shifts and working hours to periods when network flows are lower and spreading arrivals and departures across a longer window;
- Allowing flexible working hours where appropriate within the defined working hours identified in **Requirement 12** of **Schedule 2** of the **dDCO (3.1, Rev1)** and the **Outline Code of Construction Practice (7.5, Rev1)**;
- reconfirming the profile of the number of personnel on-site during the peak construction process; and
- Pursuing and managing a robust Construction Worker Travel Plan with the applicable CTMP, agreed with the Local Highway Authority and, as appropriate, TfL.

5.5. Based on the significantly reduced level of parking provision, the construction peak hour traffic during Month 13 at Erith Roundabout and A206 Queens Road/ James Watt Way is as shown in Table 4. Here the total junction flows induced by REP have reduced significantly compared to the original total junction flows shown in Table 1 and repeated at Table 4. Appendix B, of this note, provides the network diagrams showing how the construction peak hour traffic is distributed.

Table 4:Revised Construction Peak Hour Traffic Flows (Vehicle movements)

Junction	Construction Worker	Construction Material	Electrical Connection Route	Total Movements	TA Total Movements
Erith Roundabout	129	4	10	**143**	270
A206 Queens Road/ James Watt Way	99	4	11	**114**	211

5.6. The capped on-site parking provision and the implementation of workforce travel plan initiatives, which are outlined within the updated Outline CTMP (Rev 1), as submitted at deadline 2, which supersedes the **Outline CTMP**, **Appendix L** of the **TA**, **Appendix B.1** of the **ES (6.3, APP-066)**, would result in a significant reduction in the number of vehicle movements associated with the construction phase of the REP site when compared to those movements assessed in **Chapter 6 Transport** of the **ES (6.1, Rev1)** and the **TA, Appendix B.1** of the **ES (6.3, APP-066)**.

6. Minimising vehicle movements during the AM and PM peak hours

6.1. The **TA, Appendix B.1** of the ES **(6.3, APP-066)** is based on the construction workers working between 08:00 – 18:00 on a single shift – as a reasonable worst case assessment to indicate the impact on the network if workers were all to arrive and depart around the network peak periods. This does not include those working on the construction of the Electrical Connection route.

6.2. Following discussions with HZI, and by reference to the construction hours provided in **Requirement 12** at **Schedule 2** to the **dDCO (3.1, Rev1)** and set out at **Section 3.2** of the **Code of Construction Practice (7.5, Rev1)**, the Applicant's contractor would adopt a construction working day of 07:00 to 19:00 (Monday to Friday) and 07:00-13:00 on Saturday for the main works, with other task teams perhaps operating different hours within that window. Furthermore, there are many other variables which could affect the movement profile and result in a broader peak arrival and departure profile with earlier arrivals in the morning and later departures in the evening. These include:

- Toolbox talks and briefings prior to the start of the construction working day;
- The need for changing into PPE before and after shifts;
- Some flexibility due to tasks and co-ordination with other workstream; and
- Occasional extended pours or other time critical operations.

6.3. Whilst the figures shown in Table 5 assume the workforce would arrive within a single hour period, it is highly improbable that this would be the case in practice. The arrival period would also be prior to the AM network peak period and after the PM peak and the robust assumption for the cumulative vehicle movements (i.e. base traffic plus REP) would be significantly below the level of the peak period.

6.4. The **TA, Appendix B.1** of the **ES (6.3, APP-066)**, has assessed a robust scenario for the construction period. Through the capped reduction in workforce travel by car or van and those workers commuting outside the network peak period, the impacts on the network are substantially reduced from those assessed in the **TA, Appendix B.1** of the **ES (6.3, APP-066).**

7. Residual Construction Phase Movements

7.1. The arrival and departure pattern for the construction workforce would be such that the majority of movements would occur outside the network peak period, significantly reducing the potential impact on the operation of the network. A robust assumption would be that all workers arrive between 06:00 and 07:00. The flow at that time would be as indicated in Table 5. The figures in Table 5 have been factored to include 2022 TEMPro[1] growth (Factors: 1.026 off peak & 1.0345 for the AM peak) and include the requisite Committed Development flows at that time period, as set out within the **Table 6.2 Committed Developments Assessed** of the **TA, Appendix B.1** of the **ES (6.3, APP-066)**.

7.2. Data have been collected for the PM period to 19:00 which show a reducing flow from around 18:00. That data does not cover the predicted workforce egress period, i.e. after 19:00.

Table 5:Revised 2022 AM Peak Period Traffic Movements (Vehicles)

	06:00-07:00			Peak hour Erith Rbt - 08:00-09:00 / James Watt Way -07:30-08:30			
Junction	2022 Base + Comm. Devel.	REP movements	Combined	2022 Base + Comm. Devel.	Difference	2018 Observed	Difference
Erith Roundabout	2525	143	2668	3889	**1221**	3360	**692**
A206 Queens Road/ James Watt Way	2498	114	2612	3300	**688**	2859	**247**

[1] TEMPro: Trip End Model Presentation Program (TEMPro) v7.2 – Government advised geographic specific forecasts for adjustments to trip ends.

7.3. In Table 5 it is assumed that all of the predicted workforce commuting occurs during 06:00-07:00. These flows are then added to the predicted base traffic for that hour and give combined flows of 2,668 and 2,612 for the Erith Roundabout and James Watt Way, respectively. Comparing those combined flows to the predicted peak hour base + committed development flows shows that the 06:00-07:00 combined flows would be 1,221 and 688 vehicles fewer than the peak hour flows. The current observed 2018 peak hour traffic is 692 and 247 vehicles greater at Erith Roundabout and James Watt Way, respectively, than the predicted 06:00-07:00 combined 2022 traffic flows.

7.4. Snapshots have been taken of the operation of these two junctions during periods of flow similar to the predicted 2022 06:00-07:00 traffic flows. For Bexley Road that magnitude of flow is represented by the hour between 06:30-07:30 (observed as 2,757 vehicles) and for James Watt Way by the hour 06:15-07:15 (observed as 2,600 vehicles).

7.5. The images, presented at Appendix C, indicate that the junctions are running below capacity without static queueing. Video files of the junction observations can be supplied, as required.

7.6. At Erith Roundabout, vehicles were observed to arrive in platoons from the traffic signals at James Watt Way. At that time those vehicles were able to flow through the roundabout with little hindrance and left the junction some seconds before the next platoon. The priority controlled nature of junctions to the north of Erith Roundabout meant that vehicle arrivals were more dispersed on the northern arm of the junction. The traffic load from the east out of Erith was relatively light. Traffic flow from the west on Bexley Road was moderate and intermittently interrupted by the pedestrian crossing immediately west of Erith Roundabout or the operation of the roundabout at Fraser Road (South Circular). Queues that formed on the entry to the roundabout due to the interruption in flow quickly dissipated. Exits from the junction were not blocked, with the exception of those occasions when the pedestrian crossing was called.

7.7. The traffic signals at James Watt Way were observed to operate with ample spare capacity. Traffic built on each arm whilst waiting for the next green light. That traffic was able to leave the junction unhindered as there was no congestion downstream of the junction. Traffic demand on the James Watt Way arm was light with only a few vehicles through in each stage.

7.8. The observations of the hours identified above show that the junctions would not be saturated at the predicted volume of traffic, including the REP workforce and construction traffic during morning arrivals.

7.9. Video evidence and traffic data are not available for the period after 19:00 but the trend in traffic volume for each junction prior to 19:00 indicates a downward trend, and so it can be confidently assumed that flow through the junctions would continue to decrease. Looking at the trend information it is estimated that base traffic + REP workforce traffic would be similar to the flow through the junctions in the period currently preceding 19:00. Video snapshots of that period are included at Appendix C and indicate that the junction is busy, but traffic continues to flow and the junctions operate without substantial queuing.

7.10. Automatic Traffic Counter data for a week in April 2018 have been reviewed for the northern end of Bronze Age Way. The data show a typical daily variation in traffic between the lowest and the highest observed flow for that hour period of 70-150 vehicles northbound (depending on the hour period considered) and a variation of approximately 25-60 vehicles southbound. The summary in Table 6 shows that the variation in flow is similar in magnitude to the peak prediction for REP construction traffic.

Table 6: AM Peak Period Daily Variation in Traffic Movements (Vehicles)- Bronze Age Way north

Time	Daily Variation		
	Northbound	Southbound	Two-way
06:00-07:00	100	57	157
06:15-07:15	121	35	156
06:30-07:30	128	51	179
06:45-07:45	152	48	200
07:00-08:00	148	44	192
07:15-08:15	105	38	143
07:30-08:30	94	43	137
07:45-08:45	72	25	97
08:00-09:00	82	53	135

7.11. **Sections 5** and **6** of this note establish that the vehicle movements associated with the construction phase of the REP site would be capped on-site for workforce car or van based travel and that those people would commute at periods outside the main network peaks. **Section 7** has shown that applying those movements to the network off peak, when the workforce would be expected to travel to the site, would result in a lesser volume of traffic than the current peak periods. The predicted traffic volumes including the REP construction workforce and materials vehicles are also lower than the projected increased traffic volumes (without REP construction traffic) in the 2022 forecast year.

7.12. Periods of traffic flow similar to that predicted for the workforce travel (as set out at paragraph 7.4) have been observed at the junctions of Erith Roundabout and James Watt Way, using the video captured for the traffic count data in April and May 2018. Those periods represent a similar operation of the junctions for the anticipated morning commuting volumes during the peak construction period at the REP site. That video evidence has shown that the junctions continue to operate with few delays or queues. Furthermore, those junctions experience daily variations in traffic volumes which could be equivalent to the projected increase in the REP site construction traffic.

7.13. Video evidence also suggests that those junctions are expected also to operate within theoretical capacity during the evening commuting period – which would be after the network peak period.

8. Summary and Conclusion of Impacts Due to REP Site Movements

8.1. The Applicant has committed to substantially reduce the number of parking spaces to be provided within the Main Temporary Construction Compound which will almost halve the number of workers commuting by car or van.

8.2. Through detailed consideration of the indicative construction period within **Section 3.5 Construction and Commissioning** of **Chapter 3 Project and Site Description (6.1, Rev1)** and analysis of the interaction of construction tasks during the peak working period the Principal Contractor and its sub-contractors will seek to profile their workforce numbers to minimise commuting travel on the peak periods of the local road network.

8.3. It is shown that predicted peak period construction-related vehicle movements would be substantially lower than the estimates presented in ES **Chapter 6 Transport (6.1, Rev1)** and the **TA, Appendix B.1** of the ES **(6.3, APP-066)**. Furthermore it has been shown that those lesser vehicle movements would be largely on the local network prior to the morning network peak period and after the evening network peak period. During those times the volume of traffic would be at levels similar to periods where the network currently operates without significant delays or queuing – i.e. within theoretical capacity and below the current or predicted peak volumes (excluding the REP site construction traffic).

8.4. It is proposed that the reduced on-site parking provision can be captured through the detailed CTMP for the associated works period (to be secured through **Requirement 13** of **Schedule 2** of the **dDCO (3.1, Rev1)**) and that the commitment to this is recognised within the Statement of Common Ground (SoCG) between TfL and the Applicant. This would seek to secure the reduction in parking numbers, from those set out in **Chapter 6 Transport** of the **ES (6.1, Rev1)** and the **TA, Appendix B.1** of the **ES (6.3, APP-066)**, and would allow TfL to agree the parking provision (and associated vehicle movements) as a consultee to the approval process for the CTMP. The construction phase assessment of transport impacts presented in **Chapter 6 Transport** of the **ES (6.1, Rev1)** and the **TA, Appendix B.1** of the ES **(6.3, APP-066)** is considered to remain robust.

8.5. The updated Outline CTMP (Rev 1), as submitted at deadline 2, which supersedes the **Outline CTMP**, **Appendix L** of the **TA**, **Appendix B.1** of the **ES (6.3, APP-066)** amends the on-site parking provision to refer to a maximum of 275 parking spaces.

8.6. The SoCG would confirm that the assessment of construction traffic impacts presented in ES **Chapter 6 Transport (6.1, Rev1)** and the **TA, Appendix B.1** of the ES **(6.3, APP-066)** are appropriate. It is proposed that this technical note would be appended to the SoCG and the following wording included in the body of the SoCG:

> *"TfL acknowledges the REP TA assessment in relation to the construction and decommissioning phase impacts for the REP site is appropriate and robust, further to the revised workforce travel impact information and the reduced on-site parking provision to a maximum of 275 spaces. That revised information is set out and appraised in the technical note TN009 Further Appraisal of Construction Traffic Impacts on A2016/A206 Corridor (Appendix A to this SoCG). This revision is confirmed through the updated Outline CTMP (Rev 1), as submitted at deadline 2, which supersedes the **Outline CTMP**, **Appendix L** of the **TA**, **Appendix B.1** of the **ES (6.3, APP-066),** and subsequently agreed within an appropriate Construction Traffic Management Plan to be agreed with LBB in consultation with TfL. TfL has no objection to the potential effects arising from the construction process for the REP.".*

9. Construction of the Electrical Connection

9.1. The route of the Electrical Connection is identified in the Application and shown on the **Works Plans** (**2.2, Rev1**). That corridor largely follows the line of the A2016/ A206 from Norman Road to Bob Dunn Way. Options were identified and included sections of roads through Erith (approximately parallel to the preferred corridor).

9.2. The Electrical Connection route has been selected and follows the A2016/A206 corridor. The interface between the construction of the Electrical Connection and the A2016/A206 corridor is considered in technical note reference TN013 "Traffic flows on A2016 Bronze Age Way and A206 Queens Road/Northend Road - Interface with Electrical Connection Construction Works", which complements this technical note as a response to the Relevant Representation of TfL.

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DOCUMENT ISSUE RECORD

Technical Note No	Rev	Date	Prepared	Checked	Reviewed (Discipline Lead)	Approved (Project Director)
42166/5501/TN009	-	14/05/2019	MMN	APN / Client	APN	DS

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TECHNICAL NOTE

Appendix A – Technical Note TN007 - Construction Phase Sensitivity Test

[Dated: 23 January 2019)

TECHNICAL NOTE

Job Name: Riverside Energy Park

Job No: 42166

Note No: TN007

Date: 23/01/2019

Prepared By: Morteza M.Nejad

Subject: **Construction Phase Sensitivity Test**

Introduction

This technical note provides a review of the maximum capacity of local junctions during the construction phase of the proposed development at Riverside Energy Park (REP).

At the pre-application meeting held on 9th October 2018, TfL officers requested that the maximum capacity of the three junctions on Picardy Manorway during the peak construction period in 2022 should be assessed in order to determine if the peak construction traffic, as set out in Section 4 of the REP Transport Assessment (TA), could be accommodated at the local junctions and to subsequently inform discussions on the effective operation of the network during the construction stages. The three local junctions assessed are as follows:

- Junciton 1 - A2016/ Clydesdale Way/ Yarnton Way roundabout (ARCADY)
- Junciton 2 - A2016/ Norman Road (LINSIG)
- Junciton 3 - A2016/ Anderson Way/ B253

Assumptions and Scenarios Tested

As set out in Section 4 of the REP TA, the construction phase traffic consists of construction material trips, construction worker trips and also trips associated with the construction of the Electrical Connection Route. The peak period of construction is expected to be in the year of 2022 which would be month 13 of the construction programme. This peak in construction related traffic is the period during which the greatest number of construction workers are expected to be required onsite.

It has been projected that approximately 1097 workers would be operating at the worksite at REP at the peak month 13. Of those workers, the current parking proposal allows for 552 parking spaces at the construction compound and has been used as an proxy for car based travel during that period. The construction peak is projected to be short-lived and would half in maginitude within 3 months either side of the peak month.

Table 1: Illustration of predicted construction wortkforce numbers per month

Month	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*	*12*	*13*	*14*	*15*
Personnel	0	0	49	50	143	147	156	202	205	377	556	989	1097	696	549
Parking	0	0	43	44	96	99	107	123	126	209	297	501	552	359	291
Month	*16*	*17*	*18*	*19*	*20*	*21*	*22*	*23*	*24*	*25*	*26*	*27*	*28*	*29*	*30*
Personnel	497	575	441	413	341	330	334	289	291	234	207	179	96	91	85
Parking	267	305	244	231	198	194	196	171	171	147	130	110	74	71	67
Month	*31*	*32*	*33*	*34*	*35*	*36*	*37*	*38*	*39*	*40*	*41*	*42*	*43*	*44*	*45*
Personnel	78	108	106	103	99	98	169	83	83	83	83	83	83	83	83
Parking	63	95	93	91	87	86	76	0	0	0	0	0	0	0	0

Construction workers are assumed to work between 08:00 – 18:00, with arrivals taking place between 07:00 – 08:00 and departures between 18:00 – 19:00. This is a worst case assumption as the arrival/ departure of workers and contractors are likely to be spread across a longer arrival and departure period.

There are many variables which would affect the movement profile including:

- Toolbox talks + briefings;
- changing/PPE in-out;
- flexibility due to tasks + co-ordination with other workstream; and
- extended pours etc

All other key assumptions have been set out in detail in Section 4 of the REP TA.

The following three time periods have been tested for the year of 2022 assuming that 100% of the construction workforce would arrive during the hour tested:

- 06:00 – 07:00
- 07:00 – 08:00
- 07:30 – 08:30

The traffic flows tested include background traffic growth and flows associated with committed developments, as set out in Section 6 of the REP TA.

Summary of Results

The three time periods stated above have been tested with 100% of the construction traffic. Additionally, for the 07:30-08:30 time period which has the highest level of background traffic, another test has been undertaken in which the construction traffic is proportionally increased until the junction operates above maximum capacity. A summary of the results have been shown in Table 1 below and full modelling outputs provided in Appendix A.

The construction programme would be developed during the lead into the start of construction and would be reflected in the Construction Traffic Management Plan (CTMP). The CTMP would reflect the refined predictions of workforce numbers and set out the measures that could be adopted to reduce further the percentage of the workforce commuting by car and reduce the number of cars using the network during peak times. The CTMP would allow for emerging changes to the local road network, which may include alterations to the A2016 / Bexley Road roundabout.

Table 2: Summary of Junction Modelling Results

Time	Junction 1 RFC		Junction 2 DOS		Junction 3 RFC	
	100% construction traffic	152% Construction Traffic	100% construction traffic	225% construction traffic	100% construction traffic	160% Construction Traffic
06:00-07:00	0.61	-	59.8%	-	0.69	-
07:00-08:00	0.78	-	75.2%	-	0.81	-
07:30-08:30	0.82	1.02	77.4%	103.6%	0.83	1.03

It is evident that all three junctions assessed operate with spare capacity with 100% of construction traffic flows during the peak period of construction. The tests show that the junctions reach maximum capacity during the 07:30 – 08:30 time period if the following levels of construction traffic were to be applied:

- Junciton 1: 152% of construction traffic – 870 PCUs
- Junciton 2: 225% of construction traffic – 2243 PCUs
- Junciton 3: 160% of construction traffic – 698 PCUs

Overall, it has been shown that the three junctions on Picardy Manorway are able to operate with no issues during the peak period of contruction in the year 2022.

TECHNICAL NOTE

Appendix A: Modelling Outputs

Junctions 9

ARCADY 9 - Roundabout Module

Filename: Junction 1_Failure Test_152.j9
Path: \\pba.int\cbh\Projects\42166 Riverside 2\Transport\5. Drawings & Models\Traffic Modelling\Failure Tests\AM Peak
Report generation date: 24/01/2019 11:11:43

»2022 DS AM - 100% Construction Traffic, 0600 - 0700
»2022 DS AM - 100% Construction Traffic, 0700 - 0800
»2022 DS AM - 100% Construction Traffic, 0730 - 0830
»2022 DS AM - 152% Construction Traffic, 0730 - 0830

Summary of junction performance

	0600 - 0700				0700 - 0800				0730 - 0830			
	Queue (PCU)	Delay (s)	RFC	LOS	Queue (PCU)	Delay (s)	RFC	LOS	Queue (PCU)	Delay (s)	RFC	LOS
	2022 DS AM - 100% Construction Traffic											
1 - A2016 Picardy Manorway	1.7	3.46	0.61	A	3.9	6.22	0.78	A	4.8	7.38	0.82	A
2 - Clydesdale Way	0.1	8.65	0.10	A	0.3	20.69	0.24	C	0.6	32.15	0.38	D
3 - Yarnton Way	0.3	2.62	0.19	A	0.4	3.51	0.28	A	0.6	3.77	0.34	A
4 - A2016 Eastern Way	0.8	3.57	0.41	A	1.2	4.53	0.53	A	1.6	5.47	0.59	A
	2022 DS AM - 152% Construction Traffic											
1 - A2016 Picardy Manorway									9.3	13.35	0.90	B
2 - Clydesdale Way									5.4	250.28	1.02	F
3 - Yarnton Way									0.7	4.68	0.39	A
4 - A2016 Eastern Way									2.6	8.25	0.70	A

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

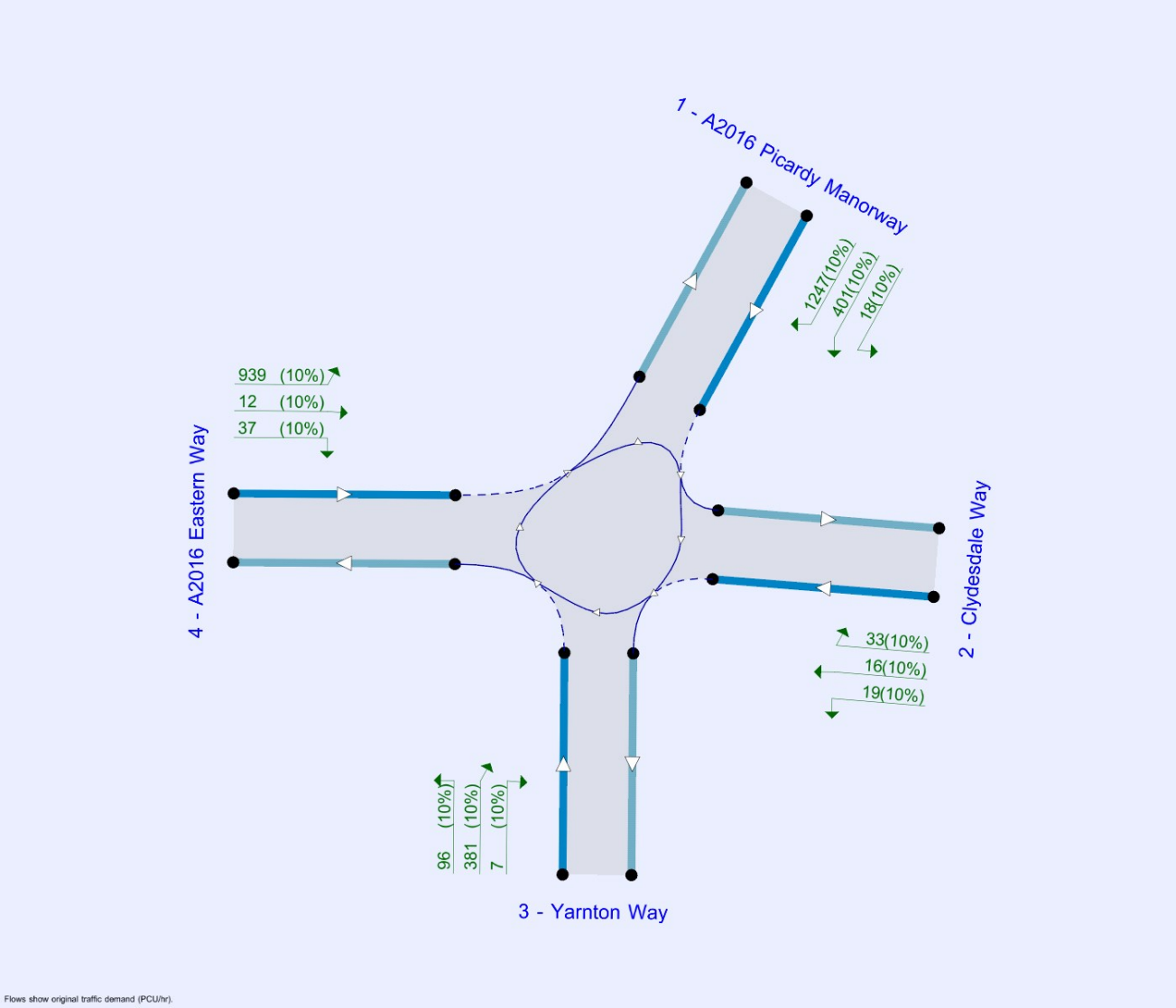
File summary

File Description

Title	Junction 1 - Senstivity Test
Location	Picardy Manorway/Eastern Way
Site number	
Date	09/07/2018
Version	
Status	(new file)
Identifier	
Client	
Jobnumber	
Enumerator	PBA\jtsmith
Description	

Units

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



The junction diagram reflects the last run of Junctions.

Analysis Options

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)
D2	2022 DS AM - 100% Construction Traffic	0600 - 0700	ONE HOUR	05:45	07:15	15
D5	2022 DS AM - 100% Construction Traffic	0700 - 0800	ONE HOUR	06:45	08:15	15
D8	2022 DS AM - 100% Construction Traffic	0730 - 0830	ONE HOUR	07:15	08:45	15
D9	2022 DS AM - 152% Construction Traffic	0730 - 0830	ONE HOUR	07:15	08:45	15

Analysis Set Details

ID	Network flow scaling factor (%)
A1	100.000

2022 DS AM - 100% Construction Traffic, 0600 - 0700

Data Errors and Warnings

No errors or warnings

Junction Network

Junctions

Junction	Name	Junction Type	Arm order	Junction Delay (s)	Junction LOS
1	Junction 1	Standard Roundabout	1, 2, 3, 4	3.48	A

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

Arms

Arms

Arm	Name	Description
1	A2016 Picardy Manorway	
2	Clydesdale Way	
3	Yarnton Way	
4	A2016 Eastern Way	

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 - A2016 Picardy Manorway	8.00	11.00	19.0	21.0	59.0	32.0	
2 - Clydesdale Way	4.30	6.00	3.7	10.5	59.0	29.0	
3 - Yarnton Way	10.60	10.60	0.0	23.0	59.0	21.0	
4 - A2016 Eastern Way	7.30	10.90	8.4	21.0	59.0	52.0	

Slope / Intercept / Capacity

Roundabout Slope and Intercept used in model

Arm	Final slope	Final intercept (PCU/hr)
1 - A2016 Picardy Manorway	0.791	3014
2 - Clydesdale Way	0.508	1450
3 - Yarnton Way	0.858	3333
4 - A2016 Eastern Way	0.678	2474

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)
D2	2022 DS AM - 100% Construction Traffic	0600 - 0700	ONE HOUR	05:45	07:15	15

Default vehicle mix	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 - A2016 Picardy Manorway		✓	1657	100.000
2 - Clydesdale Way		✓	47	100.000
3 - Yarnton Way		✓	321	100.000
4 - A2016 Eastern Way		✓	707	100.000

Origin-Destination Data

Demand (PCU/hr)

		To			
		1 - A2016 Picardy Manorway	2 - Clydesdale Way	3 - Yarnton Way	4 - A2016 Eastern Way
From	1 - A2016 Picardy Manorway	504	17	151	985
	2 - Clydesdale Way	27	0	7	13
	3 - Yarnton Way	246	4	5	66
	4 - A2016 Eastern Way	664	7	13	23

Vehicle Mix

Heavy Vehicle Percentages

		To			
		1 - A2016 Picardy Manorway	2 - Clydesdale Way	3 - Yarnton Way	4 - A2016 Eastern Way
From	1 - A2016 Picardy Manorway	10	10	10	10
	2 - Clydesdale Way	10	10	10	10
	3 - Yarnton Way	10	10	10	10
	4 - A2016 Eastern Way	10	10	10	10

Detailed Demand Data

Demand for each time segment

Time Segment	Arm	Demand (PCU/hr)	Demand in PCU (PCU/hr)
05:45-06:00	1 - A2016 Picardy Manorway	1247	1247
	2 - Clydesdale Way	35	35
	3 - Yarnton Way	242	242
	4 - A2016 Eastern Way	532	532
06:00-06:15	1 - A2016 Picardy Manorway	1490	1490
	2 - Clydesdale Way	42	42
	3 - Yarnton Way	289	289
	4 - A2016 Eastern Way	636	636
06:15-06:30	1 - A2016 Picardy Manorway	1824	1824
	2 - Clydesdale Way	52	52
	3 - Yarnton Way	353	353
	4 - A2016 Eastern Way	778	778
06:30-06:45	1 - A2016 Picardy Manorway	1824	1824
	2 - Clydesdale Way	52	52
	3 - Yarnton Way	353	353
	4 - A2016 Eastern Way	778	778
06:45-07:00	1 - A2016 Picardy Manorway	1490	1490
	2 - Clydesdale Way	42	42
	3 - Yarnton Way	289	289
	4 - A2016 Eastern Way	636	636
07:00-07:15	1 - A2016 Picardy Manorway	1247	1247
	2 - Clydesdale Way	35	35
	3 - Yarnton Way	242	242
	4 - A2016 Eastern Way	532	532

Results

Results Summary for whole modelled period

Arm	Max RFC	Max delay (s)	Max Queue (PCU)	Max LOS
1 - A2016 Picardy Manorway	0.61	3.46	1.7	A
2 - Clydesdale Way	0.10	8.65	0.1	A
3 - Yarnton Way	0.19	2.62	0.3	A
4 - A2016 Eastern Way	0.41	3.57	0.8	A

Main Results for each time segment

05:45 - 06:00

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
1 - A2016 Picardy Manorway	1247	39	2983	0.418	1244	0.8	2.274	A
2 - Clydesdale Way	35	1262	808	0.044	35	0.1	5.119	A
3 - Yarnton Way	242	1165	2332	0.104	241	0.1	1.893	A
4 - A2016 Eastern Way	532	590	2074	0.257	531	0.4	2.564	A

06:00 - 06:15

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
1 - A2016 Picardy Manorway	1490	47	2977	0.500	1488	1.1	2.657	A
2 - Clydesdale Way	42	1510	683	0.062	42	0.1	6.182	A
3 - Yarnton Way	289	1394	2136	0.135	288	0.2	2.143	A
4 - A2016 Eastern Way	636	706	1995	0.319	635	0.5	2.909	A

06:15 - 06:30

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
1 - A2016 Picardy Manorway	1824	57	2969	0.615	1822	1.7	3.446	A
2 - Clydesdale Way	52	1848	511	0.101	52	0.1	8.618	A
3 - Yarnton Way	353	1706	1868	0.189	353	0.3	2.613	A
4 - A2016 Eastern Way	778	864	1888	0.412	777	0.8	3.563	A

06:30 - 06:45

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
1 - A2016 Picardy Manorway	1824	57	2969	0.615	1824	1.7	3.460	A
2 - Clydesdale Way	52	1851	510	0.102	52	0.1	8.649	A
3 - Yarnton Way	353	1709	1866	0.189	353	0.3	2.617	A
4 - A2016 Eastern Way	778	865	1887	0.413	778	0.8	3.571	A

06:45 - 07:00

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
1 - A2016 Picardy Manorway	1490	47	2977	0.500	1492	1.1	2.673	A
2 - Clydesdale Way	42	1514	681	0.062	42	0.1	6.205	A
3 - Yarnton Way	289	1398	2133	0.135	289	0.2	2.149	A
4 - A2016 Eastern Way	636	708	1994	0.319	637	0.5	2.921	A

07:00 - 07:15

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
1 - A2016 Picardy Manorway	1247	39	2983	0.418	1249	0.8	2.286	A
2 - Clydesdale Way	35	1267	806	0.044	35	0.1	5.139	A
3 - Yarnton Way	242	1170	2329	0.104	242	0.1	1.899	A
4 - A2016 Eastern Way	532	592	2072	0.257	533	0.4	2.572	A

2022 DS AM - 100% Construction Traffic, 0700 - 0800

Data Errors and Warnings

No errors or warnings

Junction Network

Junctions

Junction	Name	Junction Type	Arm order	Junction Delay (s)	Junction LOS
1	Junction 1	Standard Roundabout	1, 2, 3, 4	5.69	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)
D5	2022 DS AM - 100% Construction Traffic	0700 - 0800	ONE HOUR	06:45	08:15	15

Default vehicle mix	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 - A2016 Picardy Manorway		✓	2082	100.000
2 - Clydesdale Way		✓	54	100.000
3 - Yarnton Way		✓	405	100.000
4 - A2016 Eastern Way		✓	884	100.000

Origin-Destination Data

Demand (PCU/hr)

		To			
		1 - A2016 Picardy Manorway	2 - Clydesdale Way	3 - Yarnton Way	4 - A2016 Eastern Way
From	1 - A2016 Picardy Manorway	500	18	292	1272
	2 - Clydesdale Way	22	0	13	19
	3 - Yarnton Way	303	6	7	89
	4 - A2016 Eastern Way	799	12	26	47

Vehicle Mix

Heavy Vehicle Percentages

		To			
		1 - A2016 Picardy Manorway	2 - Clydesdale Way	3 - Yarnton Way	4 - A2016 Eastern Way
From	1 - A2016 Picardy Manorway	10	10	10	10
	2 - Clydesdale Way	10	10	10	10
	3 - Yarnton Way	10	10	10	10
	4 - A2016 Eastern Way	10	10	10	10

Detailed Demand Data

Demand for each time segment

Time Segment	Arm	Demand (PCU/hr)	Demand in PCU (PCU/hr)
06:45-07:00	1 - A2016 Picardy Manorway	1567	1567
	2 - Clydesdale Way	41	41
	3 - Yarnton Way	305	305
	4 - A2016 Eastern Way	666	666
07:00-07:15	1 - A2016 Picardy Manorway	1872	1872
	2 - Clydesdale Way	49	49
	3 - Yarnton Way	364	364
	4 - A2016 Eastern Way	795	795
07:15-07:30	1 - A2016 Picardy Manorway	2292	2292
	2 - Clydesdale Way	59	59
	3 - Yarnton Way	446	446
	4 - A2016 Eastern Way	973	973
07:30-07:45	1 - A2016 Picardy Manorway	2292	2292
	2 - Clydesdale Way	59	59
	3 - Yarnton Way	446	446
	4 - A2016 Eastern Way	973	973
07:45-08:00	1 - A2016 Picardy Manorway	1872	1872
	2 - Clydesdale Way	49	49
	3 - Yarnton Way	364	364
	4 - A2016 Eastern Way	795	795
08:00-08:15	1 - A2016 Picardy Manorway	1567	1567
	2 - Clydesdale Way	41	41
	3 - Yarnton Way	305	305
	4 - A2016 Eastern Way	666	666

Results

Results Summary for whole modelled period

Arm	Max RFC	Max delay (s)	Max Queue (PCU)	Max LOS
1 - A2016 Picardy Manorway	0.78	6.22	3.9	A
2 - Clydesdale Way	0.24	20.69	0.3	C
3 - Yarnton Way	0.28	3.51	0.4	A
4 - A2016 Eastern Way	0.53	4.53	1.2	A

Main Results for each time segment

06:45 - 07:00

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
1 - A2016 Picardy Manorway	1567	74	2956	0.530	1563	1.2	2.834	A
2 - Clydesdale Way	41	1609	632	0.064	40	0.1	6.686	A
3 - Yarnton Way	305	1396	2135	0.143	304	0.2	2.162	A
4 - A2016 Eastern Way	666	629	2047	0.325	663	0.5	2.858	A

07:00 - 07:15

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
1 - A2016 Picardy Manorway	1872	88	2944	0.636	1869	1.9	3.673	A
2 - Clydesdale Way	49	1925	472	0.103	48	0.1	9.343	A
3 - Yarnton Way	364	1670	1900	0.192	364	0.3	2.578	A
4 - A2016 Eastern Way	795	752	1964	0.405	794	0.7	3.384	A

07:15 - 07:30

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
1 - A2016 Picardy Manorway	2292	108	2929	0.783	2285	3.8	6.073	A
2 - Clydesdale Way	59	2353	255	0.234	59	0.3	20.132	C
3 - Yarnton Way	446	2041	1581	0.282	445	0.4	3.484	A
4 - A2016 Eastern Way	973	920	1850	0.526	971	1.2	4.499	A

07:30 - 07:45

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
1 - A2016 Picardy Manorway	2292	108	2929	0.783	2292	3.9	6.216	A
2 - Clydesdale Way	59	2360	251	0.237	59	0.3	20.695	C
3 - Yarnton Way	446	2048	1575	0.283	446	0.4	3.506	A
4 - A2016 Eastern Way	973	923	1848	0.527	973	1.2	4.525	A

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)	LOS
1 - A2016 Picardy Manorway	1872	88	2944	0.636	1880	1.9	3.748	A
2 - Clydesdale Way	49	1935	467	0.104	49	0.1	9.509	A
3 - Yarnton Way	364	1680	1891	0.193	365	0.3	2.595	A
4 - A2016 Eastern Way	795	756	1961	0.405	797	0.8	3.407	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)	LOS
1 - A2016 Picardy Manorway	1567	74	2955	0.530	1570	1.3	2.865	A
2 - Clydesdale Way	41	1617	628	0.065	41	0.1	6.744	A
3 - Yarnton Way	305	1403	2129	0.143	305	0.2	2.171	A
4 - A2016 Eastern Way	666	632	2045	0.325	666	0.5	2.875	A

2022 DS AM - 100% Construction Traffic, 0730 - 0830

Data Errors and Warnings

No errors or warnings

Junction Network

Junctions

Junction	Name	Junction Type	Arm order	Junction Delay (s)	Junction LOS
1	Junction 1	Standard Roundabout	1, 2, 3, 4	6.85	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)
D8	2022 DS AM - 100% Construction Traffic	0730 - 0830	ONE HOUR	07:15	08:45	15

Default vehicle mix	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 - A2016 Picardy Manorway		✓	2159	100.000
2 - Clydesdale Way		✓	68	100.000
3 - Yarnton Way		✓	501	100.000
4 - A2016 Eastern Way		✓	956	100.000

Origin-Destination Data

Demand (PCU/hr)

		To			
		1 - A2016 Picardy Manorway	2 - Clydesdale Way	3 - Yarnton Way	4 - A2016 Eastern Way
From	1 - A2016 Picardy Manorway	497	18	401	1243
	2 - Clydesdale Way	33	0	19	16
	3 - Yarnton Way	381	7	17	96
	4 - A2016 Eastern Way	863	12	37	44

Vehicle Mix

Heavy Vehicle Percentages

		To			
		1 - A2016 Picardy Manorway	2 - Clydesdale Way	3 - Yarnton Way	4 - A2016 Eastern Way
From	1 - A2016 Picardy Manorway	10	10	10	10
	2 - Clydesdale Way	10	10	10	10
	3 - Yarnton Way	10	10	10	10
	4 - A2016 Eastern Way	10	10	10	10

Detailed Demand Data

Demand for each time segment

Time Segment	Arm	Demand (PCU/hr)	Demand in PCU (PCU/hr)
07:15-07:30	1 - A2016 Picardy Manorway	1625	1625
	2 - Clydesdale Way	51	51
	3 - Yarnton Way	377	377
	4 - A2016 Eastern Way	720	720
07:30-07:45	1 - A2016 Picardy Manorway	1941	1941
	2 - Clydesdale Way	61	61
	3 - Yarnton Way	450	450
	4 - A2016 Eastern Way	859	859
07:45-08:00	1 - A2016 Picardy Manorway	2377	2377
	2 - Clydesdale Way	75	75
	3 - Yarnton Way	552	552
	4 - A2016 Eastern Way	1053	1053
08:00-08:15	1 - A2016 Picardy Manorway	2377	2377
	2 - Clydesdale Way	75	75
	3 - Yarnton Way	552	552
	4 - A2016 Eastern Way	1053	1053
08:15-08:30	1 - A2016 Picardy Manorway	1941	1941
	2 - Clydesdale Way	61	61
	3 - Yarnton Way	450	450
	4 - A2016 Eastern Way	859	859
08:30-08:45	1 - A2016 Picardy Manorway	1625	1625
	2 - Clydesdale Way	51	51
	3 - Yarnton Way	377	377
	4 - A2016 Eastern Way	720	720

Results

Results Summary for whole modelled period

Arm	Max RFC	Max delay (s)	Max Queue (PCU)	Max LOS
1 - A2016 Picardy Manorway	0.82	7.38	4.8	A
2 - Clydesdale Way	0.38	32.15	0.6	D
3 - Yarnton Way	0.34	3.77	0.6	A
4 - A2016 Eastern Way	0.59	5.47	1.6	A

Main Results for each time segment

07:15 - 07:30

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
1 - A2016 Picardy Manorway	1625	88	2944	0.552	1620	1.3	2.978	A
2 - Clydesdale Way	51	1680	596	0.086	51	0.1	7.255	A
3 - Yarnton Way	377	1375	2152	0.175	376	0.2	2.228	A
4 - A2016 Eastern Way	720	702	1998	0.360	717	0.6	3.087	A

07:30 - 07:45

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
1 - A2016 Picardy Manorway	1941	105	2931	0.662	1938	2.1	3.975	A
2 - Clydesdale Way	61	2010	429	0.143	61	0.2	10.750	B
3 - Yarnton Way	450	1645	1921	0.234	450	0.3	2.692	A
4 - A2016 Eastern Way	859	839	1905	0.451	858	0.9	3.781	A

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)	LOS
1 - A2016 Picardy Manorway	2377	129	2912	0.816	2367	4.7	7.130	A
2 - Clydesdale Way	75	2455	203	0.369	73	0.6	30.182	D
3 - Yarnton Way	552	2009	1609	0.343	551	0.6	3.739	A
4 - A2016 Eastern Way	1053	1026	1778	0.592	1050	1.6	5.417	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)	LOS
1 - A2016 Picardy Manorway	2377	129	2912	0.816	2377	4.8	7.382	A
2 - Clydesdale Way	75	2465	198	0.379	75	0.6	32.147	D
3 - Yarnton Way	552	2018	1601	0.345	552	0.6	3.773	A
4 - A2016 Eastern Way	1053	1029	1776	0.593	1053	1.6	5.474	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)	LOS
1 - A2016 Picardy Manorway	1941	105	2930	0.662	1951	2.2	4.086	A
2 - Clydesdale Way	61	2023	422	0.145	63	0.2	11.089	B
3 - Yarnton Way	450	1658	1910	0.236	451	0.3	2.718	A
4 - A2016 Eastern Way	859	845	1901	0.452	862	0.9	3.820	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)	LOS
1 - A2016 Picardy Manorway	1625	88	2944	0.552	1629	1.4	3.017	A
2 - Clydesdale Way	51	1689	592	0.087	52	0.1	7.333	A
3 - Yarnton Way	377	1383	2146	0.176	378	0.2	2.241	A
4 - A2016 Eastern Way	720	705	1996	0.361	721	0.6	3.108	A

2022 DS AM - 152% Construction Traffic, 0730 - 0830

Data Errors and Warnings

No errors or warnings

Junction Network

Junctions

Junction	Name	Junction Type	Arm order	Junction Delay (s)	Junction LOS
1	Junction 1	Standard Roundabout	1, 2, 3, 4	14.98	B

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)
D9	2022 DS AM - 152% Construction Traffic	0730 - 0830	ONE HOUR	07:15	08:45	15

Default vehicle mix	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 - A2016 Picardy Manorway		✓	2382	100.000
2 - Clydesdale Way		✓	68	100.000
3 - Yarnton Way		✓	501	100.000
4 - A2016 Eastern Way		✓	1032	100.000

Origin-Destination Data

Demand (PCU/hr)

		To			
		1 - A2016 Picardy Manorway	2 - Clydesdale Way	3 - Yarnton Way	4 - A2016 Eastern Way
From	1 - A2016 Picardy Manorway	716	18	401	1247
	2 - Clydesdale Way	33	0	19	16
	3 - Yarnton Way	381	7	17	96
	4 - A2016 Eastern Way	939	12	37	44

Vehicle Mix

Heavy Vehicle Percentages

		To			
		1 - A2016 Picardy Manorway	2 - Clydesdale Way	3 - Yarnton Way	4 - A2016 Eastern Way
From	1 - A2016 Picardy Manorway	10	10	10	10
	2 - Clydesdale Way	10	10	10	10
	3 - Yarnton Way	10	10	10	10
	4 - A2016 Eastern Way	10	10	10	10

Detailed Demand Data

Demand for each time segment

Time Segment	Arm	Demand (PCU/hr)	Demand in PCU (PCU/hr)
07:15-07:30	1 - A2016 Picardy Manorway	1793	1793
	2 - Clydesdale Way	51	51
	3 - Yarnton Way	377	377
	4 - A2016 Eastern Way	777	777
07:30-07:45	1 - A2016 Picardy Manorway	2141	2141
	2 - Clydesdale Way	61	61
	3 - Yarnton Way	450	450
	4 - A2016 Eastern Way	928	928
07:45-08:00	1 - A2016 Picardy Manorway	2623	2623
	2 - Clydesdale Way	75	75
	3 - Yarnton Way	552	552
	4 - A2016 Eastern Way	1136	1136
08:00-08:15	1 - A2016 Picardy Manorway	2623	2623
	2 - Clydesdale Way	75	75
	3 - Yarnton Way	552	552
	4 - A2016 Eastern Way	1136	1136
08:15-08:30	1 - A2016 Picardy Manorway	2141	2141
	2 - Clydesdale Way	61	61
	3 - Yarnton Way	450	450
	4 - A2016 Eastern Way	928	928
08:30-08:45	1 - A2016 Picardy Manorway	1793	1793
	2 - Clydesdale Way	51	51
	3 - Yarnton Way	377	377
	4 - A2016 Eastern Way	777	777

Results

Results Summary for whole modelled period

Arm	Max RFC	Max delay (s)	Max Queue (PCU)	Max LOS
1 - A2016 Picardy Manorway	0.90	13.35	9.3	B
2 - Clydesdale Way	1.02	250.28	5.4	F
3 - Yarnton Way	0.39	4.68	0.7	A
4 - A2016 Eastern Way	0.70	8.25	2.6	A

Main Results for each time segment

07:15 - 07:30

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
1 - A2016 Picardy Manorway	1793	88	2944	0.609	1787	1.7	3.401	A
2 - Clydesdale Way	51	1847	512	0.100	51	0.1	8.581	A
3 - Yarnton Way	377	1542	2009	0.188	376	0.3	2.423	A
4 - A2016 Eastern Way	777	866	1887	0.412	774	0.8	3.550	A

07:30 - 07:45

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
1 - A2016 Picardy Manorway	2141	105	2931	0.731	2136	2.9	4.954	A
2 - Clydesdale Way	61	2208	328	0.186	61	0.2	14.785	B
3 - Yarnton Way	450	1844	1750	0.257	450	0.4	3.046	A
4 - A2016 Eastern Way	928	1035	1772	0.524	926	1.2	4.673	A

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)	LOS
1 - A2016 Picardy Manorway	2623	128	2912	0.901	2599	8.8	11.847	B
2 - Clydesdale Way	75	2687	85	0.883	63	3.1	147.421	F
3 - Yarnton Way	552	2236	1414	0.390	550	0.7	4.581	A
4 - A2016 Eastern Way	1136	1257	1621	0.701	1131	2.5	7.992	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)	LOS
1 - A2016 Picardy Manorway	2623	129	2912	0.901	2621	9.3	13.347	B
2 - Clydesdale Way	75	2709	74	1.015	66	5.4	250.275	F
3 - Yarnton Way	552	2255	1397	0.395	552	0.7	4.684	A
4 - A2016 Eastern Way	1136	1265	1616	0.703	1136	2.6	8.247	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)	LOS
1 - A2016 Picardy Manorway	2141	106	2930	0.731	2166	3.0	5.347	A
2 - Clydesdale Way	61	2239	313	0.196	82	0.3	18.674	C
3 - Yarnton Way	450	1884	1716	0.263	452	0.4	3.135	A
4 - A2016 Eastern Way	928	1056	1758	0.528	933	1.2	4.831	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)	LOS
1 - A2016 Picardy Manorway	1793	88	2944	0.609	1799	1.7	3.471	A
2 - Clydesdale Way	51	1859	505	0.101	52	0.1	8.740	A
3 - Yarnton Way	377	1553	2000	0.189	378	0.3	2.441	A
4 - A2016 Eastern Way	777	871	1883	0.413	779	0.8	3.591	A

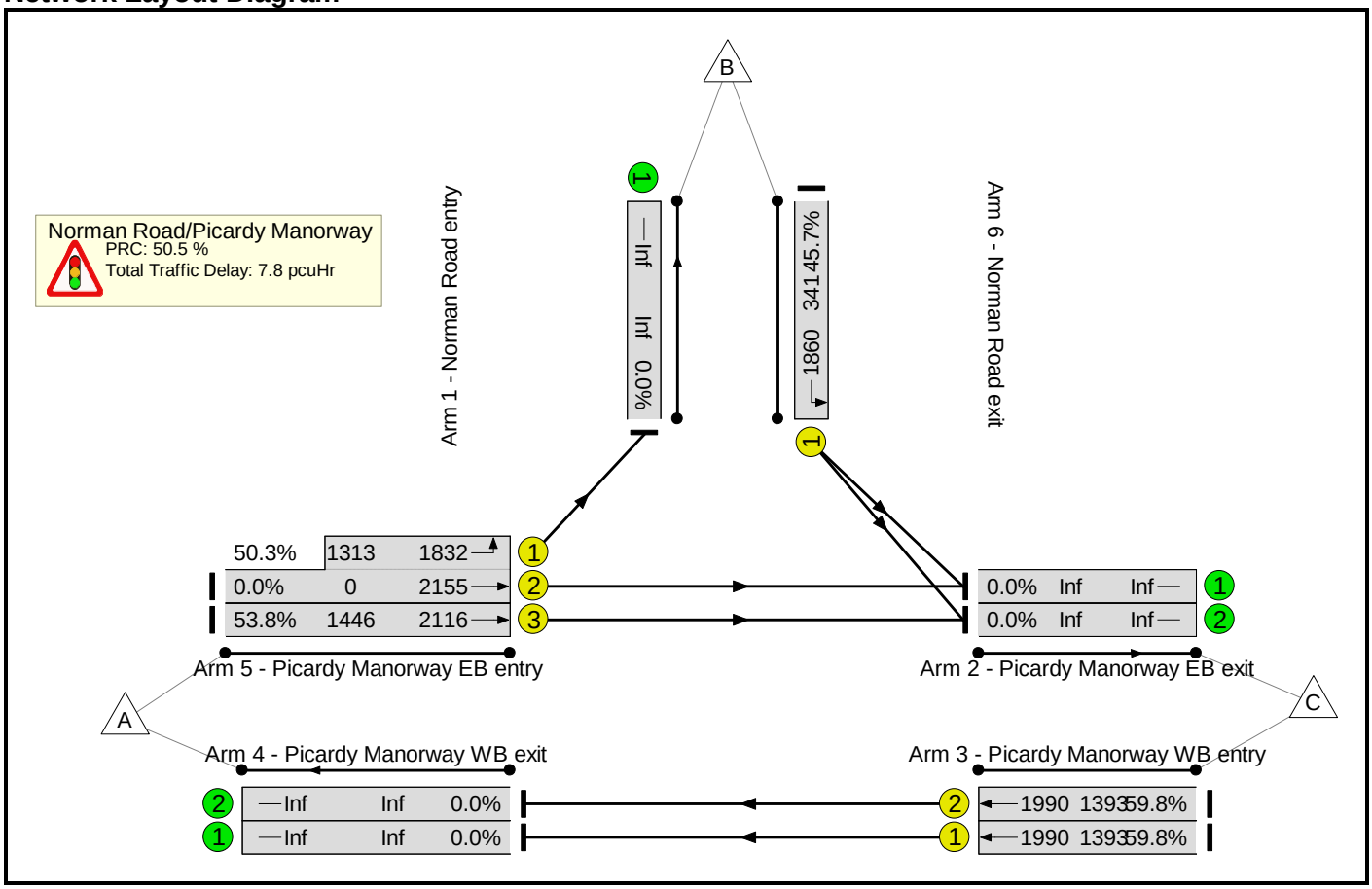
Basic Results Summary

User and Project Details

Project:	**Riverside Energy Park**
Title:	
Location:	
File name:	Junction 2_Failure Test_225.lsg3x
Author:	jdymock
Company:	PBA
Address:	
Notes:	Sensitivity Test

Scenario 1: '2022 DS AM (100% Rd) - 0600-0700' (FG2: '2022 DS AM (100% Rd)', Plan 1: 'Network Control Plan 1')

Network Layout Diagram



Basic Results Summary

Network Results

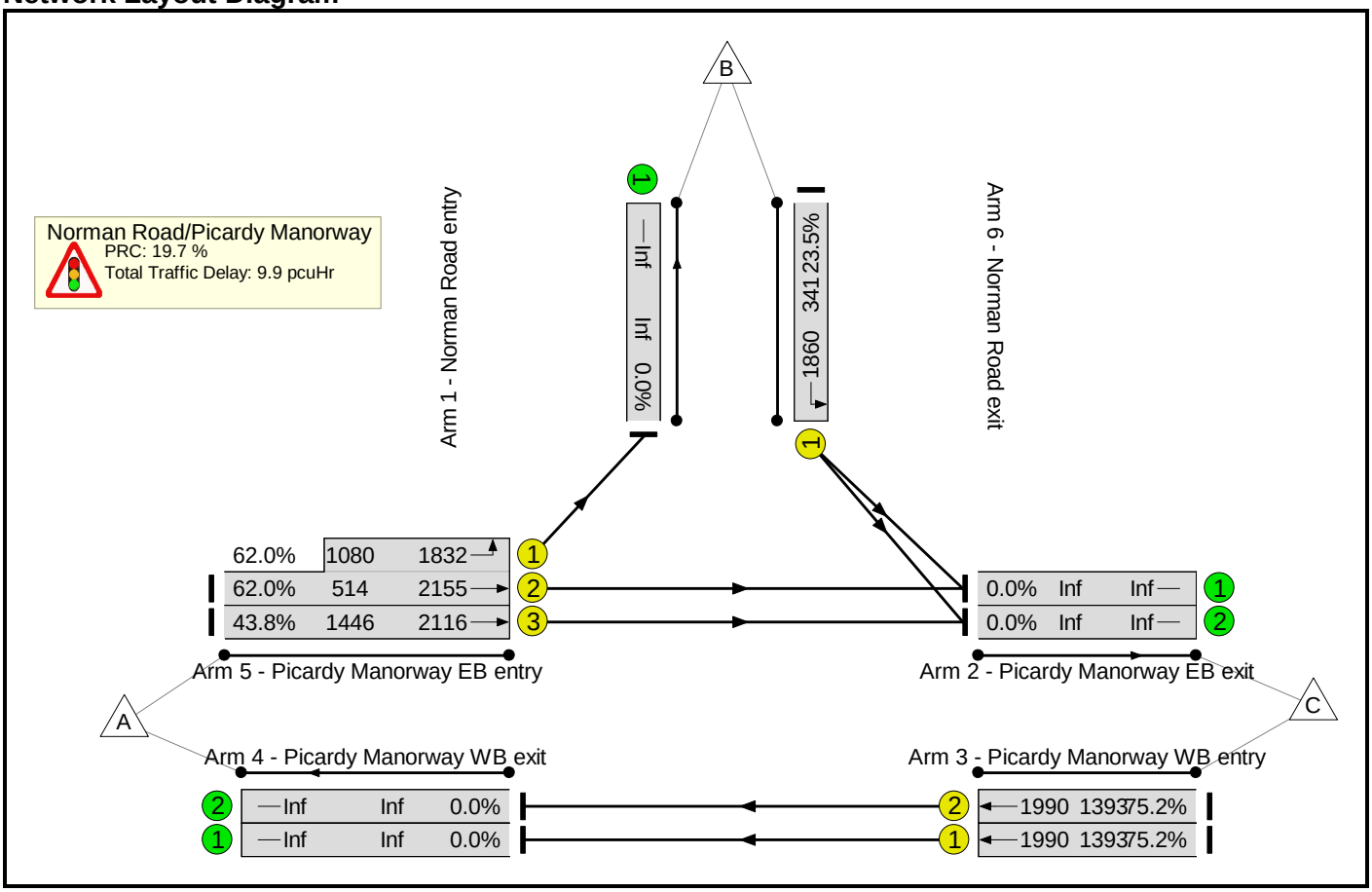
Item	Lane Description	Lane Type	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)	Mean Max Queue (pcu)
Network	-	-	-		-	-	-	-	-	-	**59.8%**	**0**	**0**	**0**	**7.8**	-	-
Norman Road/Picardy Manorway	-	-	-		-	-	-	-	-	-	**59.8%**	**0**	**0**	**0**	**7.8**	-	-
1/1	Norman Road entry Left	U	B		1	10	-	156	1860	341	45.7%	-	-	-	1.4	31.5	2.7
3/1	Picardy Manorway WB entry Ahead	U	G		1	41	-	833	1990	1393	59.8%	-	-	-	1.8	7.9	7.7
3/2	Picardy Manorway WB entry Ahead	U	G		1	41	-	833	1990	1393	59.8%	-	-	-	1.8	7.9	7.7
5/2+5/1	Picardy Manorway EB entry Ahead Left	U	A E		1	40:42	-	661	2155:1832	0+1313	0.0 : 50.3%	-	-	-	1.2	6.5	5.3
5/3	Picardy Manorway EB entry Ahead	U	A		1	40	-	778	2116	1446	53.8%	-	-	-	1.6	7.4	7.1

C1	Stream: 1 PRC for Signalled Lanes (%):	67.3	Total Delay for Signalled Lanes (pcuHr):	4.18	Cycle Time (s):	60
C1	Stream: 2 PRC for Signalled Lanes (%):	0.0	Total Delay for Signalled Lanes (pcuHr):	0.00	Cycle Time (s):	60
C1	Stream: 3 PRC for Signalled Lanes (%):	50.5	Total Delay for Signalled Lanes (pcuHr):	3.63	Cycle Time (s):	60
	PRC Over All Lanes (%):	50.5	Total Delay Over All Lanes(pcuHr):	7.81		

Basic Results Summary

Scenario 2: '2022 DS AM (100% Rd) - 0700-0800' (FG5: '2022 DS AM (100% Rd)', Plan 1: 'Network Control Plan 1')

Network Layout Diagram



Basic Results Summary

Network Results

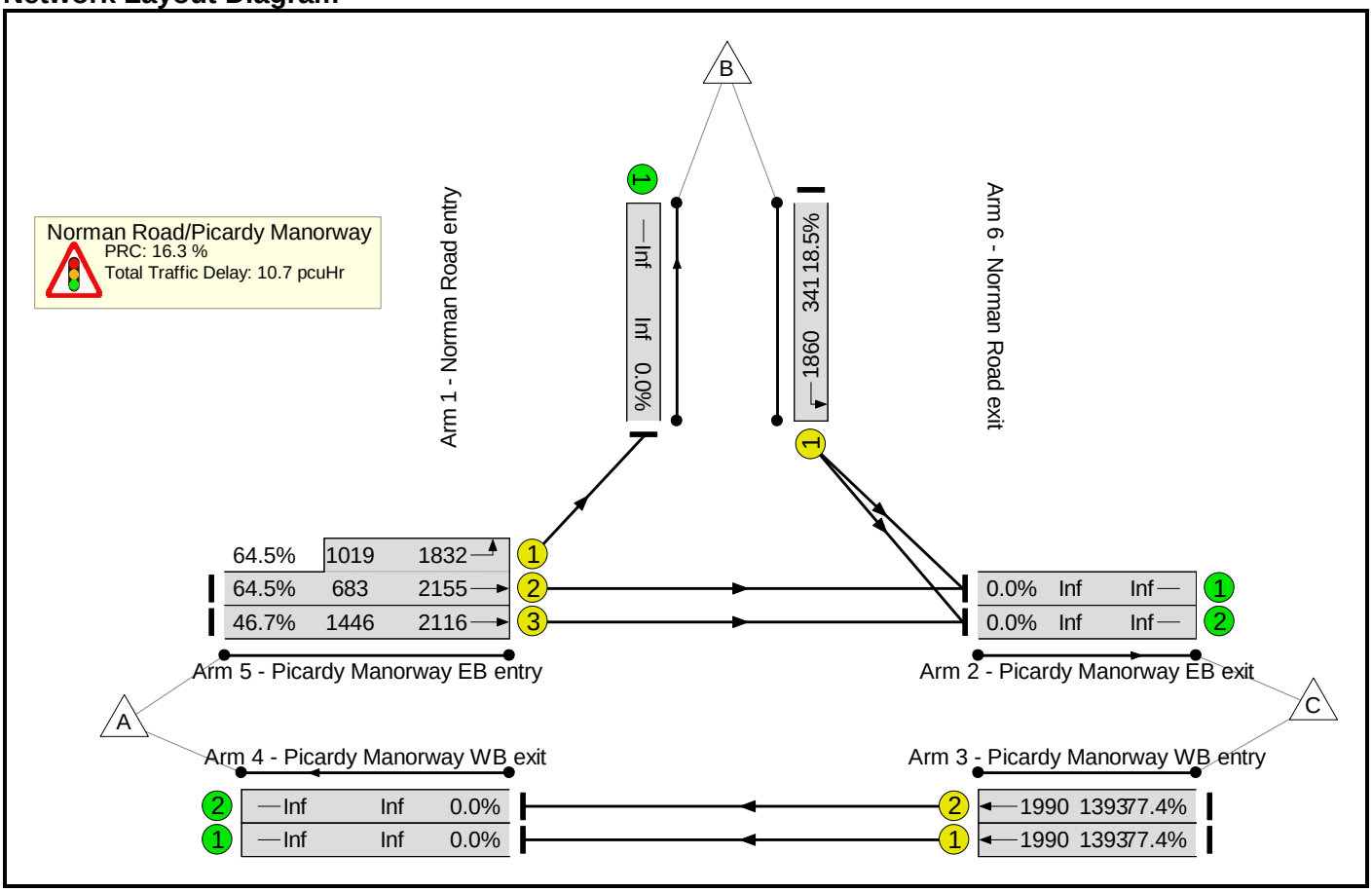
Item	Lane Description	Lane Type	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)	Mean Max Queue (pcu)
Network	**-**	**-**	**-**		**-**	**-**	**-**	**-**	**-**	**-**	**75.2%**	**0**	**0**	**0**	**9.9**	**-**	**-**
Norman Road/Picardy Manorway	**-**	**-**	**-**		**-**	**-**	**-**	**-**	**-**	**-**	**75.2%**	**0**	**0**	**0**	**9.9**	**-**	**-**
1/1	Norman Road entry Left	U	B		1	10	-	80	1860	341	23.5%	-	-	-	0.6	27.8	1.3
3/1	Picardy Manorway WB entry Ahead	U	G		1	41	-	1047	1990	1393	75.2%	-	-	-	3.2	10.9	12.3
3/2	Picardy Manorway WB entry Ahead	U	G		1	41	-	1047	1990	1393	75.2%	-	-	-	3.2	10.9	12.3
5/2+5/1	Picardy Manorway EB entry Ahead Left	U	A E		1	40:42	-	989	2155:1832	514+1080	62.0 : 62.0%	-	-	-	1.8	6.7	5.7
5/3	Picardy Manorway EB entry Ahead	U	A		1	40	-	633	2116	1446	43.8%	-	-	-	1.1	6.5	5.1

C1	Stream: 1 PRC for Signalled Lanes (%):	45.0	Total Delay for Signalled Lanes (pcuHr):	3.60	Cycle Time (s):	60
C1	Stream: 2 PRC for Signalled Lanes (%):	0.0	Total Delay for Signalled Lanes (pcuHr):	0.00	Cycle Time (s):	60
C1	Stream: 3 PRC for Signalled Lanes (%):	19.7	Total Delay for Signalled Lanes (pcuHr):	6.31	Cycle Time (s):	60
	PRC Over All Lanes (%):	19.7	Total Delay Over All Lanes(pcuHr):	9.91		

Basic Results Summary

Scenario 3: '2022 DS AM (100% Rd) - 0730-0830' (FG8: '2022 DS AM (100% Rd)', Plan 1: 'Network Control Plan 1')

Network Layout Diagram



Basic Results Summary

Network Results

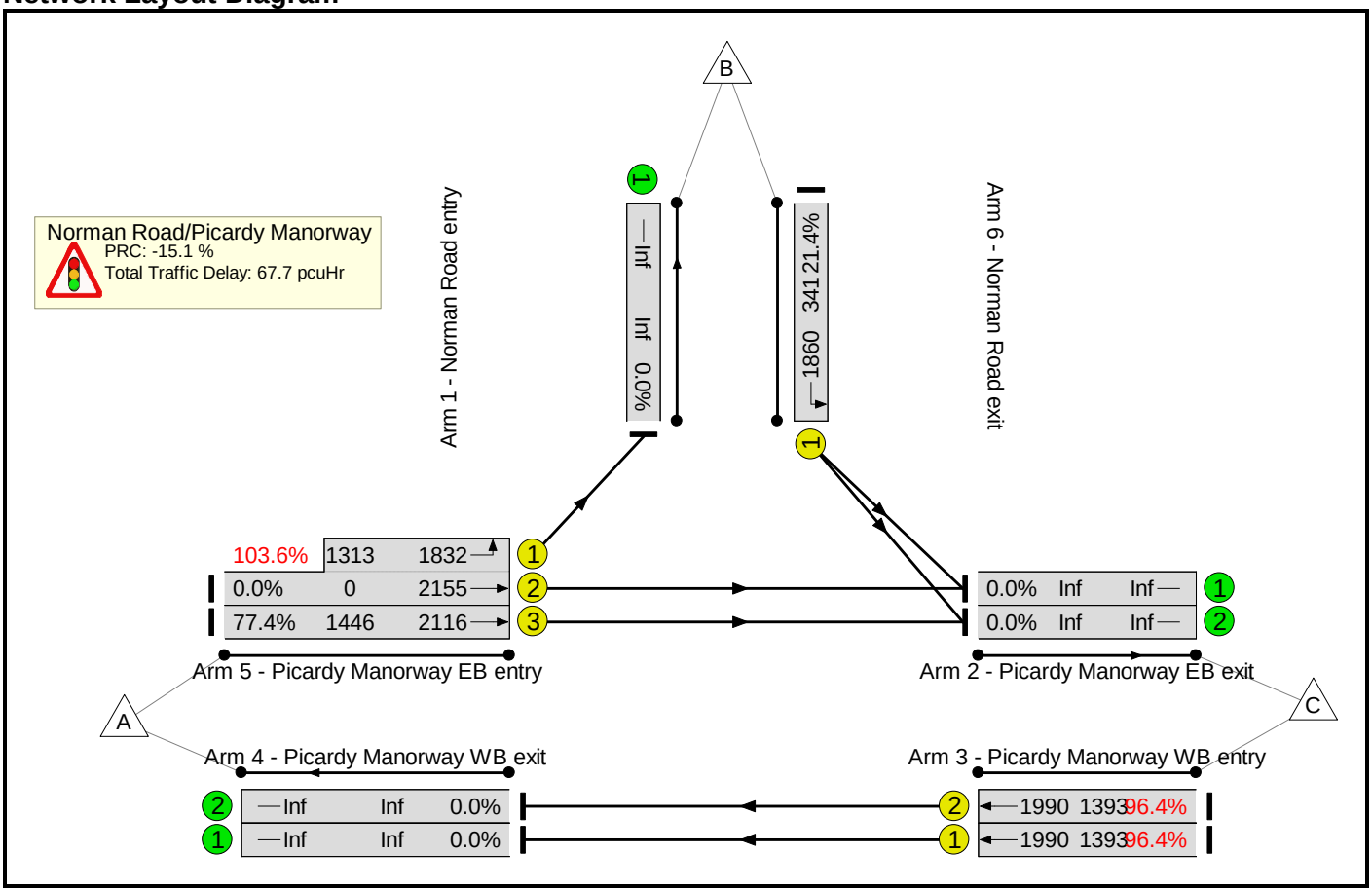
Item	Lane Description	Lane Type	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)	Mean Max Queue (pcu)
Network	**-**	**-**	**-**		**-**	**-**	**-**	**-**	**-**	**-**	**77.4%**	**0**	**0**	**0**	**10.7**	**-**	**-**
Norman Road/Picardy Manorway	**-**	**-**	**-**		**-**	**-**	**-**	**-**	**-**	**-**	**77.4%**	**0**	**0**	**0**	**10.7**	**-**	**-**
1/1	Norman Road entry Left	U	B		1	10	-	63	1860	341	18.5%	-	-	-	0.5	27.2	1.0
3/1	Picardy Manorway WB entry Ahead	U	G		1	41	-	1078	1990	1393	77.4%	-	-	-	3.5	11.5	13.4
3/2	Picardy Manorway WB entry Ahead	U	G		1	41	-	1078	1990	1393	77.4%	-	-	-	3.5	11.5	13.4
5/2+5/1	Picardy Manorway EB entry Ahead Left	U	A E		1	40:42	-	1097	2155:1832	683+1019	64.5 : 64.5%	-	-	-	2.1	6.7	5.6
5/3	Picardy Manorway EB entry Ahead	U	A		1	40	-	675	2116	1446	46.7%	-	-	-	1.3	6.8	5.5

C1	Stream: 1 PRC for Signalled Lanes (%):	39.6	Total Delay for Signalled Lanes (pcuHr):	3.80	Cycle Time (s): 60
C1	Stream: 2 PRC for Signalled Lanes (%):	0.0	Total Delay for Signalled Lanes (pcuHr):	0.00	Cycle Time (s): 60
C1	Stream: 3 PRC for Signalled Lanes (%):	16.3	Total Delay for Signalled Lanes (pcuHr):	6.91	Cycle Time (s): 60
	PRC Over All Lanes (%):	16.3	Total Delay Over All Lanes(pcuHr):	10.71	

Basic Results Summary

Scenario 4: '2022 DS AM (225% Rd) - 0730-0830' (FG9: '2022 DS AM (225% Rd)', Plan 1: 'Network Control Plan 1')

Network Layout 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	-	-	-		-	-	-	-	-	-	**103.6%**	**0**	**0**	**0**	**67.7**	-	-
Norman Road/Picardy Manorway	-	-	-		-	-	-	-	-	-	**103.6%**	**0**	**0**	**0**	**67.7**	-	-
1/1	Norman Road entry Left	U	B		1	10	-	73	1860	341	21.4%	-	-	-	0.6	27.5	1.2
3/1	Picardy Manorway WB entry Ahead	U	G		1	41	-	1343	1990	1393	96.4%	-	-	-	12.8	34.3	30.2
3/2	Picardy Manorway WB entry Ahead	U	G		1	41	-	1343	1990	1393	96.4%	-	-	-	12.8	34.3	30.2
5/2+5/1	Picardy Manorway EB entry Ahead Left	U	A E		1	40:42	-	1360	2155:1832	0+1313	0.0 : 103.6%	-	-	-	37.9	100.2	58.6
5/3	Picardy Manorway EB entry Ahead	U	A		1	40	-	1119	2116	1446	77.4%	-	-	-	3.7	11.8	14.1

C1	Stream: 1 PRC for Signalled Lanes (%):	-15.1	Total Delay for Signalled Lanes (pcuHr):	42.10	Cycle Time (s):	60
C1	Stream: 2 PRC for Signalled Lanes (%):	0.0	Total Delay for Signalled Lanes (pcuHr):	0.00	Cycle Time (s):	60
C1	Stream: 3 PRC for Signalled Lanes (%):	-7.1	Total Delay for Signalled Lanes (pcuHr):	25.56	Cycle Time (s):	60
	PRC Over All Lanes (%):	-15.1	Total Delay Over All Lanes(pcuHr):	67.65		

Junctions 9

ARCADY 9 - Roundabout Module

Filename: Junction 3_Failure Test_160.j9
Path: \\pba.int\cbh\Projects\42166 Riverside 2\Transport\5. Drawings & Models\Traffic Modelling\Failure Tests\AM Peak
Report generation date: 24/01/2019 11:23:27

Summary of junction performance

	0600 - 0700				0700 - 0800				0730 - 0830			
	Queue (PCU)	Delay (s)	RFC	LOS	Queue (PCU)	Delay (s)	RFC	LOS	Queue (PCU)	Delay (s)	RFC	LOS
	2022 DS AM - 100% Construction traffic											
1 - A2016 Picardy Manorway	0.8	2.82	0.42	A								
2 - Anderson Way	0.2	1.97	0.14	A								
3 - A2016 Bronze Age Way	2.4	4.92	0.69	A								
4 - B253 Picardy Manorway	0.7	5.32	0.38	A								
	2022 DS AM - 100% Construction Traffic											
1 - A2016 Picardy Manorway					1.0	3.17	0.48	A	1.3	3.71	0.55	A
2 - Anderson Way					0.2	2.13	0.17	A	0.3	2.37	0.20	A
3 - A2016 Bronze Age Way					4.7	8.57	0.81	A	5.2	9.71	0.83	A
4 - B253 Picardy Manorway					2.5	12.81	0.70	B	4.3	18.98	0.80	C
	2022 DS AM - 160% Construction Traffic											
1 - A2016 Picardy Manorway									1.4	3.71	0.55	A
2 - Anderson Way									0.3	2.37	0.20	A
3 - A2016 Bronze Age Way									9.4	16.45	0.90	C
4 - B253 Picardy Manorway									28.3	101.15	1.03	F

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

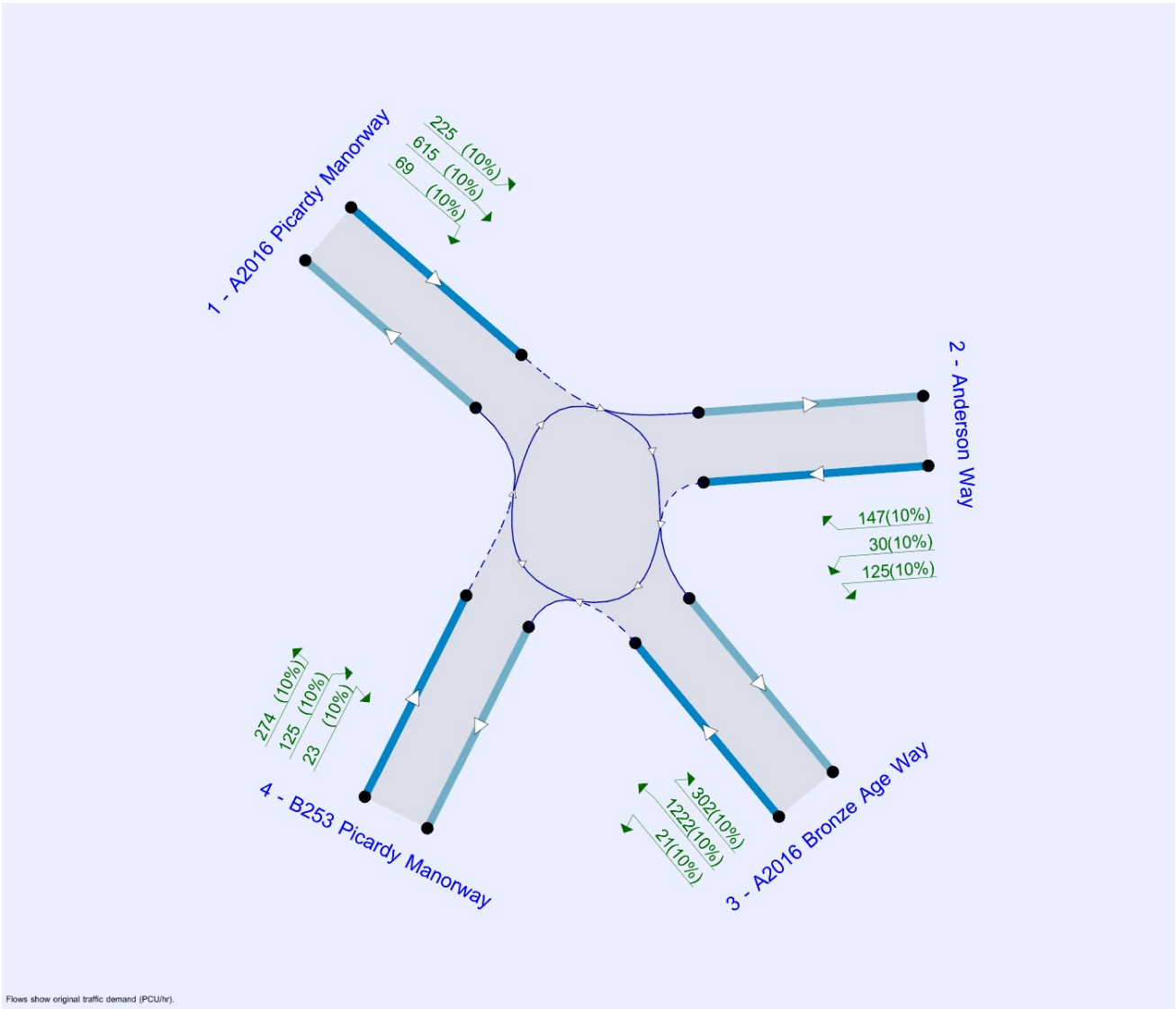
File summary

File Description

Title	Junction 3 - Senstivity Test
Location	Picardy Manorway
Site number	
Date	09/07/2018
Version	
Status	(new file)
Identifier	
Client	
Jobnumber	
Enumerator	PBA\jtsmith
Description	

Units

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



The junction diagram reflects the last run of Junctions.

Analysis Options

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)
D2	2022 DS AM - 100% Construction traffic	0600 - 0700	ONE HOUR	05:45	07:15	15
D4	2022 DS AM - 100% Construction Traffic	0700 - 0800	ONE HOUR	06:45	08:15	15
D6	2022 DS AM - 100% Construction Traffic	0730 - 0830	ONE HOUR	07:15	08:45	15
D7	2022 DS AM - 160% Construction Traffic	0730 - 0830	ONE HOUR	07:15	08:45	15

Analysis Set Details

ID	Network flow scaling factor (%)
A1	100.000

2022 DS AM - 100% Construction traffic, 0600 - 0700

Data Errors and Warnings

No errors or warnings

Junction Network

Junctions

Junction	Name	Junction Type	Arm order	Junction Delay (s)	Junction LOS
1	untitled	Standard Roundabout	1, 2, 3, 4	4.10	A

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

Arms

Arms

Arm	Name	Description
1	A2016 Picardy Manorway	
2	Anderson Way	
3	A2016 Bronze Age Way	
4	B253 Picardy Manorway	

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 - A2016 Picardy Manorway	7.70	10.50	4.9	35.0	62.0	11.5	
2 - Anderson Way	7.50	16.00	8.9	29.0	62.0	24.0	
3 - A2016 Bronze Age Way	7.50	10.50	6.7	35.0	62.0	20.5	
4 - B253 Picardy Manorway	4.50	10.30	30.0	28.6	62.0	20.0	

Slope / Intercept / Capacity

Roundabout Slope and Intercept used in model

Arm	Final slope	Final intercept (PCU/hr)
1 - A2016 Picardy Manorway	0.764	2857
2 - Anderson Way	0.778	3012
3 - A2016 Bronze Age Way	0.745	2789
4 - B253 Picardy Manorway	0.706	2570

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)
D2	2022 DS AM - 100% Construction traffic	0600 - 0700	ONE HOUR	05:45	07:15	15

Default vehicle mix	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 - A2016 Picardy Manorway		✓	932	100.000
2 - Anderson Way		✓	302	100.000
3 - A2016 Bronze Age Way		✓	1602	100.000
4 - B253 Picardy Manorway		✓	422	100.000

Origin-Destination Data

Demand (PCU/hr)

		To			
		1 - A2016 Picardy Manorway	2 - Anderson Way	3 - A2016 Bronze Age Way	4 - B253 Picardy Manorway
From	1 - A2016 Picardy Manorway	23	225	615	69
	2 - Anderson Way	147	0	125	30
	3 - A2016 Bronze Age Way	1222	302	57	21
	4 - B253 Picardy Manorway	274	125	23	0

Vehicle Mix

Heavy Vehicle Percentages

		To			
		1 - A2016 Picardy Manorway	2 - Anderson Way	3 - A2016 Bronze Age Way	4 - B253 Picardy Manorway
From	1 - A2016 Picardy Manorway	10	10	10	10
	2 - Anderson Way	10	10	10	10
	3 - A2016 Bronze Age Way	10	10	10	10
	4 - B253 Picardy Manorway	10	10	10	10

Detailed Demand Data

Demand for each time segment

Time Segment	Arm	Demand (PCU/hr)	Demand in PCU (PCU/hr)
05:45-06:00	1 - A2016 Picardy Manorway	702	702
	2 - Anderson Way	227	227
	3 - A2016 Bronze Age Way	1206	1206
	4 - B253 Picardy Manorway	318	318
06:00-06:15	1 - A2016 Picardy Manorway	838	838
	2 - Anderson Way	271	271
	3 - A2016 Bronze Age Way	1440	1440
	4 - B253 Picardy Manorway	379	379
06:15-06:30	1 - A2016 Picardy Manorway	1026	1026
	2 - Anderson Way	333	333
	3 - A2016 Bronze Age Way	1764	1764
	4 - B253 Picardy Manorway	465	465
06:30-06:45	1 - A2016 Picardy Manorway	1026	1026
	2 - Anderson Way	333	333
	3 - A2016 Bronze Age Way	1764	1764
	4 - B253 Picardy Manorway	465	465
06:45-07:00	1 - A2016 Picardy Manorway	838	838
	2 - Anderson Way	271	271
	3 - A2016 Bronze Age Way	1440	1440
	4 - B253 Picardy Manorway	379	379
07:00-07:15	1 - A2016 Picardy Manorway	702	702
	2 - Anderson Way	227	227
	3 - A2016 Bronze Age Way	1206	1206
	4 - B253 Picardy Manorway	318	318

Results

Results Summary for whole modelled period

Arm	Max RFC	Max delay (s)	Max Queue (PCU)	Max LOS
1 - A2016 Picardy Manorway	0.42	2.82	0.8	A
2 - Anderson Way	0.14	1.97	0.2	A
3 - A2016 Bronze Age Way	0.69	4.92	2.4	A
4 - B253 Picardy Manorway	0.38	5.32	0.7	A

Main Results for each time segment

05:45 - 06:00

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
1 - A2016 Picardy Manorway	702	381	2566	0.273	700	0.4	2.119	A
2 - Anderson Way	227	591	2552	0.089	227	0.1	1.702	A
3 - A2016 Bronze Age Way	1206	202	2638	0.457	1202	0.9	2.751	A
4 - B253 Picardy Manorway	318	1314	1642	0.194	317	0.3	2.984	A

06:00 - 06:15

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
1 - A2016 Picardy Manorway	838	455	2509	0.334	837	0.5	2.368	A
2 - Anderson Way	271	707	2462	0.110	271	0.1	1.806	A
3 - A2016 Bronze Age Way	1440	242	2609	0.552	1438	1.3	3.379	A
4 - B253 Picardy Manorway	379	1572	1459	0.260	379	0.4	3.662	A

06:15 - 06:30

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
1 - A2016 Picardy Manorway	1026	557	2432	0.422	1025	0.8	2.814	A
2 - Anderson Way	333	866	2339	0.142	332	0.2	1.973	A
3 - A2016 Bronze Age Way	1764	296	2568	0.687	1760	2.4	4.874	A
4 - B253 Picardy Manorway	465	1924	1211	0.384	463	0.7	5.286	A

06:30 - 06:45

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
1 - A2016 Picardy Manorway	1026	558	2431	0.422	1026	0.8	2.819	A
2 - Anderson Way	333	866	2338	0.142	333	0.2	1.974	A
3 - A2016 Bronze Age Way	1764	296	2568	0.687	1764	2.4	4.920	A
4 - B253 Picardy Manorway	465	1928	1208	0.385	465	0.7	5.324	A

06:45 - 07:00

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
1 - A2016 Picardy Manorway	838	457	2508	0.334	839	0.6	2.373	A
2 - Anderson Way	271	708	2461	0.110	272	0.1	1.808	A
3 - A2016 Bronze Age Way	1440	242	2609	0.552	1444	1.4	3.412	A
4 - B253 Picardy Manorway	379	1578	1455	0.261	381	0.4	3.690	A

07:00 - 07:15

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
1 - A2016 Picardy Manorway	702	382	2565	0.274	702	0.4	2.127	A
2 - Anderson Way	227	593	2551	0.089	227	0.1	1.703	A
3 - A2016 Bronze Age Way	1206	203	2638	0.457	1208	0.9	2.771	A
4 - B253 Picardy Manorway	318	1320	1638	0.194	318	0.3	3.003	A

2022 DS AM - 100% Construction Traffic, 0700 - 0800

Data Errors and Warnings

No errors or warnings

Junction Network

Junctions

Junction	Name	Junction Type	Arm order	Junction Delay (s)	Junction LOS
1	untitled	Standard Roundabout	1, 2, 3, 4	7.25	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	2022 DS AM - 100% Construction Traffic	0700 - 0800	ONE HOUR	06:45	08:15	15

Default vehicle mix	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 - A2016 Picardy Manorway		✓	1045	100.000
2 - Anderson Way		✓	351	100.000
3 - A2016 Bronze Age Way		✓	1828	100.000
4 - B253 Picardy Manorway		✓	657	100.000

Origin-Destination Data

Demand (PCU/hr)

		To			
		1 - A2016 Picardy Manorway	2 - Anderson Way	3 - A2016 Bronze Age Way	4 - B253 Picardy Manorway
From	1 - A2016 Picardy Manorway	13	244	644	144
	2 - Anderson Way	181	0	125	45
	3 - A2016 Bronze Age Way	1454	284	47	43
	4 - B253 Picardy Manorway	446	159	50	2

Vehicle Mix

Heavy Vehicle Percentages

		To			
		1 - A2016 Picardy Manorway	2 - Anderson Way	3 - A2016 Bronze Age Way	4 - B253 Picardy Manorway
From	1 - A2016 Picardy Manorway	10	10	10	10
	2 - Anderson Way	10	10	10	10
	3 - A2016 Bronze Age Way	10	10	10	10
	4 - B253 Picardy Manorway	10	10	10	10

Detailed Demand Data

Demand for each time segment

Time Segment	Arm	Demand (PCU/hr)	Demand in PCU (PCU/hr)
06:45-07:00	1 - A2016 Picardy Manorway	787	787
	2 - Anderson Way	264	264
	3 - A2016 Bronze Age Way	1376	1376
	4 - B253 Picardy Manorway	495	495
07:00-07:15	1 - A2016 Picardy Manorway	939	939
	2 - Anderson Way	316	316
	3 - A2016 Bronze Age Way	1643	1643
	4 - B253 Picardy Manorway	591	591
07:15-07:30	1 - A2016 Picardy Manorway	1151	1151
	2 - Anderson Way	386	386
	3 - A2016 Bronze Age Way	2013	2013
	4 - B253 Picardy Manorway	723	723
07:30-07:45	1 - A2016 Picardy Manorway	1151	1151
	2 - Anderson Way	386	386
	3 - A2016 Bronze Age Way	2013	2013
	4 - B253 Picardy Manorway	723	723
07:45-08:00	1 - A2016 Picardy Manorway	939	939
	2 - Anderson Way	316	316
	3 - A2016 Bronze Age Way	1643	1643
	4 - B253 Picardy Manorway	591	591
08:00-08:15	1 - A2016 Picardy Manorway	787	787
	2 - Anderson Way	264	264
	3 - A2016 Bronze Age Way	1376	1376
	4 - B253 Picardy Manorway	495	495

Results

Results Summary for whole modelled period

Arm	Max RFC	Max delay (s)	Max Queue (PCU)	Max LOS
1 - A2016 Picardy Manorway	0.48	3.17	1.0	A
2 - Anderson Way	0.17	2.13	0.2	A
3 - A2016 Bronze Age Way	0.81	8.57	4.7	A
4 - B253 Picardy Manorway	0.70	12.81	2.5	B

Main Results for each time segment

06:45 - 07:00

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
1 - A2016 Picardy Manorway	787	406	2547	0.309	785	0.5	2.246	A
2 - Anderson Way	264	676	2486	0.106	264	0.1	1.781	A
3 - A2016 Bronze Age Way	1376	289	2573	0.535	1371	1.3	3.281	A
4 - B253 Picardy Manorway	495	1485	1521	0.325	493	0.5	3.841	A

07:00 - 07:15

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
1 - A2016 Picardy Manorway	939	486	2486	0.378	939	0.7	2.558	A
2 - Anderson Way	316	808	2383	0.132	315	0.2	1.914	A
3 - A2016 Bronze Age Way	1643	346	2531	0.649	1640	2.0	4.430	A
4 - B253 Picardy Manorway	591	1776	1316	0.449	589	0.9	5.440	A

07:15 - 07:30

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
1 - A2016 Picardy Manorway	1151	593	2404	0.479	1149	1.0	3.153	A
2 - Anderson Way	386	989	2243	0.172	386	0.2	2.133	A
3 - A2016 Bronze Age Way	2013	424	2473	0.814	2002	4.6	8.231	A
4 - B253 Picardy Manorway	723	2169	1038	0.697	717	2.4	12.117	B

07:30 - 07:45

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
1 - A2016 Picardy Manorway	1151	597	2401	0.479	1151	1.0	3.165	A
2 - Anderson Way	386	991	2241	0.172	386	0.2	2.134	A
3 - A2016 Bronze Age Way	2013	424	2473	0.814	2012	4.7	8.569	A
4 - B253 Picardy Manorway	723	2178	1031	0.701	723	2.5	12.813	B

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)	LOS
1 - A2016 Picardy Manorway	939	491	2482	0.379	941	0.7	2.571	A
2 - Anderson Way	316	811	2381	0.133	316	0.2	1.919	A
3 - A2016 Bronze Age Way	1643	346	2531	0.649	1654	2.1	4.568	A
4 - B253 Picardy Manorway	591	1789	1306	0.452	597	0.9	5.635	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)	LOS
1 - A2016 Picardy Manorway	787	409	2545	0.309	787	0.5	2.254	A
2 - Anderson Way	264	678	2484	0.106	264	0.1	1.785	A
3 - A2016 Bronze Age Way	1376	290	2573	0.535	1379	1.3	3.326	A
4 - B253 Picardy Manorway	495	1493	1515	0.326	496	0.5	3.892	A

2022 DS AM - 100% Construction Traffic, 0730 - 0830

Data Errors and Warnings

No errors or warnings

Junction Network

Junctions

Junction	Name	Junction Type	Arm order	Junction Delay (s)	Junction LOS
1	untitled	Standard Roundabout	1, 2, 3, 4	9.04	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	2022 DS AM - 100% Construction Traffic	0730 - 0830	ONE HOUR	07:15	08:45	15

Default vehicle mix	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 - A2016 Picardy Manorway		✓	1192	100.000
2 - Anderson Way		✓	372	100.000
3 - A2016 Bronze Age Way		✓	1805	100.000
4 - B253 Picardy Manorway		✓	766	100.000

Origin-Destination Data

Demand (PCU/hr)

		To			
		1 - A2016 Picardy Manorway	2 - Anderson Way	3 - A2016 Bronze Age Way	4 - B253 Picardy Manorway
From	1 - A2016 Picardy Manorway	12	235	714	231
	2 - Anderson Way	186	0	135	51
	3 - A2016 Bronze Age Way	1427	274	58	46
	4 - B253 Picardy Manorway	530	166	67	3

Vehicle Mix

Heavy Vehicle Percentages

		To			
		1 - A2016 Picardy Manorway	2 - Anderson Way	3 - A2016 Bronze Age Way	4 - B253 Picardy Manorway
From	1 - A2016 Picardy Manorway	10	10	10	10
	2 - Anderson Way	10	10	10	10
	3 - A2016 Bronze Age Way	10	10	10	10
	4 - B253 Picardy Manorway	10	10	10	10

Detailed Demand Data

Demand for each time segment

Time Segment	Arm	Demand (PCU/hr)	Demand in PCU (PCU/hr)
07:15-07:30	1 - A2016 Picardy Manorway	897	897
	2 - Anderson Way	280	280
	3 - A2016 Bronze Age Way	1359	1359
	4 - B253 Picardy Manorway	577	577
07:30-07:45	1 - A2016 Picardy Manorway	1072	1072
	2 - Anderson Way	334	334
	3 - A2016 Bronze Age Way	1623	1623
	4 - B253 Picardy Manorway	689	689
07:45-08:00	1 - A2016 Picardy Manorway	1312	1312
	2 - Anderson Way	410	410
	3 - A2016 Bronze Age Way	1987	1987
	4 - B253 Picardy Manorway	843	843
08:00-08:15	1 - A2016 Picardy Manorway	1312	1312
	2 - Anderson Way	410	410
	3 - A2016 Bronze Age Way	1987	1987
	4 - B253 Picardy Manorway	843	843
08:15-08:30	1 - A2016 Picardy Manorway	1072	1072
	2 - Anderson Way	334	334
	3 - A2016 Bronze Age Way	1623	1623
	4 - B253 Picardy Manorway	689	689
08:30-08:45	1 - A2016 Picardy Manorway	897	897
	2 - Anderson Way	280	280
	3 - A2016 Bronze Age Way	1359	1359
	4 - B253 Picardy Manorway	577	577

Results

Results Summary for whole modelled period

Arm	Max RFC	Max delay (s)	Max Queue (PCU)	Max LOS
1 - A2016 Picardy Manorway	0.55	3.71	1.3	A
2 - Anderson Way	0.20	2.37	0.3	A
3 - A2016 Bronze Age Way	0.83	9.71	5.2	A
4 - B253 Picardy Manorway	0.80	18.98	4.3	C

Main Results for each time segment

07:15 - 07:30

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
1 - A2016 Picardy Manorway	897	426	2532	0.354	895	0.6	2.416	A
2 - Anderson Way	280	815	2378	0.118	279	0.1	1.886	A
3 - A2016 Bronze Age Way	1359	363	2519	0.540	1354	1.3	3.384	A
4 - B253 Picardy Manorway	577	1468	1533	0.376	574	0.7	4.118	A

07:30 - 07:45

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
1 - A2016 Picardy Manorway	1072	509	2468	0.434	1071	0.8	2.833	A
2 - Anderson Way	334	974	2254	0.148	334	0.2	2.062	A
3 - A2016 Bronze Age Way	1623	434	2466	0.658	1619	2.1	4.662	A
4 - B253 Picardy Manorway	689	1756	1330	0.518	687	1.2	6.137	A

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)	LOS
1 - A2016 Picardy Manorway	1312	620	2384	0.551	1310	1.3	3.684	A
2 - Anderson Way	410	1192	2085	0.196	409	0.3	2.363	A
3 - A2016 Bronze Age Way	1987	531	2393	0.830	1975	5.1	9.221	A
4 - B253 Picardy Manorway	843	2143	1056	0.798	832	4.0	16.881	C

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)	LOS
1 - A2016 Picardy Manorway	1312	625	2380	0.552	1312	1.3	3.709	A
2 - Anderson Way	410	1194	2083	0.197	410	0.3	2.366	A
3 - A2016 Bronze Age Way	1987	532	2393	0.831	1987	5.2	9.714	A
4 - B253 Picardy Manorway	843	2154	1048	0.804	842	4.3	18.978	C

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)	LOS
1 - A2016 Picardy Manorway	1072	517	2462	0.435	1074	0.9	2.857	A
2 - Anderson Way	334	978	2251	0.149	335	0.2	2.066	A
3 - A2016 Bronze Age Way	1623	435	2465	0.658	1635	2.2	4.839	A
4 - B253 Picardy Manorway	689	1771	1319	0.522	701	1.2	6.532	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)	LOS
1 - A2016 Picardy Manorway	897	429	2529	0.355	898	0.6	2.428	A
2 - Anderson Way	280	818	2376	0.118	280	0.1	1.891	A
3 - A2016 Bronze Age Way	1359	364	2518	0.540	1362	1.3	3.436	A
4 - B253 Picardy Manorway	577	1477	1527	0.378	579	0.7	4.185	A

2022 DS AM - 160% Construction Traffic, 0730 - 0830

Data Errors and Warnings

No errors or warnings

Junction Network

Junctions

Junction	Name	Junction Type	Arm order	Junction Delay (s)	Junction LOS
1	untitled	Standard Roundabout	1, 2, 3, 4	28.47	D

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)
D7	2022 DS AM - 160% Construction Traffic	0730 - 0830	ONE HOUR	07:15	08:45	15

Default vehicle mix	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 - A2016 Picardy Manorway		✓	1198	100.000
2 - Anderson Way		✓	372	100.000
3 - A2016 Bronze Age Way		✓	1961	100.000
4 - B253 Picardy Manorway		✓	866	100.000

Origin-Destination Data

Demand (PCU/hr)

		To			
		1 - A2016 Picardy Manorway	2 - Anderson Way	3 - A2016 Bronze Age Way	4 - B253 Picardy Manorway
From	1 - A2016 Picardy Manorway	14	235	718	231
	2 - Anderson Way	186	0	135	51
	3 - A2016 Bronze Age Way	1583	274	58	46
	4 - B253 Picardy Manorway	627	166	70	3

Vehicle Mix

Heavy Vehicle Percentages

		To			
		1 - A2016 Picardy Manorway	2 - Anderson Way	3 - A2016 Bronze Age Way	4 - B253 Picardy Manorway
From	1 - A2016 Picardy Manorway	10	10	10	10
	2 - Anderson Way	10	10	10	10
	3 - A2016 Bronze Age Way	10	10	10	10
	4 - B253 Picardy Manorway	10	10	10	10

Detailed Demand Data

Demand for each time segment

Time Segment	Arm	Demand (PCU/hr)	Demand in PCU (PCU/hr)
07:15-07:30	1 - A2016 Picardy Manorway	902	902
	2 - Anderson Way	280	280
	3 - A2016 Bronze Age Way	1476	1476
	4 - B253 Picardy Manorway	652	652
07:30-07:45	1 - A2016 Picardy Manorway	1077	1077
	2 - Anderson Way	334	334
	3 - A2016 Bronze Age Way	1763	1763
	4 - B253 Picardy Manorway	779	779
07:45-08:00	1 - A2016 Picardy Manorway	1319	1319
	2 - Anderson Way	410	410
	3 - A2016 Bronze Age Way	2159	2159
	4 - B253 Picardy Manorway	953	953
08:00-08:15	1 - A2016 Picardy Manorway	1319	1319
	2 - Anderson Way	410	410
	3 - A2016 Bronze Age Way	2159	2159
	4 - B253 Picardy Manorway	953	953
08:15-08:30	1 - A2016 Picardy Manorway	1077	1077
	2 - Anderson Way	334	334
	3 - A2016 Bronze Age Way	1763	1763
	4 - B253 Picardy Manorway	779	779
08:30-08:45	1 - A2016 Picardy Manorway	902	902
	2 - Anderson Way	280	280
	3 - A2016 Bronze Age Way	1476	1476
	4 - B253 Picardy Manorway	652	652

Results

Results Summary for whole modelled period

Arm	Max RFC	Max delay (s)	Max Queue (PCU)	Max LOS
1 - A2016 Picardy Manorway	0.55	3.71	1.4	A
2 - Anderson Way	0.20	2.37	0.3	A
3 - A2016 Bronze Age Way	0.90	16.45	9.4	C
4 - B253 Picardy Manorway	1.03	101.15	28.3	F

Main Results for each time segment

07:15 - 07:30

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
1 - A2016 Picardy Manorway	902	428	2530	0.356	899	0.6	2.425	A
2 - Anderson Way	280	821	2373	0.118	279	0.1	1.890	A
3 - A2016 Bronze Age Way	1476	364	2518	0.586	1470	1.5	3.760	A
4 - B253 Picardy Manorway	652	1586	1450	0.450	648	0.9	4.919	A

07:30 - 07:45

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
1 - A2016 Picardy Manorway	1077	511	2466	0.437	1076	0.8	2.847	A
2 - Anderson Way	334	982	2248	0.149	334	0.2	2.069	A
3 - A2016 Bronze Age Way	1763	436	2464	0.715	1758	2.7	5.571	A
4 - B253 Picardy Manorway	779	1897	1230	0.633	775	1.8	8.618	A

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)	LOS
1 - A2016 Picardy Manorway	1319	608	2393	0.551	1317	1.3	3.675	A
2 - Anderson Way	410	1197	2081	0.197	409	0.3	2.369	A
3 - A2016 Bronze Age Way	2159	533	2392	0.903	2135	8.8	14.248	B
4 - B253 Picardy Manorway	953	2305	942	1.012	892	17.3	52.712	F

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)	LOS
1 - A2016 Picardy Manorway	1319	616	2386	0.553	1319	1.4	3.709	A
2 - Anderson Way	410	1201	2078	0.197	410	0.3	2.373	A
3 - A2016 Bronze Age Way	2159	534	2391	0.903	2157	9.4	16.451	C
4 - B253 Picardy Manorway	953	2326	927	1.029	910	28.3	101.146	F

08:15 - 08:30

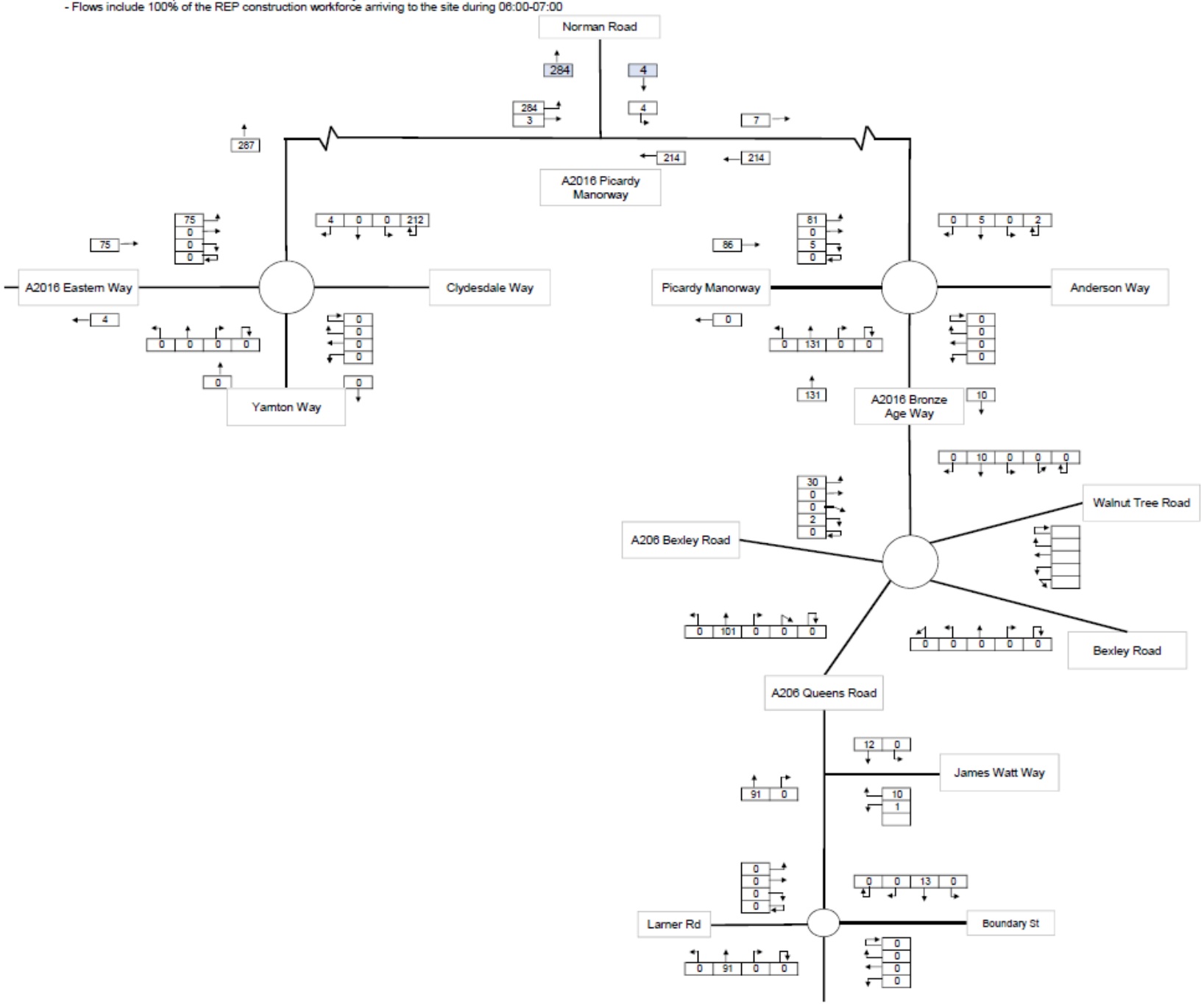
Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
1 - A2016 Picardy Manorway	1077	547	2439	0.442	1079	0.9	2.914	A
2 - Anderson Way	334	995	2238	0.149	335	0.2	2.081	A
3 - A2016 Bronze Age Way	1763	437	2463	0.716	1789	2.8	6.094	A
4 - B253 Picardy Manorway	779	1927	1209	0.644	883	2.1	16.514	C

08:30 - 08:45

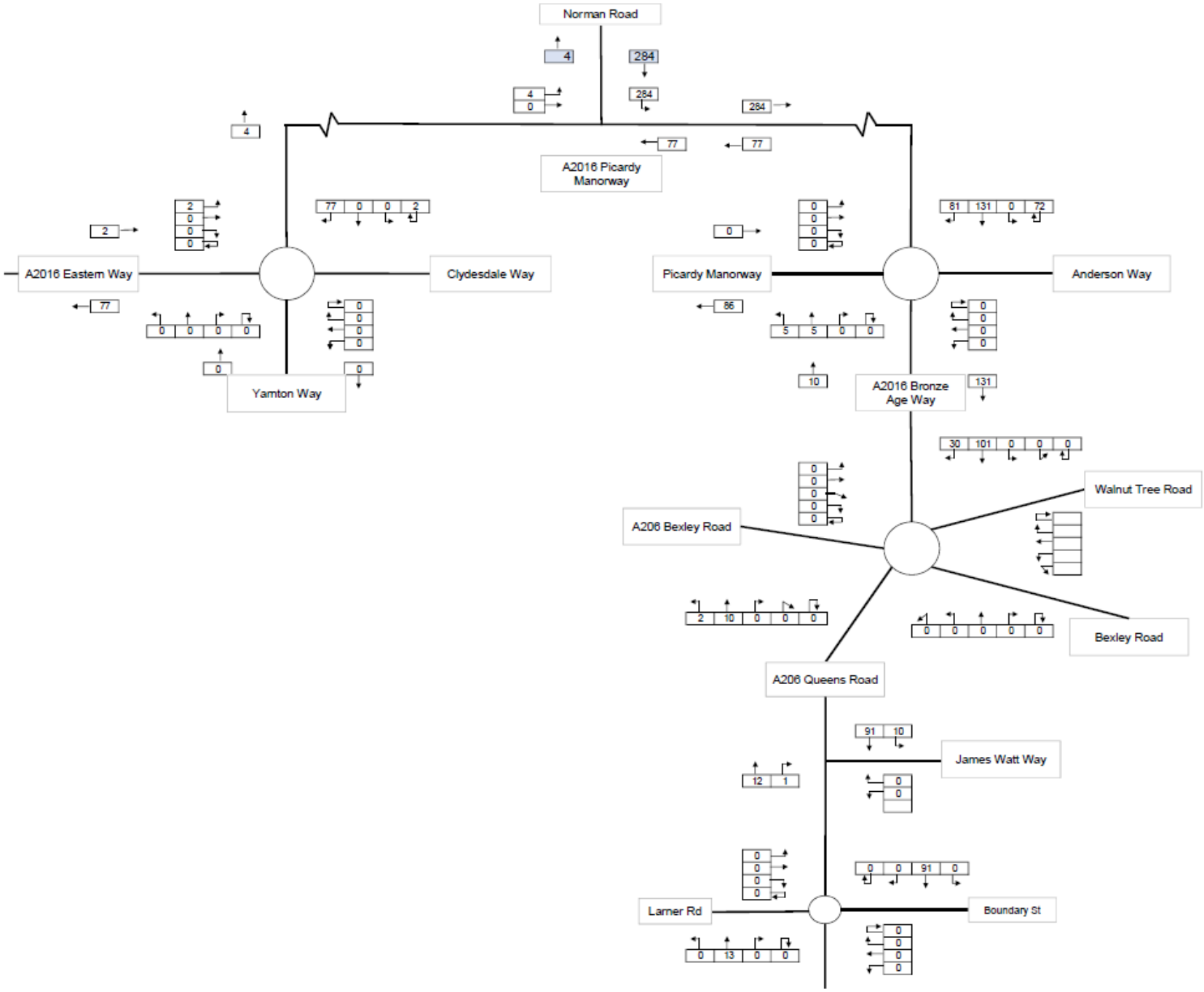
Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
1 - A2016 Picardy Manorway	902	432	2527	0.357	903	0.6	2.439	A
2 - Anderson Way	280	825	2370	0.118	280	0.1	1.893	A
3 - A2016 Bronze Age Way	1476	365	2517	0.587	1481	1.6	3.844	A
4 - B253 Picardy Manorway	652	1597	1442	0.452	657	0.9	5.073	A

Appendix B – Network Distribution Diagrams

Construction Traffic Flows - AM Consruction Peak Hour 06:00 - 07:00 (in Vehicles)
- Flows relate to the peak month of construction acitivity
- Flows include 100% of the REP construction workforce arriving to the site during 06:00-07:00



Construction Traffic Flows - PM Consruction Peak Hour 19:00 - 20:00 (in Vehicles)
- Flows relate to the peak month of construction acitivity
- Flows include 100% of the REP construction workforce departing the site during 19:00-20:00



Appendix C – Junction Utilisation Images

Erith Roundabout – Morning Period 06:00 - 07:30

06:00 – Light traffic; no queues

Traffic from James Watt Way arrives at junction and is unimpeded.

Between 06:00 and 07:00 there was no static queueing on both the A2016 and A206 Queens Road.

Queens Road is operating with spare capacity. The flow around the roundabout does not block traffic from entering the junction.

Traffic which arrives from James Watt Way quickly moves through the junction at 06:45.

06:00 - A206 Bexley Road Light traffic; no queues

A platoon of vehicles from James Watt Way momentarily impedes traffic exiting from A206 Bexley Road

At points during the period there were some instances of queuing of approximately 5-10 vehicles when the signal crossing on Bexley Road is called. That traffic quickly dispersed.

The volume of traffic heading from the Fraser Road starts to build toward the end of the observed period. Traffic continues to move well through the junction – as shown below.

Erith Roundabout – Evening Period 19:00

Similar to the morning period, traffic was observed to move freely through the junction. Momentary queues would occur on arms and quickly dissipate.

The volume of traffic through the junction was higher than the morning period but the junction was not congested.

James Watt Way Junction – Morning Period 06:00-07:45

A206 – northbound traffic signal demand and end of green phase southbound

A206 – southbound demand prior to green phase and start of build for northbound

Between 06:00 and 07:00, there is demand in both directions with traffic building in readiness for the next green phase. For most cycles observed, the queueing for both directions clears by the end of the green time.

For the northbound movement towards the end of the observation period, there are some cycles whereby not all vehicles are able to clear the stop line and so there is some minor residual demand.

James Watt Way arm has light demand before the morning peak

Between 06.00 and 07:00 there is limited queuing for each stage and all vehicles are able to clear the junction each time.

Demand at signals on James Watt Way clears within green phase

James Watt Way Junction – Evening 19:00

After the PM peak, the queue lengths decrease for both directions. Vehicle demand is able to clear in each cycle.

James Watt Way operates in a similar way after the evening peak to the morning pre-peak period.

Appendix B – Technical Note - Traffic flows on A2016 Bronze Age Way and A206 Queens Road/Northend Road - Interface with Electrical Connection Construction Works

TECHNICAL NOTE

Subject: **Traffic flows on A2016 Bronze Age Way and A206 Queens Road/Northend Road - Interface with Electrical Connection Construction Works**

1. Introduction

1.1. This technical note has been prepared on behalf of Cory Environmental Holdings Limited (trading as Cory Riverside Energy (Cory or "the Applicant")) for Riverside Energy Park (REP). The note responds to technical matters raised relating to the interface of the construction of the Electrical Connection, as described within **Chapter 3 Project and Site Description** of the **ES (6.1, Rev 1)** which accompanies the Development Consent Order (DCO) Application, with the routes of the A2016 (Picardy Manor Way to Bexley Road and A206 Queens Road to Perry Street.

1.2. The matters were raised by TfL at meetings held on 22 October 2018, 18 January 2019, 08 February 2019 and 13 March 2019, within related correspondence during that period and within the TfL Relevant Representation (RR) submitted on 12 February 2019, namely:

> *"The traffic impact of the construction of the REP is expected to be significant. TfL concludes that insufficient assessment has been undertaken to provide a realistic estimate of the impact of construction on the junctions along the SRN and therefore on bus services as well, and would therefore object to the current construction proposals. Additional modelling needs to be undertaken to show the impact of construction and mitigation measures must be secured through appropriate legal mechanisms to mitigate this impact.*
> *The impact of the Electrical Connection construction has not been sufficiently assessed through the TA or CTMP as currently the route has not been chosen, it is unclear how long construction of each section would take and therefore how long lanes would need to be closed and where they would need to be closed. The impact of the lane closures has not been assessed and therefore it cannot be determined if this impact is acceptable at this stage. However, given TfL's understanding of the existing traffic congestion along the A2016, TfL have significant concerns which have not been alleviated. It is noted that TfL would prefer the Electrical Connection to be constructed away from the SRN, as this would reduce the potential for strategic traffic impacts."*

1.3. Matters were further raised by the London Borough of Bexley in correspondence with their Consultant Ricardo, namely:

> *Cumulative Impact of REP Construction and Electrical Connection: Clarification is required from the Applicant as to how the combined potential impact of the REP construction and associated temporary works, and those regarding the Electrical Connection has been assessed. It is important that the added implication of the works associated with the Electrical Connection is considered*

with the impact of the REP construction especially as there may be programme overlap. As indicated under 6.9.62 of the ES, the final details (e.g., method of construction, form of traffic management, the programme, sequence of works, length of time within a location and location of active works) are not known at this stage since no details are currently available. Therefore, there is uncertainty about overall impact.

1.4. This Technical Note sets out the following information and analysis in relation to the construction of the Electrical Connection:

- Traffic flow characteristics on the A2016 Bronze Age Way and A206 Queens Road corridor, in each direction;
- Theoretical link capacity on the A2016 Bronze Age Way and A206 Queens Road / Northend Road;
- Queueing and congestion at key points on the A2016 Bronze Age Way and A206 Queens Road / Northend Road corridor; and
- Flow characteristics at Erith Roundabout (A2016 Bronze Age Way junction with A206 Bexley Road) and potential implications of the construction of the Electrical Connection for REP on the operation of the junction.

2. Observed Link Traffic Flows on the A2016 Bronze Age Way and A206 Northend Road

2.1. Automatic Traffic Count (ATC) surveys have been undertaken on A2016 Bronze Age Way and A206 Northend Road to inform the baseline assessment for **Appendix B.1** the **Transport Assessment (TA)** to the **ES (6.3, APP-066)** and for the appraisal of predicted traffic impacts associated with the construction of the REP site and the associated Electrical Connection.

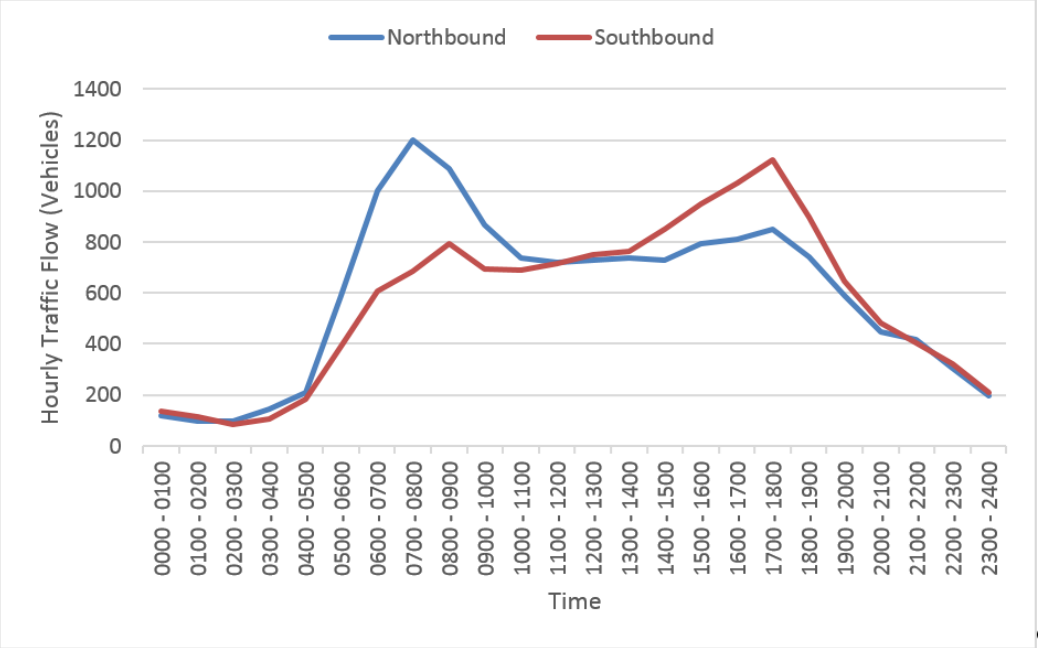
2.2. Data were collected at approximately 40m to the south of Picardy Manorway / Anderson Way roundabout and on A206 Northend Road at approximately 110m to the north of A206 Northend Road / A2000 Perry Street / Parkside Avenue roundabout. The data were collected across two weeks between 14 April 2018 to 27 April 2018. The average weekday hourly traffic profiles are illustrated in Figure 1 and Figure 2 below.

2.3. Based on a review of the traffic data across the two weeks, the following traffic characteristics have been deduced:

A2016 Bronze Age Way

- 24-hour traffic flow is slightly higher in the northbound direction - average weekday flow of 14,214 vehicles northbound and 13,623 vehicles southbound;
- The maximum hourly traffic flow is slightly higher in the northbound direction - 1,201 vehicles northbound (07:00 – 08:00) and 1,136 vehicles southbound (16:30-17:30);
- Morning two-way link flows plateau between 07:00 and 09:00 – 1,888 vehicles (07:00-08:00) and 1,880 vehicles (08:00-09:00); and
- The link data indicate a tidal flow characteristic, with northbound dominant in the morning and southbound dominant in the afternoon.

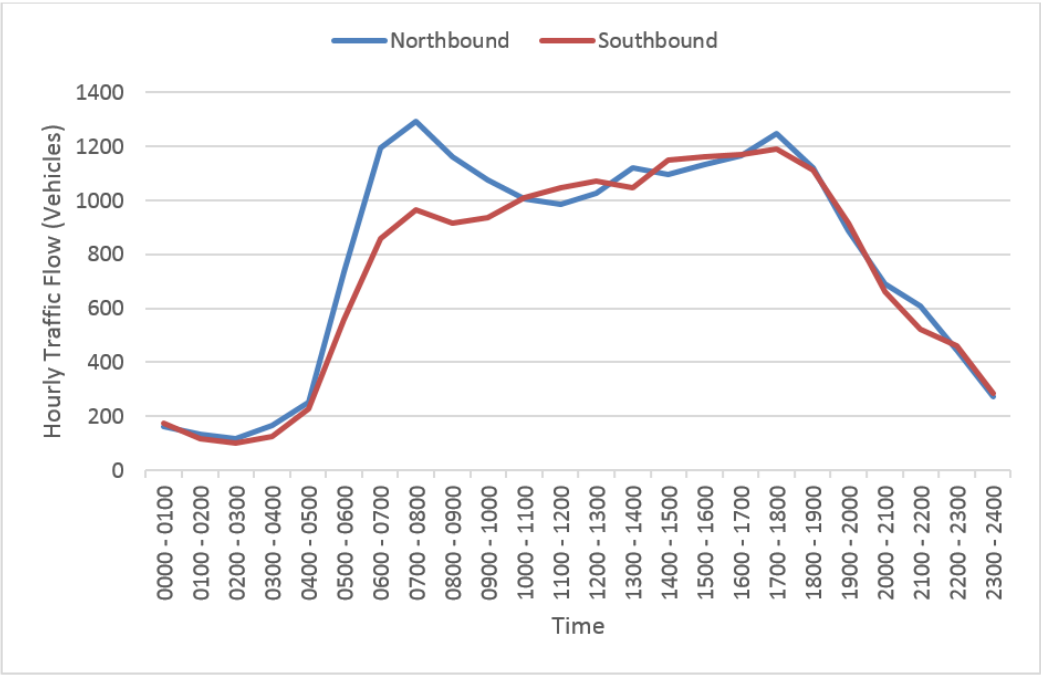
Figure 1: Daily traffic flow profile on A2016 Bronze Age Way



A206 Northend Road

- 24-hour traffic flow is higher in the northbound direction - average weekday traffic flow of 19,092 vehicles northbound and 17,769 vehicles southbound;
- The maximum hourly traffic flow is slightly higher in the northbound direction - 1,301 vehicles northbound (06:30 – 07:30) and 1,191 vehicles southbound (17:00-18:00);
- Morning two-way traffic flows peak prior to congestion building; and
- Northbound and southbound flows are balanced on A206 Northend Road during the evening peak period.

Figure 2: Daily traffic flow profile on A206 Northend Road



2.4. The data show that the corridor has a defined morning and afternoon peak in each direction and the northbound morning peak is more pronounced and higher than that in the afternoon. On A2016 to the north of the Erith Roundabout traffic volumes are lower than on A206, often more than 100 fewer vehicles per hour. The effects on traffic flow of constructing the Electrical Connection, therefore, would be less on the A2016 Bronze Age Way link than on A206 Queens Road / Northend Road links.

3. Link Capacity - A2016 Bronze Age Way and A206 Queens Road / Northend Road

3.1. The Design Manual for Roads and Bridges (DMRB) Volume 5 Section 1 Part 3 TA 79/99 Amendment No 1 – Determination of Urban Road Capacity, Table 1 'Types of Urban Roads and the features that distinguish them', provides guidance as to the classification of route for the A2016/A206 corridor. Table 2 'Capacities of Urban Roads one-way hourly flows in each direction' provides a guide to the volume of traffic each type of route might be expected to carry.

3.2. In accordance with those tables, the dual carriageway sections of A2106 and A206 would be classified as Urban All-purpose class 2 (UAP2) routes – i.e. dual carriageways of approximately 7.3m width per carriageway and 2 lanes in each direction. UAP2 class routes should be able to carry in the region of 3,200 vehicles per hour in either direction across both lanes – remote from the interaction with junctions. Each lane would have a capacity in the order of 1,600 vehicles per hour.

3.3. The link capacity along the corridor could be slightly lower due to a moderately high proportion of heavy goods vehicles (HGV) - typically observed to be higher than 15%.

3.4. The maximum traffic flow on A2016 Bronze Age Way occurs in the northbound direction during the morning peak period at 1,201 vehicles per hour, across both lanes, between 07:00 – 08:00. This volume of traffic lies substantially within the theoretical capacity of one lane of the northbound carriageway. At the A206 Northend Road survey the peak is marginally higher and earlier at 1,301 vehicles per hour, across both lanes, between 06:30 – 07:30.

3.5. At peak construction (Month 13), the predicted morning peak flow of construction traffic for the REP site and the Electrical Connection (excluding workforce, who would be travelling prior to the peak period) in 2022 is estimated to be 2 vehicles per hour on the A206/A2016 corridor to the north of the Perry Street roundabout. The cumulative morning peak hour traffic flow on Bronze Age Way during peak construction, including forecast growth to 2022 and committed developments, would be in the order of 1,322 vehicles per hour across both lanes. On A206 Northend Road the morning peak hour flow is predicted to be 1,347 vehicles in the peak hour. These traffic flows are indicated within the figure titled '2022 Do Minimum Traffic Flows - AM Peak 07:45-08:45 (in Vehicles)' of **Appendix J** of **Appendix B.1** the **TA** to the **ES (6.3, APP-066)**. That volume of link flow would be within the 1,600 vehicles per hour theoretical capacity for a single lane on this UAP2 corridor and well within the theoretical volume for two lanes.

3.6. The data collected for both the A2016 (near Picardy Manorway) and A206 (near Perry Street) indicate that the peak period is clearly defined with traffic volumes rising quickly to the peak and diminishing after it. This suggests that residual demand is quickly cleared. Video evidence of the operation of the junctions along the corridor substantiate this.

3.7. The link peak traffic volumes are within the theoretical capacity of a single lane on a road constructed to the standard of a UAP2 road – as identified in DMRB Volume 5 Section 1 Part 3 TA 79/99 Amendment No 1 – Determination of Urban Road Capacity. A localised temporary lane closure during the construction of the Electrical Connection would not take the link out of theoretical capacity in either the northbound or southbound direction.

4. Levels of Queueing at Key Points along the A2016 Bronze Age Way, A206 Queens Road and A206 South Road

4.1. Video footage was collected at six junctions along the A2016/A206 to provide data on vehicle activity to inform the baseline for the appraisal of traffic impacts within **Appendix B.1** the **TA** to the **ES (6.3, APP-066).** The locations surveyed are listed in **Table 2.1** and **Figure 2.1** of **Appendix B.1**, the **TA** to the **ES (6.3, APP-066).**

4.2. TfL had noted during engagement and in its Relevant Representation, that:

> "*it is considered that the junctions* [of Picardy Manorway, Erith Roundabout and James Watt Way] *are influenced by each other's performance given that they are closely linked*".

4.3. The footage of the Picardy Manorway/Anderson Way roundabout shows there is no queueing on the approaches to or exits from the junction, including during the network peak periods. The junction currently works within capacity and sensitivity analysis has demonstrated that there is sufficient reserve capacity during the construction period for the network not to be congested during the construction of the Electrical Connection. TN007 – Construction Phase Sensitivity Test (dated 23/01/19, issued to TfL on 28/01/19), shows that the A2016 Picardy Manorway roundabout is expected to operate with spare capacity as assessed during the peak period of construction for REP, and based on the robust assumptions adopted within the **TA, Appendix B.1** of the **ES (6.3, APP-066)** for Month 13 (i.e. the highest level of cumulative workforce and construction traffic, anticipated to be during 2022).

4.4. The Erith Roundabout is 2.3km from the Picardy Manorway/Anderson Way junction and there is no evidence of interaction between the operation of these junctions in either the northbound or southbound direction. Consequently, this Technical Note focuses on Erith Roundabout and A206 Queens Road/ James Watt Way during the above peak construction phase for REP. The junctions on Picardy Manorway are priority roundabouts and there is no control linkage to the Erith Roundabout - i.e. the junction of A2016 Bronze Age Way/Bexley Road/Queens Road or the A206 Queens Road/James Watt Way traffic signals.

4.5. Example screenshots of the video footage for Erith Roundabout, A206 Queens Road / James Watt Way junction and A206 Northend Road / Boundary Street roundabout during the morning peak are included at Figures 3 – 8 below.

Figure 3: Erith Roundabout 2018 during morning peak period – Bexley Road (west)

Figure 4: James Watt Way junction 2018 at start of morning peak period – A206 (camera facing southbound)

Figure 5: James Watt Way junction 2018 morning peak period – A206 (camera facing southbound)

Figure 6: James Watt Way junction 2018 end of morning peak period – A206 (camera facing southbound)

Figure 7: A206 South Road/ Boundary Street/ A206 Northend Road junction 2018 morning peak period – A206 (camera facing southbound)

Figure 8: A206 South Road/ Boundary Street/ A206 Northend Road junction 2018 end of morning peak period – A206 (camera facing southbound)

4.6. Video footage recorded as part of the traffic surveys at: Erith Roundabout; James Watt Way traffic signals; and Boundary Street / Northend Road roundabout indicate that during the morning peak period the network is congested, and queues can form northbound along this section.

4.7. On the day of the video survey at James Watt Way, Friday 25 May 2018, northbound queues built during the morning from 07:30 and dissipated between 09:45 and 10:00. A video survey of the Erith Roundabout, on Wednesday 19 April 2018, however, indicated that the northbound approach to Erith Roundabout was not congested at 07:30 – as illustrated in Figure 9. The approach started to become congested around 08:00. At that time, traffic continued to move through the junction and there were no stationary queues. Traffic was only observed to queue momentarily on this approach when the pedestrian crossing on Bexley Road was used.

Figure 9: A206 Erith Roundabout April 2018 morning peak period – from Walnut Tree Road (camera facing southwest)

4.8. Southbound traffic, including during peak periods, typically flows through the junctions and clears the James Watt Way junctions on each cycle of the traffic signals.

4.9. Based on the video footage from 25 May 2018, queueing is observed in the northbound direction in the morning, originating from the interface between James Watt Way and Erith Roundabout. At their peak, queues extend to the south until approximately 100m to the south of A206 Boundary Street / A206 Northend Road roundabout.

4.10. The section of A206 between Erith Roundabout and Boundary Street / Northend Road is approximately 850m long. Traffic which is discharged from the traffic signals at James Watt Way towards Erith Roundabout generally cleared sufficiently to let traffic emerge from James Watt Way before the next green time for northbound A206 traffic.

4.11. Queues were not observed to build in either northbound or southbound direction on the A2016/A206 corridor during the evening peak period. Figures 9 and 10 are example screenshots of the network during the evening peak.

Figure 10:Erith Roundabout 2018 evening peak period – A206 (camera facing west to Bexley Road (west))

Figure 11: James Watt Way junction 2018 evening peak period – A206 (camera facing southbound)

4.12. Video evidence has indicated that traffic flows readily through this section of the network for most of the day. Queues were only noted to build on A206 to the south of the James Watt Way junction during the morning peak period and dissipated quickly after the peak period. Those queues are considered to be a combination of the volume and balance of traffic and the operation of the James Watt Way junction. The presence of approximately 60m of on-street parking on the northbound carriageway in the vicinity of Thanet Road, to the south of James Watt Way, narrows the corridor to a single lane – extending the length of the queues.

5. Flow Characteristics at Erith Roundabout and James Watt Way Junction and Potential Implications

5.1. As stated in **Section 4**, the network can be congested around the Erith Roundabout during peak periods and queueing in the northbound direction was observed to originate from James Watt Way and build to the south in the morning peak. This section of the report considers the flow characteristics at Erith Roundabout and its potential impacts.

5.2. Overall, the following observations have been made at Erith Roundabout from the traffic count data collected in April and May 2018:

- The total junction flows peaked at both the morning and evening peak periods;
- The flows during the evening peak period are approximately 10% greater than the morning peak period - 3,690 vehicles through the junction in the evening (17:00-18:00) compared to 3,360 vehicles in the morning (08:00-09:00).

5.3. However, despite the fact that the total junction flows are higher during the evening peak period, based on the video footage available, the junction appears to be more congested during the morning peak hour with greater levels of queueing. This is likely to be attributed to:

- morning northbound flow from A206 Queens Road which is higher in number and proportion compared to the evening peak period. Of that flow from A206 Queens Road, a large proportion (72% of 1347 vehicles) travels straight ahead to A2016 Bronze Age Way. Those vehicles have priority over entry from A206 Bexley Road (west). In the evening, more of the lower volume of traffic turns left from A206 Queens Road into Bexley Road (west) (43% of 1270 vehicles) – allowing more opportunities to exit from Bexley Road (west).
- traffic exiting A206 Bexley Road (west) which is opposed by northbound and eastbound traffic flow from A206 Queens Road. Both of these traffic flows are a higher proportion of the junction flows in the morning peak period compared to the evening (52% of 3360 in the morning peak and 41% of 3690 in the evening peak).
- southbound traffic from A2016 Bronze Age Way to A206 Queens Road is unopposed. In the evening the dominant southbound flow from A2016 Bronze Age Way is to A206 Queens Road (25% of 3690 vehicles). This does not cause northbound queueing on A206 Queens Road.

Table 1: Peak Hour Traffic at Erith Roundabout – April 2018

AM Peak	08:00-09:00					
	Walnut Tree Road	Bexley Road	A206 Queens Road	A206 Bexley Road	A2016 Bronze Age Way	**Total**
Walnut Tree Road	0	0	0	0	0	**0**
Bexley Road	41	0	71	188	43	**343**
A206 Queens Road	51	0	10	373	946	**1380**
A206 Bexley Road	178	0	308	1	262	**749**
A2016 Bronze Age Way	22	0	661	201	4	**888**
Total	**292**	**0**	**1050**	**763**	**1255**	**3360**
PM Peak	**17:00-18:00**					
	Walnut Tree Road	Bexley Road	A206 Queens Road	A206 Bexley Road	A2016 Bronze Age Way	**Total**
Walnut Tree Road	0	0	0	0	0	**0**
Bexley Road	65	0	109	168	40	**382**
A206 Queens Road	85	0	10	551	719	**1365**
A206 Bexley Road	200	0	361	2	143	**706**
A2016 Bronze Age Way	23	0	933	281	0	**1237**
Total	**373**	**0**	**1413**	**1002**	**902**	**3690**

5.4. The junction at James Watt Way is a signal controlled junction with all lanes controlled by Split Cycle Offset Optimisation Technique (SCOOT) – a system to optimise the management of traffic through a traffic signal junction, often linked to other local junctions. The operation of the traffic signals at James Watt Way strongly influences the operation of the adjoining network. The cycle of the traffic signals is such that each approach can be managed to minimise or balance delays reflecting the strategy for that junction.

5.5. Observing the operation of the network in the vicinity of Erith Roundabout and James Watt Way, during the morning and evening peak periods, has shown that the junction is affected by the balance of flows as much as the volume of flow. The construction of the Electrical Connection through the junctions, and the area most affected by congestion, will not result in an increase in the volume of traffic, aside from the few construction vehicles associated with the contractor's workforce and materials. The traffic impact from the construction period will be temporary and transient road works which will require a series of lane closures.

5.6. **Paragraph 3.5.25** of **Chapter 3 Project and Site Description** of the **ES (6.1, Rev1)** states that:

"Where works are undertaken along footpaths and verges, a 3 m wide working corridor would be likely and generally be expected to cause some encroachment of the works area onto the highway, typically resulting in a lane closure. Where the proposals require works within the highway carriageway, a lane closure would be required. Depending on the width of the chosen highway route, a lane closure for the working area would typically require:

a. On dual carriageways - a reduction from two lanes to one along one of the carriageways; and

b. On single carriageways – traffic signals to control single lane traffic working."

5.7. **Paragraphs 3.5.28 and 3.5.29** of **Chapter 3 Project and Site Description** of the **ES (6.1, Rev1)** state that:

"*When trenching works are being undertaken it is expected that a length of up to 200 m would typically be excavated to facilitate duct laying. Longer lengths of excavation would be avoided by the commitment from UKPN to use a ducted cable system. This allows relatively short lengths of ducting to be installed and long cable lengths to be pulled through later between jointing pits.*

The actual working area that would be fenced off could be up to c. 300 m to allow for safe clearances, including traffic management. Typical main mobile plant for open trenching would include an excavator with a breaker attachment, a dumper truck and a compactor. A specialist trenching machine may also be used. Where works are close to existing live services, precautionary digging may be undertaken locally by hand."

5.8. **Paragraph 3.5.31** of **Chapter 3 Project and Site Description** of the **ES (6.1, Rev1)** states that:

"It is expected that a typical trench length would be open for around 7 days and that this would be on a rolling basis along the length of the route. The location of jointing pits would need to be determined by subsequent detailed design. Their location would depend on the maximum length the cables can be pulled, which will depend on the number of bends and cable drum lengths. Joint pits may need to be accessed, with an associated working area, to install and joint cables. The expected time for such an installation would be approximately 5 days."

5.9. Trenchless options for the construction of the Electrical Connection have been considered and could be adopted along sections of the route. These limited locations would typically be at bridges, waterways, railway crossings and other structures. Trenchless construction would be supported by a compound, approximately 30m by 20m in area, to contain the necessary construction plant, equipment and materials, as set out at **Paragraph 3.5.33** of **Chapter 3 Project and Site Description** of the **ES (6.1, Rev1)**.

5.10. It is therefore expected that the construction period between the vicinity of Erith Roundabout and Boundary Road / Northend Road would take place over a period of approximately 4-6 weeks.

6. Conclusion and Options for Further Mitigation

6.1. The available information has shown that the theoretical capacity along A2016 Bronze Age Way, north of Erith Roundabout, is such that a temporary and transient 300m lane closure within the links during construction of the Electrical Connection should not cause undue congestion or disruption.

6.2. From the Erith Roundabout southwards traffic flows are such that a temporary lane closure would only cause little to moderate disruption during the off-peak periods. A northbound lane closure during weekday morning peak periods would, however, cause additional congestion and queueing on the approaches to and when passing the road works due to the temporary lane closures – where peak period queues have been observed to occur between Erith Roundabout and Boundary Road / Northend Road. The extent of the addition to the existing congestion and queueing has not been quantified through software modelling, for the reasons explained below. However it is considered that such an exercise would only demonstrate what has already been observed. Implementing any identified physical mitigation, such as junction alterations / improvements would be disproportionate to the length of time it would take to construct the Electrical Connection and potentially would be more disruptive than the temporary road works.

6.3. The construction of the Electrical Connection between Erith Roundabout and Boundary Street / Northend Road roundabout is predicted to take approximately 4-6 weeks (assuming approximately 200m progress per 7 days).

6.4. Carrying out Transport Planning modelling of the impact of this period is estimated to take no less than six months to collect the requisite traffic data; prepare and fully validate the necessary models; and undertake the scenario testing. Having established the outputs from the models, a strategy for mitigation would need to be formulated and agreed. It is not known what that strategy would entail but, should it suggest physical network changes, it is anticipated that the implementation of those network changes would cause substantially more network disruption than the temporary road works for the construction of the Electrical Connection. The design of the changes would similarly take a long period to prepare, review, conclude and commission.

6.5. The Applicant does not dispute that the construction of the Electrical Connection will cause temporary disruption to the road network – similar to other Statutory Utility roadworks which might be carried out in the area and across the wider network in London. However, there seems little justification in undertaking further and extensive theoretical analysis to demonstrate a point which cannot be proportionately mitigated.

6.6. The Applicant therefore commits to continue to work with the London Borough of Bexley, as Local Highway Authority, and in consultation with TfL, to programme and manage the roadworks in such a way as to seek methods to minimise the impact of the roadworks on the A2016/A206 corridor through the development of an appropriate Construction Traffic Management Plan (CTMP). An outline for that CTMP is provided within the updated Outline CTMP (Rev 1), as submitted at deadline 2, which supersedes the **Outline CTMP**, **Appendix L** of the **TA**, **Appendix B.1** of the **ES (6.3, APP-066**.

6.7. The detailed route of the Electrical Connection within the Order Limits, as indicated on the **Works Plans** (**2.2, Rev1**), would be communicated to LBB as part of the development of the detailed CTMP. That CTMP is secured at **Requirement 13** of the **draft Development Consent Order (dDCO) (3.1, Rev1)**.

6.8. The Electrical Connection contractor will seek to use Erith Station approach to circumvent the northbound exit from Erith Roundabout – unless it is not practicable, economic, efficient or coordinated to do so.

6.9. South of the railway crossing on-street parking currently narrows the carriageway to a single lane, as such the lane closure to construct the Electrical Connection would not materially change the width of the corridor at that point. On-street parking would have to be suspended and relocated during that period.

6.10. **Section 5.5** of **Chapter 5 'Alternatives Considered'** of the **ES (6.1, Rev1)** presents the options which have been explored for the route of the Electrical Connection including a connection to Barking; upgrading existing connections and options within the road route between REP and the Littlebrook sub-station.

6.11. The option for the Electrical Connection following Anderson Way; Church Manorway through West Street and Manor Road has been withdrawn, with the **Works Plan (2.2, Rev1)**, duly updated and submitted at Deadline 2.

6.12. Defining the construction period, method and management of the Electrical Connection through a detail CTMP will help to minimise impacts and disruption and would be secured through **Requirement 13** of **Schedule 2** of the **dDCO (3.1, Rev1).**

6.13. On the basis of the evolving detail for the Electrical Connection route, the following additional mitigation would be agreed through the finalised CTMP for those works. That mitigation is included at Section 7 in the updated **Outline CTMP (Rev 1),** as submitted at deadline 2, which supersedes the **Outline CTMP**, **Appendix L** of the **TA**, **Appendix B.1** of the **ES (6.3, APP-066)**, as follows:

> *"It is the Applicant's intention to utilise the area in front of Erith Station for the southbound approach to Erith Roundabout. This will avoid cable installation on the immediate southbound approach or northbound exit of that roundabout. The EC will continue offline along an existing footpath and then cross the western arm of the same roundabout before re-joining the main highway.*

For the crossing of the western arm of Erith Roundabout, the Applicant will seek to install ducting during off-peak periods only, although such mitigation may require off-peak closure of inbound and outbound lanes on this arm.

If the route has to remain on the main highway north-south through Erith Roundabout then a solution in the southbound carriageway will be sought in preference to using the northbound carriageway. This approach would be further reviewed for the section south toward Colyers Lane.

The Applicant will adopt this approach to the route for the Electrical Connection unless it is no longer economic, efficient or coordinated to do so[1].

6.14. The complementary reduction in on-site parking to a maximum of 275 spaces would significantly reduce the induced level of workforce traffic on the local road network. This has been proposed and discussed in Technical Note reference TN009 "Further Appraisal of Construction Traffic Impacts on A2016/A206 Corridor", which has been submitted as part of the response to the Relevant Representation of TfL and LBB and is appended to the draft Statements of Common Ground with those organisations.

6.15. **Paragraphs 6.9.77 and 6.9.78** of **Chapter 6 Transport** of the **ES (6.1, Rev1)** has assessed the impacts of the construction of the Electrical Connection on Driver Delay. It is not contested that the working areas associated with the construction will impact on traffic flow along the corridor but it is concluded that the level of impact would continue to be Minor Adverse, subject to the implementation of a CTMP, secured as **Requirement 13** of the **dDCO (3.1, Rev1).**

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[1] These are obligations on UK Power Networks as a Distribution Licence holder.

Appendix C – Notes of meetings with TfL.

MINUTES

Meeting Title: Riverside Energy Park – Traffic Assessment – Process and Progress Review

Attendees: Natalie Maletras - PBA (NM), Michal Miklasz – Tfl Planning/ Network Performance Modelling Liaison (MM), Tim DeLaat – TfL Case Office (TD), Siddharth Iyer – PBA (SL), Morteza Mortezai-Nejad - PBA (MMN), Adrian Neve - PBA (AN)

Circulation: All present + Cory Riverside Energy + PBA Environmental Statement project co-ordinators.

Date of Meeting: 9th October 2018

Item	Subject	Actions
1.	**Introduction** Introductions were made and Tim confirmed he was the new appointed case officer for TfL.	
2.	**REP Summary** NM provided a summary of the REP Project and outlined the expected timetable for the Project: Mid November – Submission Dec 2018 – Acceptance of Application by PINS Jan 2019 – Section 56 Consultation Late Q1 2019 – Examination in Public 2021 – Start of Construction 2024 – REP Operational NM advised that it is intended to have a single 'preferred' route for the Electrical Connection by the time of examination. NM expressed that the 806k tonnes per annum for the ERF was the maximum predicted but that the actual level of throughput should be anticipated to be nearer 655k tpa. The 40k tpa for the AD is similarly a maximum but this may be lower depending on the technology choice and therefore can be considered as a robust 'worst case'.	
3.	**Operational Impacts** MMN walked through the trip rate assumptions for operation and explained the reasonable worst case scenario. MM asked for confirmation on any contingency plans expected to be in place for a Jetty Outage. NM confirmed that there had never been an outage in the years RRRF has been operating. PBA will discuss with the Applicant the contingencies they have or would have, and report back to TfL. MM asked if there is a planning restriction on the number of HGVs at RRRF during an outage? PBA to confirm this point with Cory. [Post Meeting Note: Condition 27 of 04 October 2017 Decision notice of 16/02167/FUL states that "*In the case of jetty outage, the number of heavy commercial vehicles carrying waste in peak hours along Norman Road shall be restricted as follows: 0730-0900 hours a maximum of 30 heavy commercial vehicle movements two-ways;*	ACTION PBA ACTION PBA

	between 1630-1800 hours a maximum of 30 heavy commercial vehicle movements two-ways and subject to there being a maximum of 300 heavy commercial vehicle movements tow-ways between 0000 hours and 24000hours on any day."]	
	MM asked for clarification on why the flat profile of distribution of vehicles entering the ERF over 24 hours and also the AD over 12 hours and whether Cory could provide more clarity / evidence on expected arrivals/departures timetable to refine assessment or substantiate the current flat profile to enhance robustness of assessment of impact at peak times. MM also asked whether Bexley could comment on the assumptions on origin/ destination and temporal distribution of the food waste for AD but appreciated that current waste arrangements are variable and could change significantly in the future. NM highlighted to TfL that Bexley Borough would already be doing these collections and also that it would not just be the council bringing material. There would also be a commercial element.	ACTION NM to liaise with Cory and report back.
	MM asked for PBA to consider the impacts of staff arriving for the 6pm shift slightly earlier and thus hitting the 'peak hours'.	ACTION PBA to review
	TD asked for clarity in why 260 days are assumed for the Bexley AD inputs.	ACTION NM to confirm
	MMN explained the approach to the use of TEMPro and also including committed developments. MM agreed this appeared to be a sensible approach but asked PBA to include all committed developments in close to proximity to the site, even if their expected trip generations are less than 50 – particularly if they had a cumulative impact of +50.	ACTION PBA to review
	MM asked for the trip distribution for the committed developments to be diagrammatically represented and issued to him in excel for ease of reference. It was agreed that this should form part of the evidence towards a Statement of Common Ground rather than forming part of the TA (avoiding the need to make it available to all). PBA would then present only a cumulative committed development sheet for the TA. PBA would also supply details of the junction assessments – cycle time/green time, saturation, queue length observations etc, as part of a pack to TfL for their review. It was agreed that there is no requirement to collect queue data for the junctions now but the current video would help to substantiate the free flowing nature / rolling queue at the junctions.	ACTION PBA
	SL outlined the approach taken to modelling and highlighted the 3 junctions assessed and issues surrounding validation. MM confirmed that the modelling assumptions seemed reasonable and that the level of modelling would be sufficient but requested SL send him through the models to confirm. MM confirmed he would be able to do this asap.	ACTION SL to issue models to MM and MM to confirm

	MM agreed that the percentage impacts of the operational flows were very low and that the network on Picardy Manorway is typically free flowing. PBA should continue to engage with LBB.	ACTION PBA
4.	**Construction** MM expressed concerns of the expected car number for construction, particularly for the peak months 12/13/14. The current assumption is for 50% of workforce to travel by car. MM to go back to TfL team to discuss the best approach to consider construction impacts. MM requested for PBA to review capacity of local routes by checking how much additional traffic could be accommodated at the three junctions. This could give an indication of the approximate level of movements that the junction could accommodate. This could then help to inform and guide later discussions about the effective operation during the construction stages – which would be encompassed in the CTMPs. However, this request would be confirmed by TfL. MM advised that for this piece of assessment, it may be sensible to exclude committed developments that are unlikely to be operational by 2022 and use TEMPro instead. MM asked for consideration to be given to reprofiling of workforce shifts and/or construction programme timetable to avoid conflicts with peak time and also try to avoid peak construction works at the REP site to clash with construction of the electrical connection works. AN confirmed that a Construction Traffic Management Plan would be a requirement of the DCO and that effective implementation of this plan would be to the benefit of Cory and thus options for alternative to car travel would be fully explored to help to manage access to the works and assist the efficiency of the construction programme. MM highlighted that considerable thought would need to go into the Construction Traffic Management Plan to enable a deliverable solution to be identified. MM concluded that the management of traffic during the construction phase was more challenging than the operational phase – albeit for an extended temporary period.	ACTION MM ACTION PBA ACTION PBA to Consider as part of CTMP
5.	**Summary & Next Steps** MM confirmed that the operational effects relating to transport are considered negligible however, would like to see clarification on some of the assumptions as outlined above. In relation to the construction phase, more dialogue needs to occur to understand how impacts from construction can be mitigated notably through the Construction Traffic Management Plan. It was accepted that this would be a developing dialogue. NM explained the process of Statement of Common Ground (SoCG) and TfL agreed this could be developed post submission pre-examination.	

MINUTES

Meeting Title: Riverside Energy Park – Transport Correspondence Update

Attendees: TfL - Tim DeLaat (TdL) TfL Planning Case Officer, Michal Miklasz (MM) Network Performance Modelling Liaison;
Cory Riverside Energy – Richard Wilkinson (RW) Head of Planning
PBA - Morteza Mortezai-Nejad (MMN), Adrian Neve (AN), Claire Sorrin (CS)

Circulation: All present + John Courtney (TfL – Network Operations -East) + Devon Christensen + PBA Core project co-ordinators.

Date of Meeting: 18th January 2019

Item	Subject	Actions
1.	**DCO Timetable** CS and RW outlined the anticipated programme: • **Dec 2018** - DCO accepted by PINS – allowing progress towards Examination • **Jan 2019** – s56 packages of information circulated to all identified stakeholders (inc TfL. TdL confirmed receipt) • **Jan-Feb 2019** – review of submitted documents; resolution of concerns; preparation of Statement of Common Ground. • **12 Feb** – responses required to PINS. • **Late March** – preliminary Exam meeting with Inspectors • **Apr-Oct 2019** – Examination period • **Q1 2020** – Decision • **2020** - Requirements discharge • **2021-2024** – Construction	
2.	**Issues Schedule** Ran through a schedule of matters, which was an amalgam of the points raised by TfL during previous correspondence and meetings. **Version 1.3 of the Schedule used at the meeting is appended** to these notes. A set of "slides" summarised the findings of the work which is outlined below. A **copy of those slides is appended to these Minutes**. Update version 2.1 reflects resolutions and points raised at meeting. It is proposed that version 2.1 is now used to inform the development of the Statement of Common Ground. Headline of specific points raised: <u>Item 1.1 and 1.2 (Contingency planning and planning restrictions)</u> – No previous jetty outage that has affected operations at the existing Riverside Resource Recovery Facility (RRRF) but Planning Condition in place to control access by road in the event of such an event happening. Contingency operations haven't been used and would only be expected to be used if the "outage" were for a number of days. CRE would be prepared to consider a Requirement on the DCO along a similar vein to the Planning Condition 27 of 04 October 2017 on RRRF, i.e.: *"In the case of jetty outage, the number of heavy commercial vehicles carrying waste in peak hours along Norman Road shall be restricted as follows: between 0730-0900 hours a maximum of 30 heavy commercial vehicle movements two-ways; between 1630-1800 hours a maximum of 30 heavy commercial vehicle movements two-ways and subject to there being a maximum of 300 heavy commercial vehicle movements two-ways between 0000 hours and 2400hours on any day."*	APN APN

	MM requested that consideration be given where possible to avoiding the network peak hours. Item 1.3 (Materials delivery profile): CRE and PBA stated that the flat profiling of the delivery of material to the Energy Recovery Facility (ERF) and the Anaerobic Digestion (AD) plant reflects the anticipated profile for REP. ERF material was expected to be supplied on a seven day 24hr basis, including commercial source contracts, and the AD material is anticipated to operate on a weekday 12hr basis. The details of contracts cannot be known at this stage and could change during the life of the facility. A peak scenario would not materially affect the conclusions drawn within the TA and ES. A peaked profile, with flows concentrated outside the peak period would further reduce the predicted network peak period impacts. Item 1.4 (Operational Phase shift change sensitivity): TfL had requested that a review were done to understand the likely implication of the workforce shift changes occurring during network peak periods. Summary details of a range of scenarios indicate that alternative analysis would not materially affect the outcome of the operational shift change appraisal. **A Technical Note is appended** to these notes providing details of the scenario appraisals. Items 1.7 and 1.8 (Construction phase junction and network sensitivity): PBA summarised the sensitivity work that had been done to understand the maximum throughput for the junctions of Picardy Manorway. This indicated that the junctions could handle the throughput of the maximum parking allocation at REP (552 parking spaces). **A Technical Note detailing this work is appended** to these Minutes RW expressed that it was in CRE's commercial interest to seek to reduce the number of parking spaces but that the detail for the construction programme was not yet available and that the Construction Traffic Management Plan (CTMP) was the mechanism to determine the appropriate parking provision (and locations) – reflecting the main contractor's knowledge of their workforce (often quite specialist people). The key section of network to be appraised was around the Bexley Road / A2016) Bronze Age Way junction. AN showed that the current indicative construction programme shows a marked peak in workforce numbers around Month 13. MM questioned whether it was CRE's intention to provide all parking spaces from the outset. The point on commerciality was reiterated. RW explained that an area of land adjacent to Norman Road had been preliminarily identified as a possible location for parking but that alternative sites might be identified subsequently and on a phased approach. Subject to these future proposals the focus for car based travel could be elsewhere with the last leg of the journey by other means. MM stated that he continues to need to understand the impact on the network of the construction period but *acknowledged that this could be through the CTMP*. **MM and TdL to confirm that TfL is content with this approach** – i.e. agree a position through a Requirement of the DCO for a CTMP?	APN APN TdL/MM

	AN expressed that the REP construction phase would not be an appropriate mechanism to deliver physically mitigation at the Bexley Road junction. The impacts would be short term and should be mitigated by other means. AN questioned whether there are models available of the Bexley Road roundabout, which could be made available if required. MM suggested that others could be preparing models – LBBexley and/or through the proposed development at Crabtree Manorway. Other points: were either previously addressed through exchanges of information prior to the meeting or are points of technical detail which will be **agreed between MM and MM-N outside the meeting**. The updated schedule is appended to these minutes.	MM/MM-N
3.	**Statement of Common Ground (SoCG)** CS and RW outlined the reasoning behind the SoCG – focusing the considerations for the Examination, guiding the Inspectors to the key points of discussion/negotiation. TfL is encouraged to review the document provided on 07 January and provide feedback to CRE/PBA. A further meeting is expected to be required to consider each point raised by TfL. **APN will organise**. The meeting should include a review of comments from TfL.	APN
4.	**AOB** TdL confirmed that his colleague (Julia Bray) would have delegated authority to sign the SoCG and that she would not be required to report to board or committee. **TdL to confirm this position.**	TdL

NOTES

Job Name: Riverside Energy Park

Job No: 42166

Note No: TN005

Date: 17/01/19

Prepared By: Morteza M.Nejad

Subject: **TfL Engagement Position Log**

This schedule provides an amalgamation of the points raised by Tim de Laat (Consultant Senior Technical Planner – TfL Spatial Planning) and Michal Miklasz (Network Performance Modelling Liaison), of Transport for London. The points have been raised through engagement further to the Transport Assessment scoping stage in March 2018; TfL response to that scoping in May 2018; the Preliminary Environmental Information Report in June 2018; and the GLA/TfL response to that in July 2018.

A meeting was held with TfL on 09 October 2018 to continue engagement on the points raised through early consultation and has been followed with on-going communication exchanges thereafter.

The points raised at the 09 October 2018 meeting and the communications are summarised in the table below, showing the response so far and whether the matter has been resolved or actions to be pursued.

This Technical Note will be updated as the Actions are progressed and resolved.

Item	TfL Request / Query	PBA Response	Action Required Green = Action resolved Amber =PBA responded, awaiting TfL response Red = Action outstanding
1	**TfL Pre-App Meeting (09/10/18) Actions**		
1.1	Operational Period: TfL asked for information on any contingency plans expected to be in place in the event of a jetty outage?	The Applicant has confirmed that there has never been an outage in the years RRRF has been operating.	The Applicant is to provide details of the contingency plans.

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1.2	Operational Period: TfL asked if there is a planning restriction on the number of HGVs at RRRF during a jetty outage?	Condition 27 of 04 October 2017 Decision notice of 16/02167/FUL refer to the control of movements of waste by road during a jetty outage. "*In the case of jetty outage, the number of heavy commercial vehicles carrying waste in peak hours along Norman Road shall be restricted as follows: between 0730-0900 hours a maximum of 30 heavy commercial vehicle movements two-ways; between 1630-1800 hours a maximum of 30 heavy commercial vehicle movements two-ways and subject to there being a maximum of 300 heavy commercial vehicle movements two-ways between 0000 hours and 2400hours on any day.*"	Action resolved.
1.3	Operational Period: TfL asked for clarification on why the flat profile of distribution of vehicles entering the ERF over 24 hours and also the AD over 12 hours and whether Cory could provide more clarity / evidence on expected arrivals/departures timetable to refine assessment or substantiate the current flat profile to enhance robustness of assessment of impact at peak times. TfL also asked whether Bexley could comment on the assumptions on origin/ destination and temporal distribution of the food waste for AD but appreciated that current waste arrangements are variable and could change significantly in the future.	The Applicant's representative highlighted at the meeting that Bexley Borough would already be doing these collections and that it would not just be the council bringing material. There would also be an input from commercial contracts from another source/origin.	The Applicant will show that a peak or flat profile would have no significant impact on the network.
1.4	Operational Period: TfL has requested that the Applicant considers the impacts of staff arrivals for the 6pm shift coinciding with the 'peak hours'.	Sensitivity analysis has been undertaken testing various scenarios relating to the PM shift arrivals. The Applicant is to share results of the sensitivity testing with TfL.	The Applicant will provide an output from sensitivity analysis on the shift change variance and demonstrate that the network is not sensitive to the variation in shift profile.

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1.5	Operational Period: TfL has asked for clarity on why 260 days are assumed for the Bexley Borough AD inputs.	The 260 days takes an assumption that the AD inputs would be received across an average 5 day week (5 x 52). Material input to the ERF is assumed to operate on a 7 day week.	Action resolved.
1.6	Committed Development: TfL has requested that the Applicant indicates the calculation assumptions, committed development flows, modelling inputs and models that have been used to infirm the TA and ES.	The requested data and information has been provided in email to TfL on 11/10/18. The traffic survey video footage was delivered to TfL on 17/10/18.	Action resolved.
1.7	Construction Period: TfL requested a review of capacity of local routes by checking how much additional traffic could be accommodated at the three junctions being assessed on Picardy Manorway. To inform later discussions about the effective operation of the network during the construction stages.	The Applicant has assigned the morning peak construction period traffic to the Picardy Manorway corridor to predict the likely available reserve capacity. This has shown that these junctions would continue to operate with reserve capacity under the reasonable worst case assumptions.	PBA to provide outputs from sensitivity tests on how much additional traffic could be accommodated at the three junctions on Picardy Manorway being assessed.
1.8	Construction Period: TfL asked for consideration to be given to re-profiling of workforce shifts and/or construction programme timetable to avoid conflicts with peak time and also try to avoid peak construction works at the REP site to clash with construction of the electrical connection works.	The Applicant has stated that this refinement could form part of the CTMP. The workforce projections are based from the process used for the construction of RRRF.	Further detail to be provided at time of CTMP preparation and agreement. Links to Item 1.7.
2	**TfL (Tim de Laat) Email on 24/10/18**		
2.1	Network Models: TfL requested for the Junctions 9 modelling input measurements to be sent over for review.	Requested files sent to TfL on 06/11/18	Action resolved.
3	**TfL (Michal Miklasz) Email on 06/11/18**		
3.1	Network Models: PBA has reported that, with regards to the LinSig model, the modelled Degree of Saturation (DOS) and	From the video footage available, queuing on the Norman Road/ Picardy Manorway junction cannot be observed in either direction. The	PBA response provided. Awaiting response from TfL.

	queues on Picardy Manorway EB and lack of demand on Norman Road suggest that the junction does not suffer from any Underutilised Green Time (UGT). TfL has subsequently queried whether there is no queuing back from the downstream junction and from Yarnton Way roundabout.	observations of the free flow of traffic through the junction and the apparent reserve capacity suggests that queues at the junction are minimal.	
3.2	Network Models: TfL has stated that demand on Norman Road is fairly frequent in the PM peak and that queue survey comparison should be used for validation if DoS values were not possible for collection.	Detailed queue counts cannot be determined for each arm from the video footage angles available. The video footage is sufficient to show that queueing is minimal at this junction for all arms which is consistent with the LinSig model outputs. TfL has access to the video footage for this junction for review.	PBA response provided. Awaiting response from TfL.
3.3	Saturation Flows for Models: TfL has stated that some values are surprisingly high and to exclude anything above 2200 PCUs/Hr.	The saturation flows for the Picardy Manorway (west) arm (ahead only lanes) has been calculated based on observations from the video footage. This is based on 10 saturation flow readings for each lane and averaging. Some of the observed saturation flow readings are higher than 2200 PCUs/Hr. However, the overall averaged saturation flows for each lane which has been input into the LinSig model are below 2200 PCUs/Hr. The saturations flows (in PCUs/Hr) for each entry lane is as follows: • Picardy Manorway (eastbound) – - nearside:1832 PCUs/Hr, - middle lane:2155 PCUs/Hr, - offside lane:2116 PCUs/Hr • Picardy Manorway (westbound) – - nearside:1990 PCUs/Hr, - offside:1990 PCUs/Hr • Norman Road- - 860 PCUs/Hr.	PBA response provided. Awaiting response from TfL.

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		It should be noted that excluding the saturation flow readings that are higher than 2200 PCUs/Hr would not materially affect the averaged saturation flows and would not significantly impact on the modelling outputs.	
3.4	Demand Dependency (DD): TfL has queried how DD has been calculated for the Picardy Manorway (west) arm?	Readily resolved technical point to be addressed at TfL meeting. PBA has spot checked the DD over a 27min and 17min period in the AM and PM peak respectively – using the available video footage. The spot checks have been used to estimate peak hourly demand from Norman Road. The calculation presented in PBA's spreadsheet for calculating DD based on the actual duration of demand compared to the total duration of time observed as opposed to only considering the number of demand calls. For example, the DD % during the AM peak is estimated to be 19%, as worst case, using 5 minutes of demand recorded over 26.7 minutes.	PBA response provided. Awaiting response from TfL.
3.5	Queue Data: Request for queue counts to be provided for the Norman Way/ Picardy Manorway Junction.	Refer to Item 3.2 above.	PBA response provided. Awaiting response from TfL.
4	**TfL (Michal Miklasz) Email on 20/11/18**		
4.1	Network Models: Following review of the video footage, it is acknowledged by TfL that "*the junctions seem to operate without any issues*" - it is stated that the base models can be accepted once the previous comments Item 3 are addressed. It is re-iterated that more details regarding queue comparison data should be provided.	Refer to PBA responses in Item 3.	PBA response provided. Awaiting response from TfL.

NOTES

4.2	Committed Development: TfL requested that the revised models should feature reviewed committed development flows as per request from the previous meeting.	This has been addressed in the revised models and assessments included within the TA. The sensitivity test analysis as per Item 1.4 will also include the reviewed committed developments.	PBA response provided. No further action required.
4.3	A2016 / Bexley Road junctions: TfL has stated that "*although not included in the final scope of assessment the Fish Roundabout images confirm that it is a pinch point on the local network with severe and frequent queuing and blocking back through the junction*" and this could "*become more of a concern in the future years when all developments will start generating more flows and could be cause for concern when considering new cable connection works*"	The percentage impact of the proposed development at the 'Fish Roundabout' is 0.3% during both the AM and PM peaks during the operational phase. Furthermore, it is unlikely that queueing back from the roundabout up to the north will have an impact at the three junctions within the assessment scope - 2.5km to the north (to the 'Horse Roundabout'). Based on the above, it is not deemed reasonable for Fish Roundabout to be modelled as part of the Operational Phase impact assessments. The Construction Phase impacts at the junction during the peak construction period, as a reasonable worst case scenario, are predicted to be of the order of 3.7% for the whole junction and 6.2% on Queens Road arm in the AM peak period. These impacts would be temporary, as noted within the TA and ES. The CTMP would seek to mitigate the level of impact.	PBA response provided relating to the operational phase. PBA to present sensitivity analysis relating to construction phase.
4.4	Committed Developments: TfL has queried the list of committed developments and whether flows represent vehicle trips or total number of trips.	The committed development flows provided to TfL in the aggregated MSExcel files represent vehicle flows for all identified sites. The full list of committed developments (which have been reviewed as mentioned in Item 4.3) have been included within the assessments in the ES and TA. The committed development spreadsheet containing the revised committed development vehicle flows and the associated trip distribution for each site can be sent to TfL if required.	PBA response provided. No further Action required.
4.5	Meeting Presentation: A copy of the presentation from the TfL pre-app meeting on 09/10/18 was requested.	Presentation sent on 17/12/18.	Action resolved.

NOTES

Riverside Energy Park

TfL Engagement – Update on Traffic Appraisal

18 January 2019

CORY
RIVERSIDE ENERGY

pba peterbrett now part of Stantec

Agenda

1. DCO Submission update
2. Statement of Common Ground
3. Schedule of comments

Operational Phase

PM Peak Hour Sensitivity Test

TA Assumptions

- Staff: 78 workforce + 5 managers
- Two 12hr shifts (workforce): 06:00 – 18:00 & 18:00 – 06:00
- PM shift arrivals: 17:30 – 18:00
- PM network peak assessed: 16:30 – 17:30
- Workforce movements not within network assessment

Context

- TA junction modelling excludes workforce movements in PM peak hour
- Sensitivity analysis tests scenarios relating to PM Peak workforce arrivals and departures
- Sets out REP impacts concentrated at junctions on Picardy Manorway

Operational Phase

PM Peak Hour Sensitivity Test – Scenarios Tested

Time periods tested: 16:30-17:30
17:00-18:00
18:00–19:00

Scenario	Core	Sensitivity	Worst case
AM shift (% workforce)	50% (39)	80% (62)	50% (39)
PM shift (% workforce)	50% (39)	20% (16)	50% (39)
Arrive before / Depart after	1 hour	1 hour	30 mins
Car mode share	63%	100%	100%

Operational Phase

PM Peak Hour Sensitivity Test – Scenarios Tested

Time Period	Core Scenarios - 39 AM Shift Workers - 39 PM Shift Workers	Sensitivity Scenarios - 62 AM Shift Workers - 16 PM Shift Workers	Worst-Case Scenarios - 39 AM Shift Workers - 39 PM Shift Workers
16:30 - 17:30	50% of 39 PM shift arrivals = 20	50% of 16 PM shift arrivals = 8	No shift worker arrival or departures
17:00- 18:00	100% of 39 PM shift arrivals = 39	100% of 16 PM shift arrivals = 16	Not tested as similar to Core scenario for this time period
17:30 - 18:30	50% of 39 PM shift arrivals + 50% of 39 AM shift departures = 39	50% of 16 PM shift arrivals and 50% of 62 AM shift departures = 39	100% of 39 PM shift arrivals + 100% of 39 AM shift departures = 78
18:00 - 19:00	100% of 39 AM shift departures = 39	100% of 62 AM shift departures = 62	Not tested as similar to Core scenario for this time period

Operational Phase

PM Peak Hour Sensitivity Test – Results

All scenarios

Greatest percentage impacts at Picardy Manorway junctions

Core scenario

<1% impact at Bexley Road, James Watt Way and Boundary Road junctions on all arms

Sensitivity scenario

<1% impact at Bexley Road, James Watt Way and Boundary Road junctions on all arms (except A2016 Bronze Age Way, A206 Queens Road (North) and A206 South Road which have 2% - 3% between 18:00 – 19:00).

Worst Case scenario

<1% impacts at Bexley Road, James Watt Way and Boundary Road junctions on all arms (expect for A2016 Bronze Age Way which has 2% between 17:30-18:30).

Construction Period

Sensitivity of network

- TA assumes worst case 08:00-18:00
  (arr. 07:00-08:00 / dep. 18:00-19:00)

- Anticipated actual one shift 07:00-19:00
  (arr. 06:30-07:00 / dep. 19:00-19:30)

- Many variables in movement profile:
  - -Toolbox talks + briefings;
  - -changing/PPE in-out;
  - -flexibility due to tasks + co-ordination with other workstream;
  - -extended pours etc.

Construction Phase

Sensitivity Test – Maximum Throughput

Context

- Sensitivity analysis to test maximum capacity of three junctions on Picardy Manorway during construction phase
- Results inform how much of construction phase movements could be accommodated at the three junctions
- Constructions workers make largest contribution to construction phase trips (~ 552 movements per peak)
- TA reasonable worst case assumption - construction workers work 08:00 – 18:00

Scenarios Tested

- Time periods: 06:00 – 07:00, 07:00 – 08:00 and 07:30 – 08:30
- 100% construction worker arrivals for each time period
- Construction phase movements increased proportionally until junction failure

Construction Phase

Sensitivity Test - Max Throughput - Summary

- All three junctions work within desirable capacity for all scenarios with all construction traffic added (552 movements) during 2022 future base

- Junctions only start operating over capacity when REP construction traffic is uplifted to 150% - 200% and only during 07:30 – 08:30 (equates to 850 – 1200 movements on top of the 2022 future base)

Construction Flows

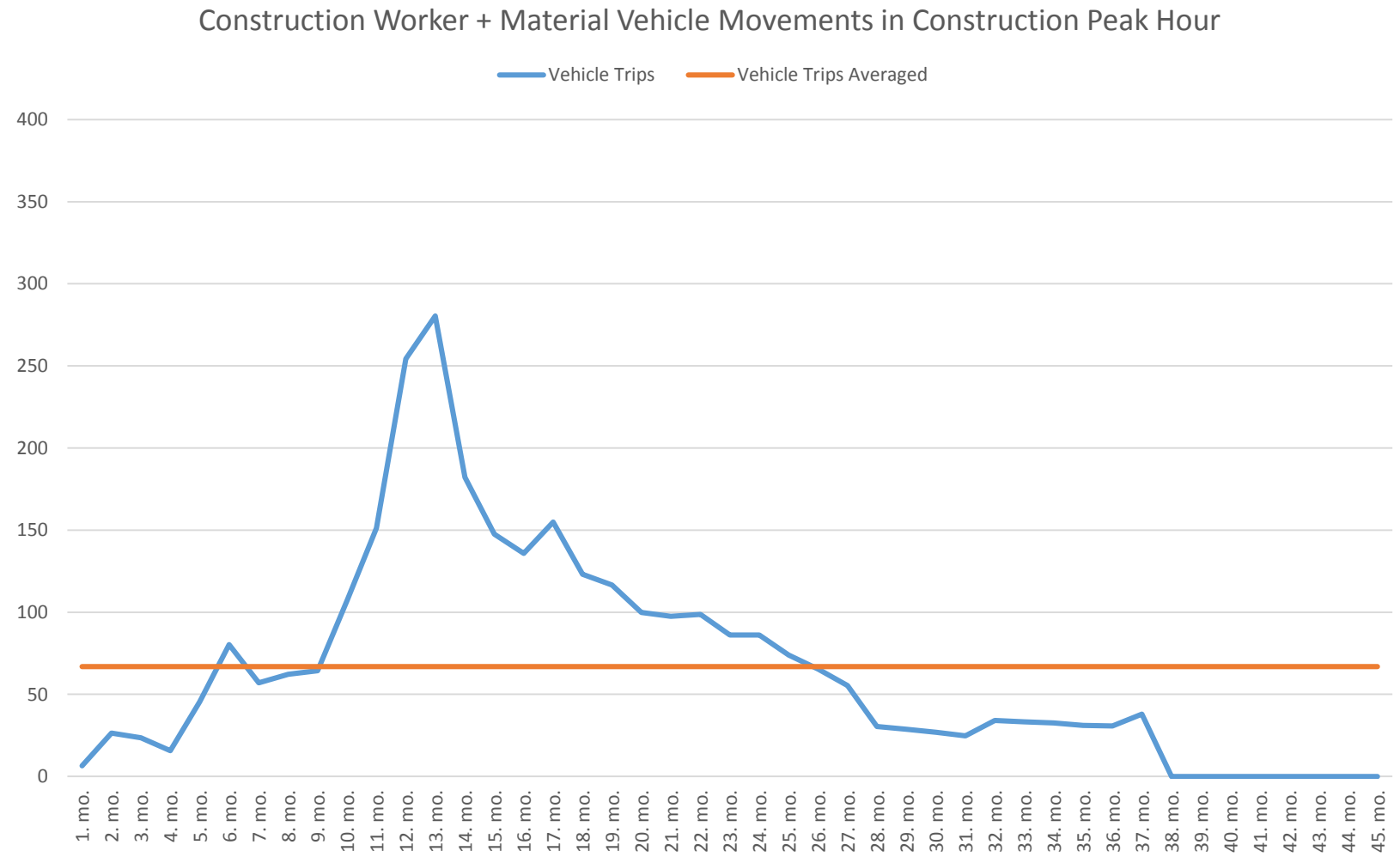
Trip Generation - REP Construction Staff

Construction staff trip generation is based on the expected number of personnel and onsite parking provision over the construction period

Month	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*	*12*	*13*	*14*	*15*
Personnel	0	0	49	50	143	147	156	202	205	377	556	989	1097	696	549
Parking	0	0	43	44	96	99	107	123	126	209	297	501	552	359	291
Month	*16*	*17*	*18*	*19*	*20*	*21*	*22*	*23*	*24*	*25*	*26*	*27*	*28*	*29*	*30*
Personnel	497	575	441	413	341	330	334	289	291	234	207	179	96	91	85
Parking	267	305	244	231	198	194	196	171	171	147	130	110	74	71	67
Month	*31*	*32*	*33*	*34*	*35*	*36*	*37*	*38*	*39*	*40*	*41*	*42*	*43*	*44*	*45*
Personnel	78	108	106	103	99	98	169	83	83	83	83	83	83	83	83
Parking	63	95	93	91	87	86	76	0	0	0	0	0	0	0	0

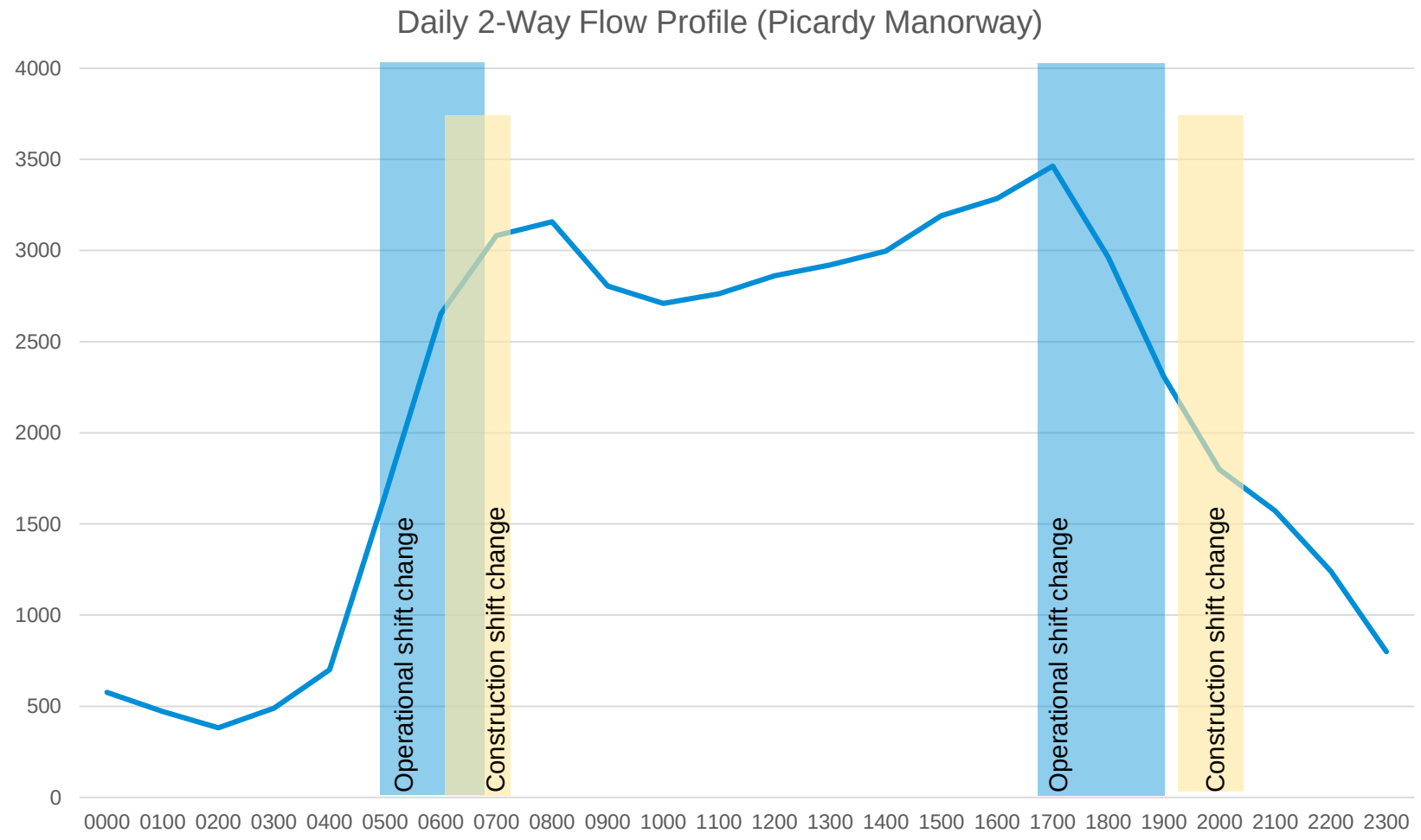
Construction Flows

Trip Generation – Flow Profile



Construction Flows

Base Network Hourly Flow Profile (2018)



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Thank you

TECHNICAL NOTE

Job Name: Riverside Energy Park

Job No: 42166

Note No: TN004

Date: 24/01/2019

Prepared By: Morteza M.Nejad

Subject: **Shift Worker Impacts During PM Peak Period**

Introduction

This technical note sets out the highway impacts associated with the operational phase shift-worker vehicle movements during the PM peak period for the proposed development at Riverside Energy Park (REP).

At the pre-application meeting held on 9th October 2018, TfL officers requested that for the operational assessment of the proposed development, the cumulative impacts of shift-workers arriving and departing during the PM peak period (16:30 – 19:00) should be assessed. This request has been made in order to establish whether additional analysis should be undertaken at Junctions 4,5 and 6 of the following list:

- Junciton 1 - A2016/ Clydesdale Way/ Yarnton Way roundabout
- Junciton 2 - A2016/ Norman Road
- Junciton 3 - A2016/ Anderson Way/ B253
- Junciton 4 - A2016 Bronze Age Way/ A206 Queens Road / A206 Bexley Road
- Junciton 5 - A206 Queens Road/ James Watt Way
- Junciton 6 - A206 South Road/ Boundary Road/ A206 Northend Road/ Larner Road

Junctions 4,5 and 6 were not included within the initial scoping, commented on by TfL in May 2018. Assessments of the likely impact at these junctions have shown the low percentage impacts forecasted as a result of the proposed development. Details of the impacts at each junction and each arm, compared to the predicted future base of 2028, are set out at Appendix A to this Technical Note.

Shift Worker Assumptions

For the purposes of the assessment of traffic impacts the following assumptions have been used in relation to the operational phase workforce:

- Total REP workforce: 83 persons/day FTE
- Management staff: 5 persons/day working standard working hours (09:00 – 17:00)
- Shift workers: 78 persons/day working 12-hour shifts (day shift: 06:00 – 18:00 and night shift:18:00 – 06:00)

For shift workers, the exact proportions of staff working the day and night shift is not known at this stage. However, it is expected that between 50% - 80% of the shift workers may work during the day shift and 20% - 50% may work during the night shift.

The operational phase assessments included within the TA assume that all shift worker arrival and departures occur in the 30 minutes preceding or following the shift start and end times. Consequently, no shift worker trips coincided with the TA assessments which cover the PM peak hour of 16:45-17:45.

As part of the assessments included herein, various different sensitivity scenarios have been tested with different shift worker departure profile and car mode share assumptions, as set out below, to explore the change in impact between those alternative scenarios and that tested in the TA.

The operatonal staff vehicle trips have been distributed onto the highway network using 2011 Census data, as set out in Section 5 of the TA.

Scenarios Assessed

Percentage impact assessments have been undertaken for the following scenarios across 16:30 – 19:00:

Core Scenario: - 50% of all shift workers working the day shift and remaining 50% working the night shift
- Arrivals and departures take place in the hour preceding or following shift start and finish times
- Census car mode-share of 63% applied to worker trips
- Management staff and non-staff operational trips included as normal

Sensitivity Scenario: - 80% of all shift workers working the day shift and remaining 20% working the night shift
- Arrivals and departures take place in the hour preceding or following shift start and finish times
- Worst-case (100%) car mode-share applied to worker trips
- Management staff and non-staff operational trips included as normal

TA Assumed Scenario: - 50% of all shift workers working the day shift and remaining 50% working the night shift
- Arrivals and departures take place in the 30 minutes preceding or following shift start and finish times
- Worst-case (100%) car mode-share applied to worker trips
- Management staff and non-staff operational trips included as normal

Table 1 sets out a summary of the shift worker movements for all scenarios assessed.

Table 1: Summary Shift Worker Assumptions in the Scenarios Assessed

Time Period	Core Scenarios - 39 Day Shift Workers - 39 Night Shift Workers	Sensitivity Scenarios - 62 Day Shift Workers - 16 Night Shift Workers	TA Assummed Scenario
16:30 - 17:30	50% of 39 night shift arrivals = 20	50% of 16 night shift arrivals = 8	No shift worker arrival or departures
17:00- 18:00	100% of 39 night shift arrivals = 39	100% of 16 night shift arrivals = 16	Not tested as similar to Core scenario for this time period
17:30 - 18:30	50% of 39 night shift arrivals + 50% of 39 day shift departures = 39	50% of 16 night shift arrivals and 50% of 62 day shift departures = 38	100% of 39 night shift arrivals + 100% of 39 day shift departures = 78
18:00 - 19:00	100% of 39 day shift departures = 39	100% of 62 day shift departures = 38	Not tested as similar to Core scenario for this time period

Percentage Impact Assessment

Percentage impact assessments have been undertaken for the scenarios listed in Table 1 for the junctions surveyed as part of the Transport Assessment work.

The Core scenario, Sensitivity scenario and TA Assumed scenario junction percentage impacts have been shown in Appendix A Table A1, Table A2 and Table A3 respectively. These tables include the predicted materials movements during that period – e.g. material imports and exports.

As can be seen from percentage impacts, the overall impacts of the development on the highway network are generally negligible or minor.

In all three scenarios, the greatest percentage impacts occur at Junctions 1,2 and 3. The highest percentage impact occurs at Junction 2 and in particular the Norman Road arm which forms the access route from the A2016 Picardy Manorway. The Norman Road arm also has a low level of background traffic which results in higher percentage impacts as a result of the development.

In the Core scenario the percentage impacts at Junctions 4,5 and 6 are between 0 - 1% for all arms. In the Sensitivity scenario, the percentage impacts at Junctions 4,5 and 6 are between 0 - 1% for all arms except for A2016 Bronze Age way, A206 Queens Road (North) and A206 South Road which have percentage impacts between 2 - 3% at 18:00 – 19:00.

In the TA Assumed scenario, the percentage impacts at Junctions 4,5 and 6 are between 0 - 1% for all arms expect for A2016 Bronze Age Way which has an impact of 2% between 17:30-18:30.

It should be noted that although for some junction arms the percentage impacts are slightly higher between 18:00 – 19:00 in the Sensitivity scenario and between 17:30-18:30 in the TA Assumed scenario, the overall junction flows during the preceding hours are higher even without development. This has been shown in Table 3 and Table 4 below.

Table 3: Junction Flows for 17:00 - 18:00 and 18:00-19:00 2028 Future Base and 18:00-19:00 2028 With Development (Sensitivity scenario)

Junction	17:00 - 18:00 2028 Future Baseline	18:00 - 19:00 2028 Future Baseline	18:00 - 19:00 2028 With Development
Junction 4	4388	3926	3949
Junction 5	3782	3434	3453
Junction 6	3199	2916	2935

Table 4: Junction Flows for 16:30 – 17:30 and 17:30-18:30 2028 Future Base and 17:30-18:30 2028 With Development (TA Assumed scenario)

Junction	16:30 - 17:30 2028 Future Baseline	17:30 - 18:30 2028 Future Baseline	17:30 – 18:30 2028 With Development
Junction 4	4351	4163	4186
Junction 5	3881	3577	3597
Junction 6	3166	3046	3065

The tables above demonstrate that the Future Base junction flows, at or very close to the network peak hour (16:30-17:30), are significantly higher than the flows from 17:30 onwards and the 'With Development' flows.

The hourly traffic profile from the 2018 survey data also demonstrates that the junction flows are sharply peaked near the network PM peak hour and drop significantly from 17:30 onwards. The PM period hourly traffic profiles for Junctions 4,5 and 6 have been shown in Figures B1, B2 and B3 within Appendix B.

Summary

Overall, it has been shown that the highway impacts associated with the following junctions are very low and do not warrant further investigation for the operational assessment for:

- Junction 4: A2016 Bronze Age Way/ A206 Queens Road / A206 Bexley Road

- Junction 5: A206 Queens Road/ James Watt Way
- Junction 6: A206 South Road/ Boundary Road/ A206 Northend Road/ Larner Road

The percentage impacts at Junctions 1, 2 and 3 are higher but those junctions continue to operate with substantial reserve capacity, as has been indicated within the DCO TA and ES.

It has also been shown that the traffic flows at the above junctions are sharply peaked near the junction PM peak hour and that traffic flows drop significantly post 17:30. This, coupled with low percentage impacts at junctions 4,5 and 6 show that the impact of the proposed development is negligible at these junctions during its operational phase, irrespective if the shift pattern scenarios.

DOCUMENT ISSUE RECORD

Technical Note No	Rev	Date	Prepared	Checked	Reviewed (Discipline Lead)	Approved (Project Director)
42166/5501/TN004	-	30.10.18	Morteza Mortezai-Nejad	Adrian Neve		

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Appendix A: Percentage Impacts

Table A1: Core Scenario Junction Percentage Impacts [All REP Vehicles]

Junction	16:30-17:30		17:00-18:00		17:30-18:30		18:00-19:00	
	Trip Generation	% Impact compared to 2028 FB	Trip Generation	% Impact compared to 2028 FB	Trip Generation	% Impact compared to 2028 FB	Trip Generation	% Impact compared to 2028 FB
J1 - A2016/ Clydesdale Way/ Yarnton Way roundabout	38	1.2%	50	1.6%	41	1.4%	31	1.2%
A2016 Picardy Manorway	25	2.0%	34	2.7%	28	2.2%	22	1.8%
Clydesdale Way	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Yarnton Way roundabout	0	0.0%	0	0.0%	0	0.1%	0	0.1%
A2016 Eastern Way	12	1.1%	15	1.3%	12	1.1%	9	1.0%
J2 - A2016/ Norman Road	70	2.3%	92	3.1%	86	3.0%	79	3.1%
Norman Road	18	24.1%	18	34.5%	30	42.3%	43	54.6%
A2016 Picardy Manorway (East)	25	2.0%	34	2.7%	28	2.2%	22	1.8%
A2016 Picardy Manorway (West)	27	1.6%	40	2.4%	27	1.8%	15	1.2%
J3 - A2016/ Anderson Way/ B253	33	0.9%	42	1.1%	45	1.3%	48	1.6%
A2016 Picardy Manorway	18	1.1%	18	1.1%	30	2.0%	43	3.2%
Anderson Way	0	0.0%	0	0.0%	0	0.0%	0	0.0%
A2016 Bronze Age Way	11	1.1%	16	1.7%	11	1.2%	5	0.6%
B253 Picardy Manorway	4	1.1%	7	2.1%	4	1.1%	0	0.1%
J4 - A2016/ Bexley Rd/ A206	17	0.4%	23	0.5%	23	0.6%	23	0.6%

Junction	16:30-17:30		17:00-18:00		17:30-18:30		18:00-19:00	
	Trip Generation	% Impact compared to 2028 FB	Trip Generation	% Impact compared to 2028 FB	Trip Generation	% Impact compared to 2028 FB	Trip Generation	% Impact compared to 2028 FB
A2016 Bronze Age way	7	0.4%	7	0.4%	12	0.9%	18	1.4%
Bexley Road	0	0.0%	0	0.0%	0	0.0%	0	0.0%
A206 Queens Road	9	0.6%	14	0.9%	9	0.6%	5	0.4%
A206 Bexley Road	1	0.2%	3	0.3%	1	0.2%	0	0.0%
J5 - A206/ James Watt Way	16	0.4%	20	0.5%	20	0.6%	20	0.6%
A206 Queens Road (North)	6	0.4%	6	0.4%	11	0.7%	15	1.1%
James Watt Way	0	0.1%	1	0.1%	0	0.1%	0	0.0%
A206 Queens Road (North)	9	0.7%	13	1.0%	9	0.7%	5	0.4%
J6 - A206/ Boundary St/ Dell View Rd	15	0.5%	19	0.6%	19	0.6%	19	0.7%
A206 South Road	6	0.4%	6	0.4%	10	0.8%	14	1.1%
Boundary Street	0	0.0%	0	0.0%	0	0.0%	0	0.0%
A206 Northend Road	9	0.6%	13	0.9%	9	0.6%	5	0.4%
Dell View Road	0	0.0%	0	0.0%	0	0.0%	0	0.0%

Table A2: Sensitivity Scenario Junction Percentage Impacts

Junction	16:30-17:30		17:00-18:00		17:30-18:30		18:00-19:00	
	Trip Generation	% Impact compared to 2028 FB	Trip Generation	% Impact compared to 2028 FB	Trip Generation	% Impact compared to 2028 FB	Trip Generation	% Impact compared to 2028 FB
J1 - A2016/ Clydesdale Way/ Yarnton Way roundabout	33	1.0%	41	1.3%	41	1.4%	41	1.5%
A2016 Picardy Manorway	22	1.7%	27	2.1%	29	2.3%	31	2.6%
Clydesdale Way	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Yarnton Way roundabout	0	0.0%	0	0.0%	0	0.1%	0	0.1%
A2016 Eastern Way	11	1.0%	13	1.1%	11	1.0%	9	1.0%
J2 - A2016/ Norman Road	62	2.1%	76	2.5%	101	3.6%	127	4.9%
Norman Road	18	24.1%	18	34.5%	49	68.7%	80	103.0%
A2016 Picardy Manorway (East)	22	1.7%	27	2.1%	29	2.3%	31	2.6%
A2016 Picardy Manorway (West)	23	1.4%	31	1.9%	23	1.5%	15	1.2%
J3 - A2016/ Anderson Way/ B253	29	0.8%	35	1.0%	61	1.8%	86	2.8%
A2016 Picardy Manorway	18	1.1%	18	1.1%	49	3.3%	80	6.1%
Anderson Way	0	0.0%	0	0.0%	0	0.0%	0	0.0%
A2016 Bronze Age Way	9	0.9%	12	1.3%	9	1.0%	5	0.6%
B253 Picardy Manorway	3	0.7%	5	1.4%	3	0.8%	0	0.1%
J4 - A2016/ Bexley Rd/ A206	15	0.3%	19	0.4%	30	0.7%	40	1.0%

Junction	16:30-17:30		17:00-18:00		17:30-18:30		18:00-19:00	
	Trip Generation	% Impact compared to 2028 FB	Trip Generation	% Impact compared to 2028 FB	Trip Generation	% Impact compared to 2028 FB	Trip Generation	% Impact compared to 2028 FB
A2016 Bronze Age way	7	0.4%	7	0.4%	21	1.5%	35	2.8%
Bexley Road	0	0.0%	0	0.0%	0	0.0%	0	0.0%
A206 Queens Road	8	0.5%	11	0.7%	8	0.5%	5	0.4%
A206 Bexley Road	1	0.1%	2	0.2%	1	0.1%	0	0.0%
J5 - A206/ James Watt Way	14	0.4%	17	0.4%	25	0.7%	33	1.0%
A206 Queens Road (North)	6	0.4%	6	0.4%	17	1.2%	28	2.0%
James Watt Way	0	0.0%	1	0.1%	0	0.1%	0	0.0%
A206 Queens Road (North)	8	0.6%	10	0.8%	8	0.6%	5	0.4%
J6 - A206/ Boundary St/ Dell View Rd	14	0.4%	16	0.5%	24	0.8%	31	1.1%
A206 South Road	6	0.4%	6	0.4%	16	1.2%	26	2.0%
Boundary Street	0	0.0%	0	0.0%	0	0.0%	0	0.0%
A206 Northend Road	8	0.5%	10	0.7%	8	0.5%	5	0.4%
Dell View Road	0	0.0%	0	0.0%	0	0.0%	0	0.0%

Table A3: TA Assumed Scenario Junction Percentage Impacts

Junction	17:30-18:30	
	Trip Generation	% Impact compared to 2028 FB
J1 - A2016/ Clydesdale Way/ Yarnton Way roundabout	74	2.5%
A2016 Picardy Manorway	55	4.3%
Clydesdale Way	0	0.0%
Yarnton Way roundabout	0	0.1%
A2016 Eastern Way	19	1.7%
J2 - A2016/ Norman Road	166	5.8%
Norman Road	57	79.6%
A2016 Picardy Manorway (East)	55	4.3%
A2016 Picardy Manorway (West)	54	3.6%
J3 - A2016/ Anderson Way/ B253	92	2.7%
A2016 Picardy Manorway	57	3.8%
Anderson Way	0	0.0%
A2016 Bronze Age Way	23	2.5%
B253 Picardy Manorway	12	3.4%
J4 - A2016/ Bexley Rd/ A206	48	1.1%
A2016 Bronze Age way	25	1.7%
Bexley Road	0	0.0%
A206 Queens Road	19	1.2%
A206 Bexley Road	4	0.5%
J5 - A206/ James Watt Way	39	1.1%
A206 Queens Road (North)	20	1.3%
James Watt Way	1	0.3%
A206 Queens Road (North)	18	1.3%
J6 - A206/ Boundary St/ Dell View Rd	36	1.2%
A206 South Road	19	1.4%
Boundary Street	0	0.0%
A206 Northend Road	18	1.2%
Dell View Road	0	0.0%

Appendix B: Hourly Traffic Flow Profiles for Junctions 4,5 and 6

Time Periods	Flows (PCU's)
16:00 - 17:00	3727.9
16:30 - 17:30	3911.6
17:00 - 18:00	3923.7
17:30 - 18:30	3690.4
18:00 - 19:00	3487.5

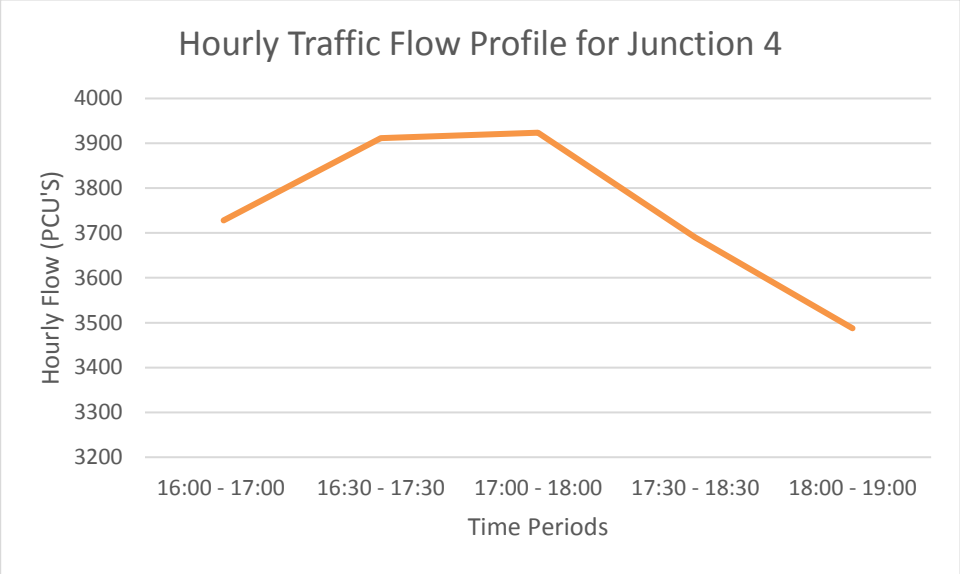


*Figure **Error! No text of specified style in document.**B.1: Hourly Traffic Flow Profile for Junction 4 (A2016 Bronze Age Way/ A206 Queens Road / A206 Bexley Road)*

Times Periods	Flows (PCU's)
16:00 - 17:00	3650.6
16:30 - 17:30	3595.5
17:00 - 18:00	3459.5
17:30 - 18:30	3244.8
18:00 - 19:00	3121.4

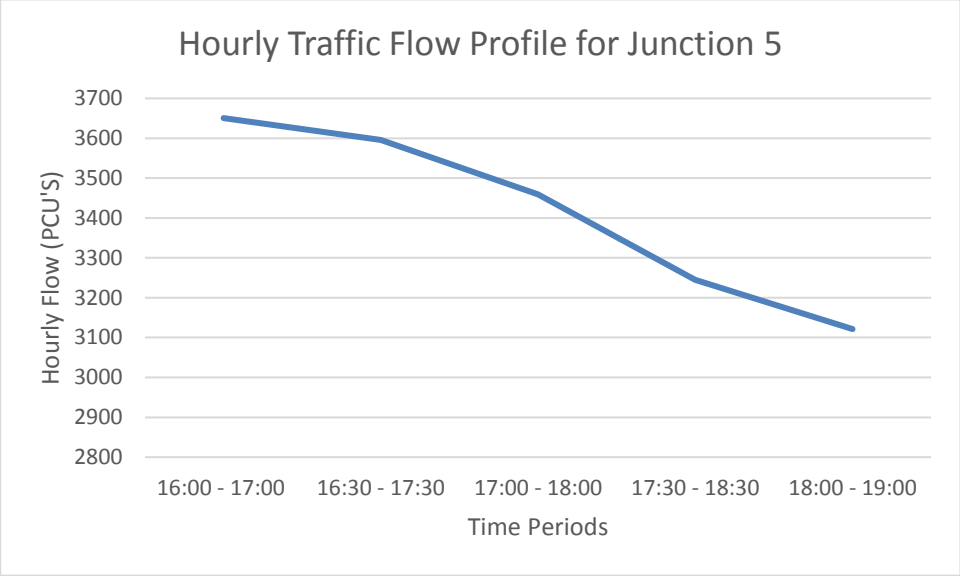


Figure B.2: Hourly Traffic Flow Profile for Junction 5 (A206 Queens Road/ James Watt Way)

Times Periods	Flows (PCU's)
16:00 - 17:00	2880.6
16:30 - 17:30	2803.7
17:00 - 18:00	2802.9
17:30 - 18:30	2646.6
18:00 - 19:00	2534

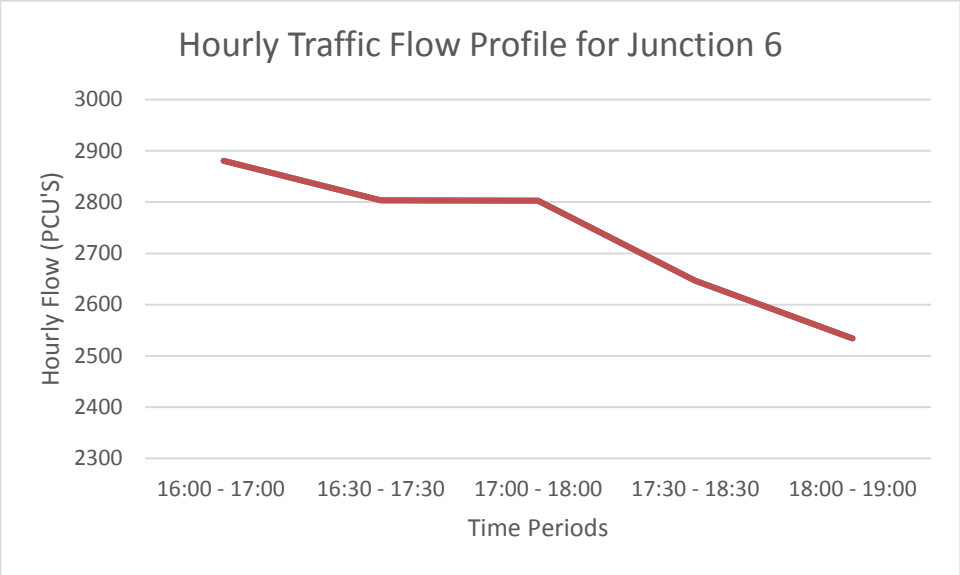


Figure B.3: Hourly Traffic Flow Profile for Junction 6 (A206 South Road/ Boundary Road/ A206 Northend Road)

TECHNICAL NOTE

Job Name: Riverside Energy Park

Job No: 42166

Note No: TN007

Date: 23/01/2019

Prepared By: Morteza M.Nejad

Subject: **Construction Phase Sensitivity Test**

Introduction

This technical note provides a review of the maximum capacity of local junctions during the construction phase of the proposed development at Riverside Energy Park (REP).

At the pre-application meeting held on 9th October 2018, TfL officers requested that the maximum capacity of the three junctions on Picardy Manorway during the peak construction period in 2022 should be assessed in order to determine if the peak construction traffic, as set out in Section 4 of the REP Transport Assessment (TA), could be accommodated at the local junctions and to subsequently inform discussions on the effective operation of the network during the construction stages. The three local junctions assessed are as follows:

- Junciton 1 - A2016/ Clydesdale Way/ Yarnton Way roundabout (ARCADY)
- Junciton 2 - A2016/ Norman Road (LINSIG)
- Junciton 3 - A2016/ Anderson Way/ B253

Assumptions and Scenarios Tested

As set out in Section 4 of the REP TA, the construction phase traffic consists of construction material trips, construction worker trips and also trips associated with the construction of the Electrical Connection Route. The peak period of construction is expected to be in the year of 2022 which would be month 13 of the construction programme. This peak in construction related traffic is the period during which the greatest number of construction workers are expected to be required onsite.

It has been projected that approximately 1097 workers would be operating at the worksite at REP at the peak month 13. Of those workers, the current parking proposal allows for 552 parking spaces at the construction compound and has been used as an proxy for car based travel during that period. The construction peak is projected to be short-lived and would half in maginitude within 3 months either side of the peak month.

Table 1: Illustration of predicted construction wortkforce numbers per month

Month	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*	*12*	*13*	*14*	*15*
Personnel	0	0	49	50	143	147	156	202	205	377	556	989	1097	696	549
Parking	0	0	43	44	96	99	107	123	126	209	297	501	552	359	291
Month	*16*	*17*	*18*	*19*	*20*	*21*	*22*	*23*	*24*	*25*	*26*	*27*	*28*	*29*	*30*
Personnel	497	575	441	413	341	330	334	289	291	234	207	179	96	91	85
Parking	267	305	244	231	198	194	196	171	171	147	130	110	74	71	67
Month	*31*	*32*	*33*	*34*	*35*	*36*	*37*	*38*	*39*	*40*	*41*	*42*	*43*	*44*	*45*
Personnel	78	108	106	103	99	98	169	83	83	83	83	83	83	83	83
Parking	63	95	93	91	87	86	76	0	0	0	0	0	0	0	0

Construction workers are assumed to work between 08:00 – 18:00, with arrivals taking place between 07:00 – 08:00 and departures between 18:00 – 19:00. This is a worst case assumption as the arrival/ departure of workers and contractors are likely to be spread across a longer arrival and departure period.

There are many variables which would affect the movement profile including:

- Toolbox talks + briefings;
- changing/PPE in-out;
- flexibility due to tasks + co-ordination with other workstream; and
- extended pours etc

All other key assumptions have been set out in detail in Section 4 of the REP TA.

The following three time periods have been tested for the year of 2022 assuming that 100% of the construction workforce would arrive during the hour tested:

- 06:00 – 07:00
- 07:00 – 08:00
- 07:30 – 08:30

The traffic flows tested include background traffic growth and flows associated with committed developments, as set out in Section 6 of the REP TA.

Summary of Results

The three time periods stated above have been tested with 100% of the construction traffic. Additionally, for the 07:30-08:30 time period which has the highest level of background traffic, another test has been undertaken in which the construction traffic is proportionally increased until the junction operates above maximum capacity. A summary of the results have been shown in Table 1 below and full modelling outputs provided in Appendix A.

The construction programme would be developed during the lead into the start of construction and would be reflected in the Construction Traffic Management Plan (CTMP). The CTMP would reflect the refined predictions of workforce numbers and set out the measures that could be adopted to reduce further the percentage of the workforce commuting by car and reduce the number of cars using the network during peak times. The CTMP would allow for emerging changes to the local road network, which may include alterations to the A2016 / Bexley Road roundabout.

Table 2: Summary of Junction Modelling Results

Time	Junction 1 RFC		Junction 2 DOS		Junction 3 RFC	
	100% construction traffic	152% Construction Traffic	100% construction traffic	225% construction traffic	100% construction traffic	160% Construction Traffic
06:00-07:00	0.61	-	59.8%	-	0.69	-
07:00-08:00	0.78	-	75.2%	-	0.81	-
07:30-08:30	0.82	1.02	77.4%	103.6%	0.83	1.03

It is evident that all three junctions assessed operate with spare capacity with 100% of construction traffic flows during the peak period of construction. The tests show that the junctions reach maximum capacity during the 07:30 – 08:30 time period if the following levels of construction traffic were to be applied:

- Junciton 1: 152% of construction traffic – 870 PCUs
- Junciton 2: 225% of construction traffic – 2243 PCUs
- Junciton 3: 160% of construction traffic – 698 PCUs

Overall, it has been shown that the three junctions on Picardy Manorway are able to operate with no issues during the peak period of contruction in the year 2022.

TECHNICAL NOTE

Appendix A: Modelling Outputs

Junctions 9

ARCADY 9 - Roundabout Module

Filename: Junction 1_Failure Test_152.j9
Path: \\pba.int\cbh\Projects\42166 Riverside 2\Transport\5. Drawings & Models\Traffic Modelling\Failure Tests\AM Peak
Report generation date: 24/01/2019 11:11:43

»2022 DS AM - 100% Construction Traffic, 0600 - 0700
»2022 DS AM - 100% Construction Traffic, 0700 - 0800
»2022 DS AM - 100% Construction Traffic, 0730 - 0830
»2022 DS AM - 152% Construction Traffic, 0730 - 0830

Summary of junction performance

	0600 - 0700				0700 - 0800				0730 - 0830			
	Queue (PCU)	Delay (s)	RFC	LOS	Queue (PCU)	Delay (s)	RFC	LOS	Queue (PCU)	Delay (s)	RFC	LOS
	2022 DS AM - 100% Construction Traffic											
1 - A2016 Picardy Manorway	1.7	3.46	0.61	A	3.9	6.22	0.78	A	4.8	7.38	0.82	A
2 - Clydesdale Way	0.1	8.65	0.10	A	0.3	20.69	0.24	C	0.6	32.15	0.38	D
3 - Yarnton Way	0.3	2.62	0.19	A	0.4	3.51	0.28	A	0.6	3.77	0.34	A
4 - A2016 Eastern Way	0.8	3.57	0.41	A	1.2	4.53	0.53	A	1.6	5.47	0.59	A
	2022 DS AM - 152% Construction Traffic											
1 - A2016 Picardy Manorway									9.3	13.35	0.90	B
2 - Clydesdale Way									5.4	250.28	1.02	F
3 - Yarnton Way									0.7	4.68	0.39	A
4 - A2016 Eastern Way									2.6	8.25	0.70	A

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

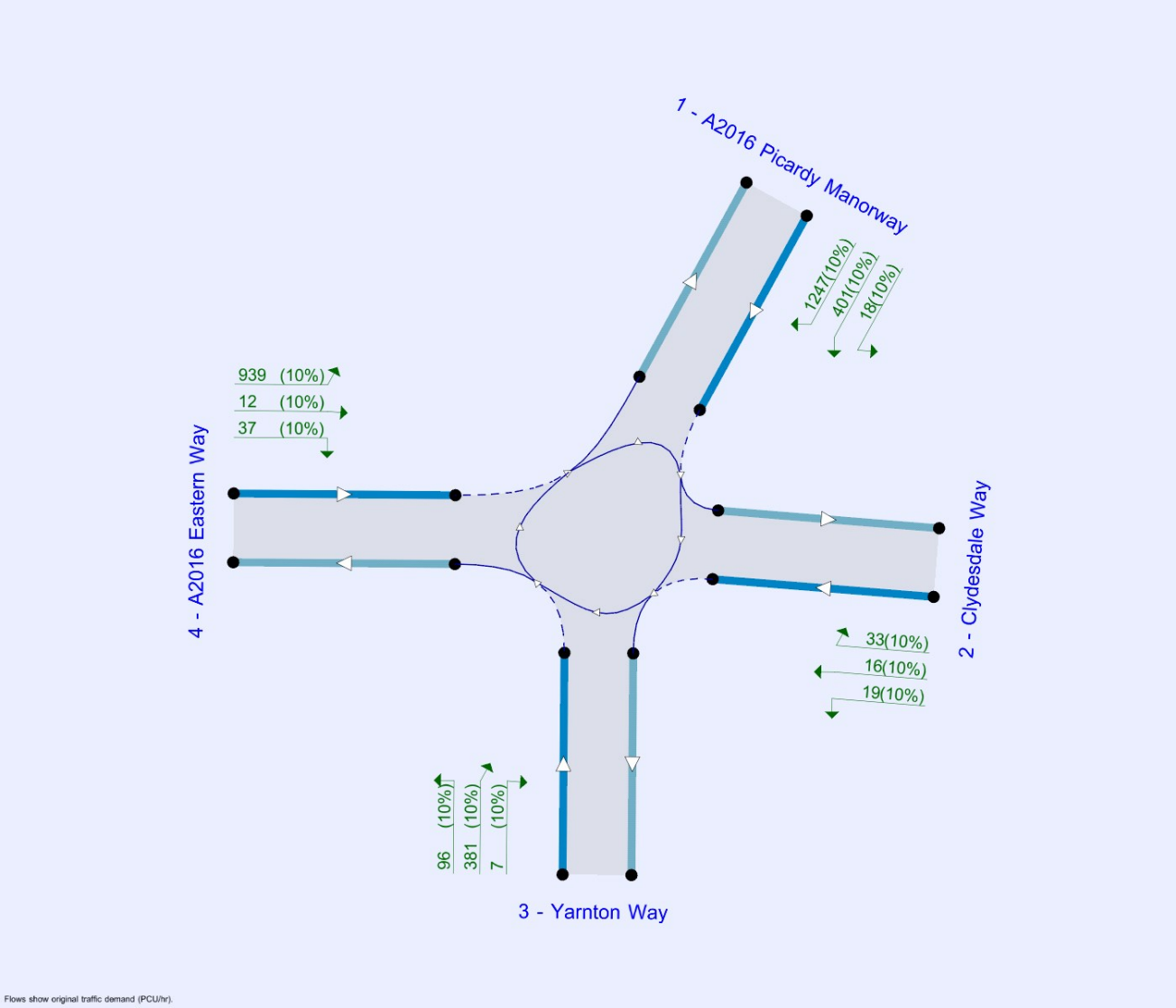
File summary

File Description

Title	Junction 1 - Senstivity Test
Location	Picardy Manorway/Eastern Way
Site number	
Date	09/07/2018
Version	
Status	(new file)
Identifier	
Client	
Jobnumber	
Enumerator	PBA\jtsmith
Description	

Units

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



The junction diagram reflects the last run of Junctions.

Analysis Options

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)
D2	2022 DS AM - 100% Construction Traffic	0600 - 0700	ONE HOUR	05:45	07:15	15
D5	2022 DS AM - 100% Construction Traffic	0700 - 0800	ONE HOUR	06:45	08:15	15
D8	2022 DS AM - 100% Construction Traffic	0730 - 0830	ONE HOUR	07:15	08:45	15
D9	2022 DS AM - 152% Construction Traffic	0730 - 0830	ONE HOUR	07:15	08:45	15

Analysis Set Details

ID	Network flow scaling factor (%)
A1	100.000

2022 DS AM - 100% Construction Traffic, 0600 - 0700

Data Errors and Warnings

No errors or warnings

Junction Network

Junctions

Junction	Name	Junction Type	Arm order	Junction Delay (s)	Junction LOS
1	Junction 1	Standard Roundabout	1, 2, 3, 4	3.48	A

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

Arms

Arms

Arm	Name	Description
1	A2016 Picardy Manorway	
2	Clydesdale Way	
3	Yarnton Way	
4	A2016 Eastern Way	

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 - A2016 Picardy Manorway	8.00	11.00	19.0	21.0	59.0	32.0	
2 - Clydesdale Way	4.30	6.00	3.7	10.5	59.0	29.0	
3 - Yarnton Way	10.60	10.60	0.0	23.0	59.0	21.0	
4 - A2016 Eastern Way	7.30	10.90	8.4	21.0	59.0	52.0	

Slope / Intercept / Capacity

Roundabout Slope and Intercept used in model

Arm	Final slope	Final intercept (PCU/hr)
1 - A2016 Picardy Manorway	0.791	3014
2 - Clydesdale Way	0.508	1450
3 - Yarnton Way	0.858	3333
4 - A2016 Eastern Way	0.678	2474

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)
D2	2022 DS AM - 100% Construction Traffic	0600 - 0700	ONE HOUR	05:45	07:15	15

Default vehicle mix	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 - A2016 Picardy Manorway		✓	1657	100.000
2 - Clydesdale Way		✓	47	100.000
3 - Yarnton Way		✓	321	100.000
4 - A2016 Eastern Way		✓	707	100.000

Origin-Destination Data

Demand (PCU/hr)

		To			
		1 - A2016 Picardy Manorway	2 - Clydesdale Way	3 - Yarnton Way	4 - A2016 Eastern Way
From	1 - A2016 Picardy Manorway	504	17	151	985
	2 - Clydesdale Way	27	0	7	13
	3 - Yarnton Way	246	4	5	66
	4 - A2016 Eastern Way	664	7	13	23

Vehicle Mix

Heavy Vehicle Percentages

		To			
		1 - A2016 Picardy Manorway	2 - Clydesdale Way	3 - Yarnton Way	4 - A2016 Eastern Way
From	1 - A2016 Picardy Manorway	10	10	10	10
	2 - Clydesdale Way	10	10	10	10
	3 - Yarnton Way	10	10	10	10
	4 - A2016 Eastern Way	10	10	10	10

Detailed Demand Data

Demand for each time segment

Time Segment	Arm	Demand (PCU/hr)	Demand in PCU (PCU/hr)
05:45-06:00	1 - A2016 Picardy Manorway	1247	1247
	2 - Clydesdale Way	35	35
	3 - Yarnton Way	242	242
	4 - A2016 Eastern Way	532	532
06:00-06:15	1 - A2016 Picardy Manorway	1490	1490
	2 - Clydesdale Way	42	42
	3 - Yarnton Way	289	289
	4 - A2016 Eastern Way	636	636
06:15-06:30	1 - A2016 Picardy Manorway	1824	1824
	2 - Clydesdale Way	52	52
	3 - Yarnton Way	353	353
	4 - A2016 Eastern Way	778	778
06:30-06:45	1 - A2016 Picardy Manorway	1824	1824
	2 - Clydesdale Way	52	52
	3 - Yarnton Way	353	353
	4 - A2016 Eastern Way	778	778
06:45-07:00	1 - A2016 Picardy Manorway	1490	1490
	2 - Clydesdale Way	42	42
	3 - Yarnton Way	289	289
	4 - A2016 Eastern Way	636	636
07:00-07:15	1 - A2016 Picardy Manorway	1247	1247
	2 - Clydesdale Way	35	35
	3 - Yarnton Way	242	242
	4 - A2016 Eastern Way	532	532

Results

Results Summary for whole modelled period

Arm	Max RFC	Max delay (s)	Max Queue (PCU)	Max LOS
1 - A2016 Picardy Manorway	0.61	3.46	1.7	A
2 - Clydesdale Way	0.10	8.65	0.1	A
3 - Yarnton Way	0.19	2.62	0.3	A
4 - A2016 Eastern Way	0.41	3.57	0.8	A

Main Results for each time segment

05:45 - 06:00

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
1 - A2016 Picardy Manorway	1247	39	2983	0.418	1244	0.8	2.274	A
2 - Clydesdale Way	35	1262	808	0.044	35	0.1	5.119	A
3 - Yarnton Way	242	1165	2332	0.104	241	0.1	1.893	A
4 - A2016 Eastern Way	532	590	2074	0.257	531	0.4	2.564	A

06:00 - 06:15

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
1 - A2016 Picardy Manorway	1490	47	2977	0.500	1488	1.1	2.657	A
2 - Clydesdale Way	42	1510	683	0.062	42	0.1	6.182	A
3 - Yarnton Way	289	1394	2136	0.135	288	0.2	2.143	A
4 - A2016 Eastern Way	636	706	1995	0.319	635	0.5	2.909	A

06:15 - 06:30

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
1 - A2016 Picardy Manorway	1824	57	2969	0.615	1822	1.7	3.446	A
2 - Clydesdale Way	52	1848	511	0.101	52	0.1	8.618	A
3 - Yarnton Way	353	1706	1868	0.189	353	0.3	2.613	A
4 - A2016 Eastern Way	778	864	1888	0.412	777	0.8	3.563	A

06:30 - 06:45

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
1 - A2016 Picardy Manorway	1824	57	2969	0.615	1824	1.7	3.460	A
2 - Clydesdale Way	52	1851	510	0.102	52	0.1	8.649	A
3 - Yarnton Way	353	1709	1866	0.189	353	0.3	2.617	A
4 - A2016 Eastern Way	778	865	1887	0.413	778	0.8	3.571	A

06:45 - 07:00

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
1 - A2016 Picardy Manorway	1490	47	2977	0.500	1492	1.1	2.673	A
2 - Clydesdale Way	42	1514	681	0.062	42	0.1	6.205	A
3 - Yarnton Way	289	1398	2133	0.135	289	0.2	2.149	A
4 - A2016 Eastern Way	636	708	1994	0.319	637	0.5	2.921	A

07:00 - 07:15

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
1 - A2016 Picardy Manorway	1247	39	2983	0.418	1249	0.8	2.286	A
2 - Clydesdale Way	35	1267	806	0.044	35	0.1	5.139	A
3 - Yarnton Way	242	1170	2329	0.104	242	0.1	1.899	A
4 - A2016 Eastern Way	532	592	2072	0.257	533	0.4	2.572	A

2022 DS AM - 100% Construction Traffic, 0700 - 0800

Data Errors and Warnings

No errors or warnings

Junction Network

Junctions

Junction	Name	Junction Type	Arm order	Junction Delay (s)	Junction LOS
1	Junction 1	Standard Roundabout	1, 2, 3, 4	5.69	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)
D5	2022 DS AM - 100% Construction Traffic	0700 - 0800	ONE HOUR	06:45	08:15	15

Default vehicle mix	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 - A2016 Picardy Manorway		✓	2082	100.000
2 - Clydesdale Way		✓	54	100.000
3 - Yarnton Way		✓	405	100.000
4 - A2016 Eastern Way		✓	884	100.000

Origin-Destination Data

Demand (PCU/hr)

		To			
		1 - A2016 Picardy Manorway	2 - Clydesdale Way	3 - Yarnton Way	4 - A2016 Eastern Way
From	1 - A2016 Picardy Manorway	500	18	292	1272
	2 - Clydesdale Way	22	0	13	19
	3 - Yarnton Way	303	6	7	89
	4 - A2016 Eastern Way	799	12	26	47

Vehicle Mix

Heavy Vehicle Percentages

		To			
		1 - A2016 Picardy Manorway	2 - Clydesdale Way	3 - Yarnton Way	4 - A2016 Eastern Way
From	1 - A2016 Picardy Manorway	10	10	10	10
	2 - Clydesdale Way	10	10	10	10
	3 - Yarnton Way	10	10	10	10
	4 - A2016 Eastern Way	10	10	10	10

Detailed Demand Data

Demand for each time segment

Time Segment	Arm	Demand (PCU/hr)	Demand in PCU (PCU/hr)
06:45-07:00	1 - A2016 Picardy Manorway	1567	1567
	2 - Clydesdale Way	41	41
	3 - Yarnton Way	305	305
	4 - A2016 Eastern Way	666	666
07:00-07:15	1 - A2016 Picardy Manorway	1872	1872
	2 - Clydesdale Way	49	49
	3 - Yarnton Way	364	364
	4 - A2016 Eastern Way	795	795
07:15-07:30	1 - A2016 Picardy Manorway	2292	2292
	2 - Clydesdale Way	59	59
	3 - Yarnton Way	446	446
	4 - A2016 Eastern Way	973	973
07:30-07:45	1 - A2016 Picardy Manorway	2292	2292
	2 - Clydesdale Way	59	59
	3 - Yarnton Way	446	446
	4 - A2016 Eastern Way	973	973
07:45-08:00	1 - A2016 Picardy Manorway	1872	1872
	2 - Clydesdale Way	49	49
	3 - Yarnton Way	364	364
	4 - A2016 Eastern Way	795	795
08:00-08:15	1 - A2016 Picardy Manorway	1567	1567
	2 - Clydesdale Way	41	41
	3 - Yarnton Way	305	305
	4 - A2016 Eastern Way	666	666

Results

Results Summary for whole modelled period

Arm	Max RFC	Max delay (s)	Max Queue (PCU)	Max LOS
1 - A2016 Picardy Manorway	0.78	6.22	3.9	A
2 - Clydesdale Way	0.24	20.69	0.3	C
3 - Yarnton Way	0.28	3.51	0.4	A
4 - A2016 Eastern Way	0.53	4.53	1.2	A

Main Results for each time segment

06:45 - 07:00

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
1 - A2016 Picardy Manorway	1567	74	2956	0.530	1563	1.2	2.834	A
2 - Clydesdale Way	41	1609	632	0.064	40	0.1	6.686	A
3 - Yarnton Way	305	1396	2135	0.143	304	0.2	2.162	A
4 - A2016 Eastern Way	666	629	2047	0.325	663	0.5	2.858	A

07:00 - 07:15

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
1 - A2016 Picardy Manorway	1872	88	2944	0.636	1869	1.9	3.673	A
2 - Clydesdale Way	49	1925	472	0.103	48	0.1	9.343	A
3 - Yarnton Way	364	1670	1900	0.192	364	0.3	2.578	A
4 - A2016 Eastern Way	795	752	1964	0.405	794	0.7	3.384	A

07:15 - 07:30

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
1 - A2016 Picardy Manorway	2292	108	2929	0.783	2285	3.8	6.073	A
2 - Clydesdale Way	59	2353	255	0.234	59	0.3	20.132	C
3 - Yarnton Way	446	2041	1581	0.282	445	0.4	3.484	A
4 - A2016 Eastern Way	973	920	1850	0.526	971	1.2	4.499	A

07:30 - 07:45

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
1 - A2016 Picardy Manorway	2292	108	2929	0.783	2292	3.9	6.216	A
2 - Clydesdale Way	59	2360	251	0.237	59	0.3	20.695	C
3 - Yarnton Way	446	2048	1575	0.283	446	0.4	3.506	A
4 - A2016 Eastern Way	973	923	1848	0.527	973	1.2	4.525	A

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)	LOS
1 - A2016 Picardy Manorway	1872	88	2944	0.636	1880	1.9	3.748	A
2 - Clydesdale Way	49	1935	467	0.104	49	0.1	9.509	A
3 - Yarnton Way	364	1680	1891	0.193	365	0.3	2.595	A
4 - A2016 Eastern Way	795	756	1961	0.405	797	0.8	3.407	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)	LOS
1 - A2016 Picardy Manorway	1567	74	2955	0.530	1570	1.3	2.865	A
2 - Clydesdale Way	41	1617	628	0.065	41	0.1	6.744	A
3 - Yarnton Way	305	1403	2129	0.143	305	0.2	2.171	A
4 - A2016 Eastern Way	666	632	2045	0.325	666	0.5	2.875	A

2022 DS AM - 100% Construction Traffic, 0730 - 0830

Data Errors and Warnings

No errors or warnings

Junction Network

Junctions

Junction	Name	Junction Type	Arm order	Junction Delay (s)	Junction LOS
1	Junction 1	Standard Roundabout	1, 2, 3, 4	6.85	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)
D8	2022 DS AM - 100% Construction Traffic	0730 - 0830	ONE HOUR	07:15	08:45	15

Default vehicle mix	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 - A2016 Picardy Manorway		✓	2159	100.000
2 - Clydesdale Way		✓	68	100.000
3 - Yarnton Way		✓	501	100.000
4 - A2016 Eastern Way		✓	956	100.000

Origin-Destination Data

Demand (PCU/hr)

		To			
		1 - A2016 Picardy Manorway	2 - Clydesdale Way	3 - Yarnton Way	4 - A2016 Eastern Way
From	1 - A2016 Picardy Manorway	497	18	401	1243
	2 - Clydesdale Way	33	0	19	16
	3 - Yarnton Way	381	7	17	96
	4 - A2016 Eastern Way	863	12	37	44

Vehicle Mix

Heavy Vehicle Percentages

		To			
		1 - A2016 Picardy Manorway	2 - Clydesdale Way	3 - Yarnton Way	4 - A2016 Eastern Way
From	1 - A2016 Picardy Manorway	10	10	10	10
	2 - Clydesdale Way	10	10	10	10
	3 - Yarnton Way	10	10	10	10
	4 - A2016 Eastern Way	10	10	10	10

Detailed Demand Data

Demand for each time segment

Time Segment	Arm	Demand (PCU/hr)	Demand in PCU (PCU/hr)
07:15-07:30	1 - A2016 Picardy Manorway	1625	1625
	2 - Clydesdale Way	51	51
	3 - Yarnton Way	377	377
	4 - A2016 Eastern Way	720	720
07:30-07:45	1 - A2016 Picardy Manorway	1941	1941
	2 - Clydesdale Way	61	61
	3 - Yarnton Way	450	450
	4 - A2016 Eastern Way	859	859
07:45-08:00	1 - A2016 Picardy Manorway	2377	2377
	2 - Clydesdale Way	75	75
	3 - Yarnton Way	552	552
	4 - A2016 Eastern Way	1053	1053
08:00-08:15	1 - A2016 Picardy Manorway	2377	2377
	2 - Clydesdale Way	75	75
	3 - Yarnton Way	552	552
	4 - A2016 Eastern Way	1053	1053
08:15-08:30	1 - A2016 Picardy Manorway	1941	1941
	2 - Clydesdale Way	61	61
	3 - Yarnton Way	450	450
	4 - A2016 Eastern Way	859	859
08:30-08:45	1 - A2016 Picardy Manorway	1625	1625
	2 - Clydesdale Way	51	51
	3 - Yarnton Way	377	377
	4 - A2016 Eastern Way	720	720

Results

Results Summary for whole modelled period

Arm	Max RFC	Max delay (s)	Max Queue (PCU)	Max LOS
1 - A2016 Picardy Manorway	0.82	7.38	4.8	A
2 - Clydesdale Way	0.38	32.15	0.6	D
3 - Yarnton Way	0.34	3.77	0.6	A
4 - A2016 Eastern Way	0.59	5.47	1.6	A

Main Results for each time segment

07:15 - 07:30

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
1 - A2016 Picardy Manorway	1625	88	2944	0.552	1620	1.3	2.978	A
2 - Clydesdale Way	51	1680	596	0.086	51	0.1	7.255	A
3 - Yarnton Way	377	1375	2152	0.175	376	0.2	2.228	A
4 - A2016 Eastern Way	720	702	1998	0.360	717	0.6	3.087	A

07:30 - 07:45

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
1 - A2016 Picardy Manorway	1941	105	2931	0.662	1938	2.1	3.975	A
2 - Clydesdale Way	61	2010	429	0.143	61	0.2	10.750	B
3 - Yarnton Way	450	1645	1921	0.234	450	0.3	2.692	A
4 - A2016 Eastern Way	859	839	1905	0.451	858	0.9	3.781	A

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)	LOS
1 - A2016 Picardy Manorway	2377	129	2912	0.816	2367	4.7	7.130	A
2 - Clydesdale Way	75	2455	203	0.369	73	0.6	30.182	D
3 - Yarnton Way	552	2009	1609	0.343	551	0.6	3.739	A
4 - A2016 Eastern Way	1053	1026	1778	0.592	1050	1.6	5.417	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)	LOS
1 - A2016 Picardy Manorway	2377	129	2912	0.816	2377	4.8	7.382	A
2 - Clydesdale Way	75	2465	198	0.379	75	0.6	32.147	D
3 - Yarnton Way	552	2018	1601	0.345	552	0.6	3.773	A
4 - A2016 Eastern Way	1053	1029	1776	0.593	1053	1.6	5.474	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)	LOS
1 - A2016 Picardy Manorway	1941	105	2930	0.662	1951	2.2	4.086	A
2 - Clydesdale Way	61	2023	422	0.145	63	0.2	11.089	B
3 - Yarnton Way	450	1658	1910	0.236	451	0.3	2.718	A
4 - A2016 Eastern Way	859	845	1901	0.452	862	0.9	3.820	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)	LOS
1 - A2016 Picardy Manorway	1625	88	2944	0.552	1629	1.4	3.017	A
2 - Clydesdale Way	51	1689	592	0.087	52	0.1	7.333	A
3 - Yarnton Way	377	1383	2146	0.176	378	0.2	2.241	A
4 - A2016 Eastern Way	720	705	1996	0.361	721	0.6	3.108	A

2022 DS AM - 152% Construction Traffic, 0730 - 0830

Data Errors and Warnings

No errors or warnings

Junction Network

Junctions

Junction	Name	Junction Type	Arm order	Junction Delay (s)	Junction LOS
1	Junction 1	Standard Roundabout	1, 2, 3, 4	14.98	B

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)
D9	2022 DS AM - 152% Construction Traffic	0730 - 0830	ONE HOUR	07:15	08:45	15

Default vehicle mix	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 - A2016 Picardy Manorway		✓	2382	100.000
2 - Clydesdale Way		✓	68	100.000
3 - Yarnton Way		✓	501	100.000
4 - A2016 Eastern Way		✓	1032	100.000

Origin-Destination Data

Demand (PCU/hr)

		To			
		1 - A2016 Picardy Manorway	2 - Clydesdale Way	3 - Yarnton Way	4 - A2016 Eastern Way
From	1 - A2016 Picardy Manorway	716	18	401	1247
	2 - Clydesdale Way	33	0	19	16
	3 - Yarnton Way	381	7	17	96
	4 - A2016 Eastern Way	939	12	37	44

Vehicle Mix

Heavy Vehicle Percentages

		To			
		1 - A2016 Picardy Manorway	2 - Clydesdale Way	3 - Yarnton Way	4 - A2016 Eastern Way
From	1 - A2016 Picardy Manorway	10	10	10	10
	2 - Clydesdale Way	10	10	10	10
	3 - Yarnton Way	10	10	10	10
	4 - A2016 Eastern Way	10	10	10	10

Detailed Demand Data

Demand for each time segment

Time Segment	Arm	Demand (PCU/hr)	Demand in PCU (PCU/hr)
07:15-07:30	1 - A2016 Picardy Manorway	1793	1793
	2 - Clydesdale Way	51	51
	3 - Yarnton Way	377	377
	4 - A2016 Eastern Way	777	777
07:30-07:45	1 - A2016 Picardy Manorway	2141	2141
	2 - Clydesdale Way	61	61
	3 - Yarnton Way	450	450
	4 - A2016 Eastern Way	928	928
07:45-08:00	1 - A2016 Picardy Manorway	2623	2623
	2 - Clydesdale Way	75	75
	3 - Yarnton Way	552	552
	4 - A2016 Eastern Way	1136	1136
08:00-08:15	1 - A2016 Picardy Manorway	2623	2623
	2 - Clydesdale Way	75	75
	3 - Yarnton Way	552	552
	4 - A2016 Eastern Way	1136	1136
08:15-08:30	1 - A2016 Picardy Manorway	2141	2141
	2 - Clydesdale Way	61	61
	3 - Yarnton Way	450	450
	4 - A2016 Eastern Way	928	928
08:30-08:45	1 - A2016 Picardy Manorway	1793	1793
	2 - Clydesdale Way	51	51
	3 - Yarnton Way	377	377
	4 - A2016 Eastern Way	777	777

Results

Results Summary for whole modelled period

Arm	Max RFC	Max delay (s)	Max Queue (PCU)	Max LOS
1 - A2016 Picardy Manorway	0.90	13.35	9.3	B
2 - Clydesdale Way	1.02	250.28	5.4	F
3 - Yarnton Way	0.39	4.68	0.7	A
4 - A2016 Eastern Way	0.70	8.25	2.6	A

Main Results for each time segment

07:15 - 07:30

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
1 - A2016 Picardy Manorway	1793	88	2944	0.609	1787	1.7	3.401	A
2 - Clydesdale Way	51	1847	512	0.100	51	0.1	8.581	A
3 - Yarnton Way	377	1542	2009	0.188	376	0.3	2.423	A
4 - A2016 Eastern Way	777	866	1887	0.412	774	0.8	3.550	A

07:30 - 07:45

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
1 - A2016 Picardy Manorway	2141	105	2931	0.731	2136	2.9	4.954	A
2 - Clydesdale Way	61	2208	328	0.186	61	0.2	14.785	B
3 - Yarnton Way	450	1844	1750	0.257	450	0.4	3.046	A
4 - A2016 Eastern Way	928	1035	1772	0.524	926	1.2	4.673	A

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)	LOS
1 - A2016 Picardy Manorway	2623	128	2912	0.901	2599	8.8	11.847	B
2 - Clydesdale Way	75	2687	85	0.883	63	3.1	147.421	F
3 - Yarnton Way	552	2236	1414	0.390	550	0.7	4.581	A
4 - A2016 Eastern Way	1136	1257	1621	0.701	1131	2.5	7.992	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)	LOS
1 - A2016 Picardy Manorway	2623	129	2912	0.901	2621	9.3	13.347	B
2 - Clydesdale Way	75	2709	74	1.015	66	5.4	250.275	F
3 - Yarnton Way	552	2255	1397	0.395	552	0.7	4.684	A
4 - A2016 Eastern Way	1136	1265	1616	0.703	1136	2.6	8.247	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)	LOS
1 - A2016 Picardy Manorway	2141	106	2930	0.731	2166	3.0	5.347	A
2 - Clydesdale Way	61	2239	313	0.196	82	0.3	18.674	C
3 - Yarnton Way	450	1884	1716	0.263	452	0.4	3.135	A
4 - A2016 Eastern Way	928	1056	1758	0.528	933	1.2	4.831	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)	LOS
1 - A2016 Picardy Manorway	1793	88	2944	0.609	1799	1.7	3.471	A
2 - Clydesdale Way	51	1859	505	0.101	52	0.1	8.740	A
3 - Yarnton Way	377	1553	2000	0.189	378	0.3	2.441	A
4 - A2016 Eastern Way	777	871	1883	0.413	779	0.8	3.591	A

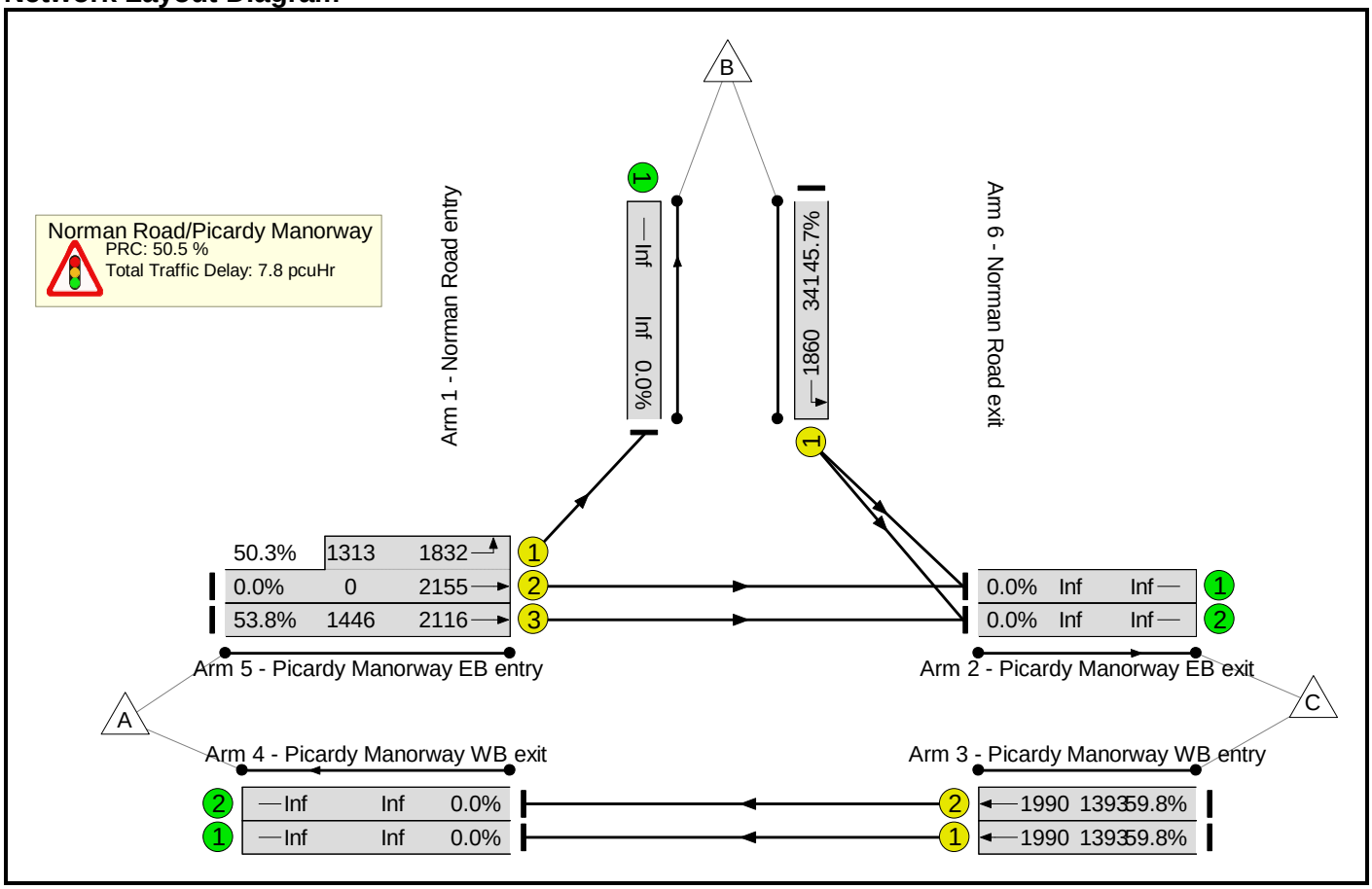
Basic Results Summary

User and Project Details

Project:	**Riverside Energy Park**
Title:	
Location:	
File name:	Junction 2_Failure Test_225.lsg3x
Author:	jdymock
Company:	PBA
Address:	
Notes:	Sensitivity Test

Scenario 1: '2022 DS AM (100% Rd) - 0600-0700' (FG2: '2022 DS AM (100% Rd)', Plan 1: 'Network Control Plan 1')

Network Layout Diagram



Basic Results Summary

Network Results

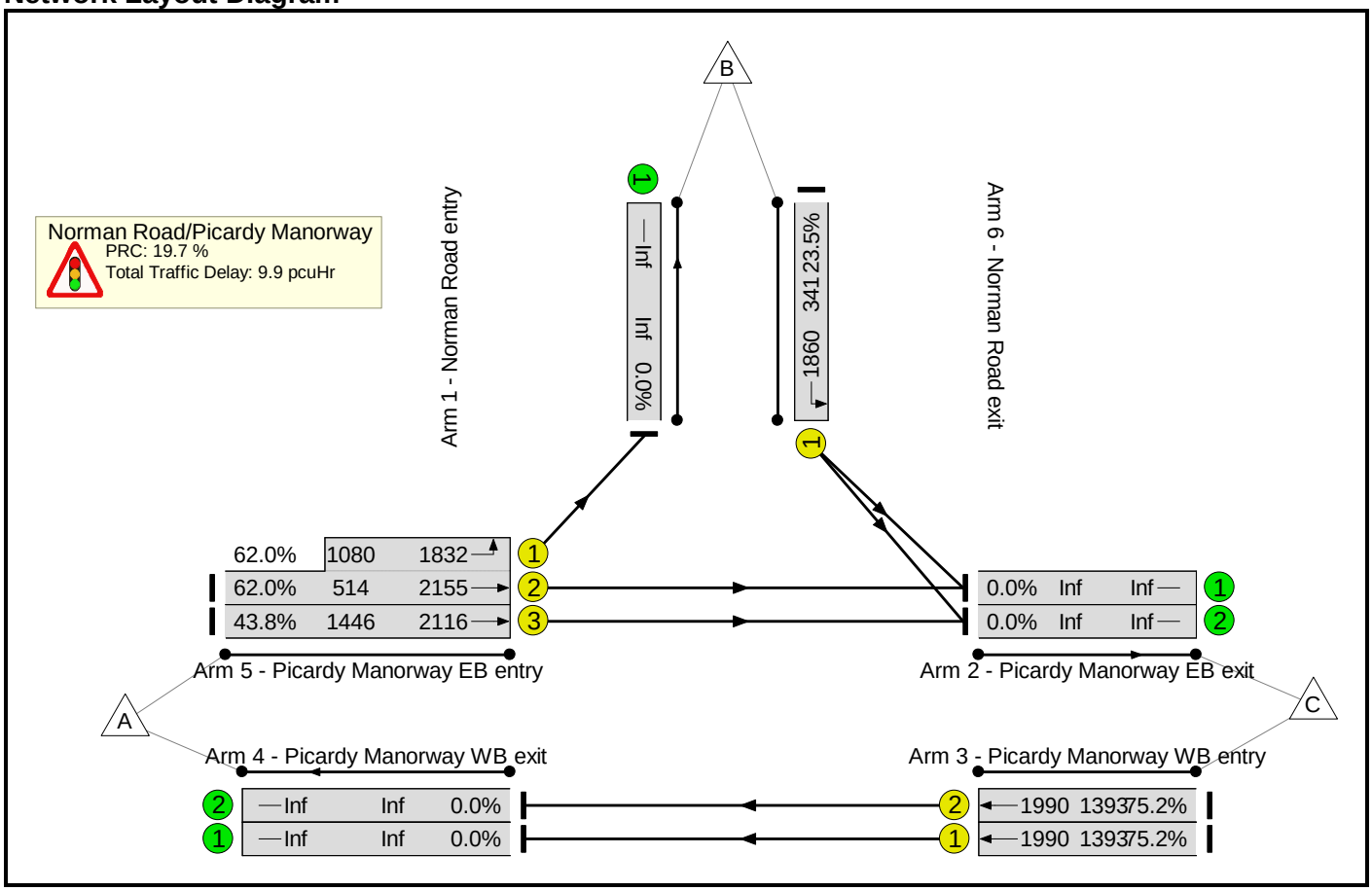
Item	Lane Description	Lane Type	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)	Mean Max Queue (pcu)
Network	-	-	-		-	-	-	-	-	-	**59.8%**	**0**	**0**	**0**	**7.8**	-	-
Norman Road/Picardy Manorway	-	-	-		-	-	-	-	-	-	**59.8%**	**0**	**0**	**0**	**7.8**	-	-
1/1	Norman Road entry Left	U	B		1	10	-	156	1860	341	45.7%	-	-	-	1.4	31.5	2.7
3/1	Picardy Manorway WB entry Ahead	U	G		1	41	-	833	1990	1393	59.8%	-	-	-	1.8	7.9	7.7
3/2	Picardy Manorway WB entry Ahead	U	G		1	41	-	833	1990	1393	59.8%	-	-	-	1.8	7.9	7.7
5/2+5/1	Picardy Manorway EB entry Ahead Left	U	A E		1	40:42	-	661	2155:1832	0+1313	0.0 : 50.3%	-	-	-	1.2	6.5	5.3
5/3	Picardy Manorway EB entry Ahead	U	A		1	40	-	778	2116	1446	53.8%	-	-	-	1.6	7.4	7.1

C1	Stream: 1 PRC for Signalled Lanes (%):	67.3	Total Delay for Signalled Lanes (pcuHr):	4.18	Cycle Time (s):	60
C1	Stream: 2 PRC for Signalled Lanes (%):	0.0	Total Delay for Signalled Lanes (pcuHr):	0.00	Cycle Time (s):	60
C1	Stream: 3 PRC for Signalled Lanes (%):	50.5	Total Delay for Signalled Lanes (pcuHr):	3.63	Cycle Time (s):	60
	PRC Over All Lanes (%):	50.5	Total Delay Over All Lanes(pcuHr):	7.81		

Basic Results Summary

Scenario 2: '2022 DS AM (100% Rd) - 0700-0800' (FG5: '2022 DS AM (100% Rd)', Plan 1: 'Network Control Plan 1')

Network Layout Diagram



Basic Results Summary

Network Results

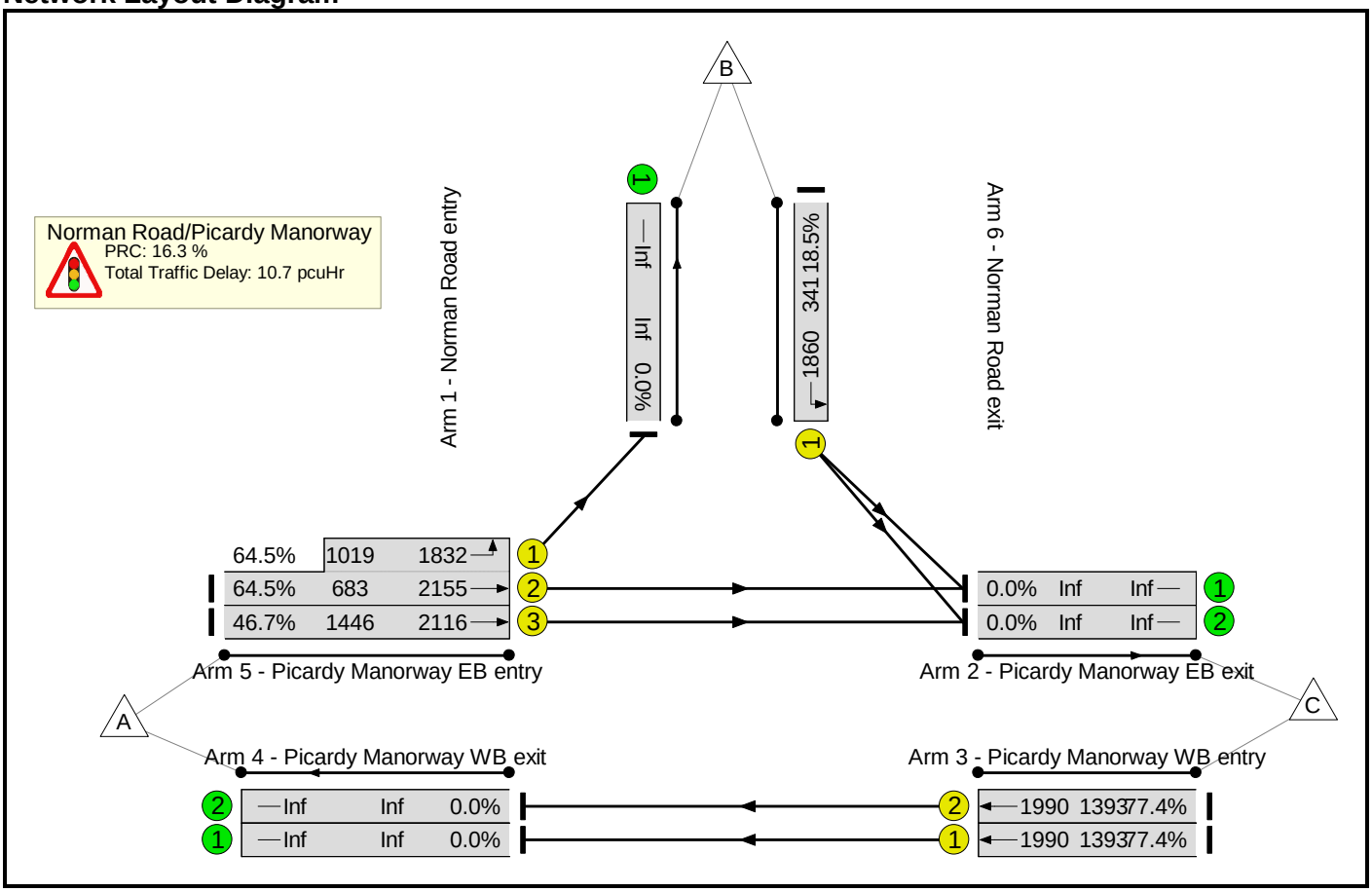
Item	Lane Description	Lane Type	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)	Mean Max Queue (pcu)
Network	**-**	**-**	**-**		**-**	**-**	**-**	**-**	**-**	**-**	**75.2%**	**0**	**0**	**0**	**9.9**	**-**	**-**
Norman Road/Picardy Manorway	**-**	**-**	**-**		**-**	**-**	**-**	**-**	**-**	**-**	**75.2%**	**0**	**0**	**0**	**9.9**	**-**	**-**
1/1	Norman Road entry Left	U	B		1	10	-	80	1860	341	23.5%	-	-	-	0.6	27.8	1.3
3/1	Picardy Manorway WB entry Ahead	U	G		1	41	-	1047	1990	1393	75.2%	-	-	-	3.2	10.9	12.3
3/2	Picardy Manorway WB entry Ahead	U	G		1	41	-	1047	1990	1393	75.2%	-	-	-	3.2	10.9	12.3
5/2+5/1	Picardy Manorway EB entry Ahead Left	U	A E		1	40:42	-	989	2155:1832	514+1080	62.0 : 62.0%	-	-	-	1.8	6.7	5.7
5/3	Picardy Manorway EB entry Ahead	U	A		1	40	-	633	2116	1446	43.8%	-	-	-	1.1	6.5	5.1

C1	Stream: 1 PRC for Signalled Lanes (%):	45.0	Total Delay for Signalled Lanes (pcuHr):	3.60	Cycle Time (s):	60
C1	Stream: 2 PRC for Signalled Lanes (%):	0.0	Total Delay for Signalled Lanes (pcuHr):	0.00	Cycle Time (s):	60
C1	Stream: 3 PRC for Signalled Lanes (%):	19.7	Total Delay for Signalled Lanes (pcuHr):	6.31	Cycle Time (s):	60
	PRC Over All Lanes (%):	19.7	Total Delay Over All Lanes(pcuHr):	9.91		

Basic Results Summary

Scenario 3: '2022 DS AM (100% Rd) - 0730-0830' (FG8: '2022 DS AM (100% Rd)', Plan 1: 'Network Control Plan 1')

Network Layout Diagram



Basic Results Summary

Network Results

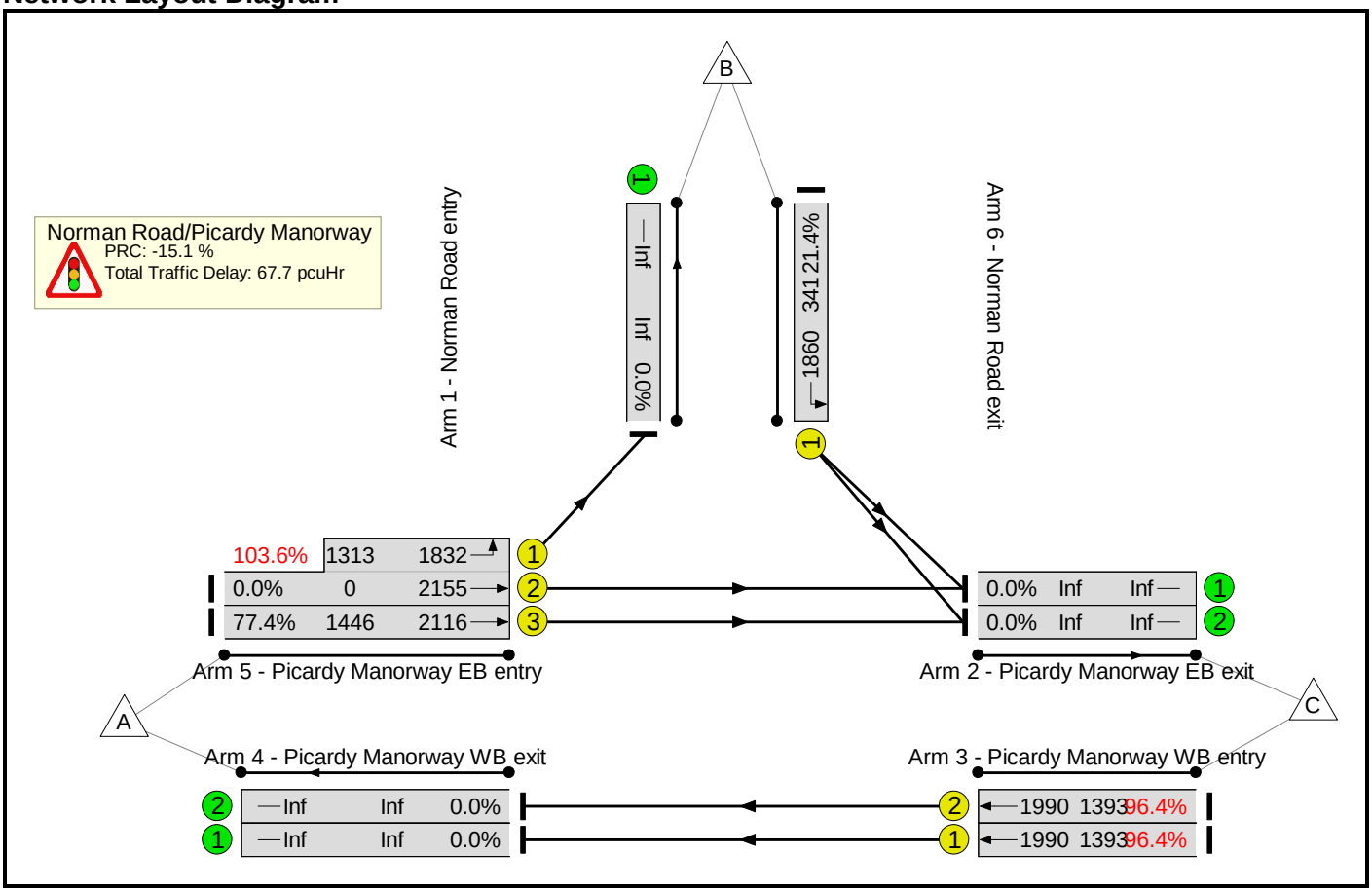
Item	Lane Description	Lane Type	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)	Mean Max Queue (pcu)
Network	**-**	**-**	**-**		**-**	**-**	**-**	**-**	**-**	**-**	**77.4%**	**0**	**0**	**0**	**10.7**	**-**	**-**
Norman Road/Picardy Manorway	**-**	**-**	**-**		**-**	**-**	**-**	**-**	**-**	**-**	**77.4%**	**0**	**0**	**0**	**10.7**	**-**	**-**
1/1	Norman Road entry Left	U	B		1	10	-	63	1860	341	18.5%	-	-	-	0.5	27.2	1.0
3/1	Picardy Manorway WB entry Ahead	U	G		1	41	-	1078	1990	1393	77.4%	-	-	-	3.5	11.5	13.4
3/2	Picardy Manorway WB entry Ahead	U	G		1	41	-	1078	1990	1393	77.4%	-	-	-	3.5	11.5	13.4
5/2+5/1	Picardy Manorway EB entry Ahead Left	U	A E		1	40:42	-	1097	2155:1832	683+1019	64.5 : 64.5%	-	-	-	2.1	6.7	5.6
5/3	Picardy Manorway EB entry Ahead	U	A		1	40	-	675	2116	1446	46.7%	-	-	-	1.3	6.8	5.5

C1	Stream: 1 PRC for Signalled Lanes (%):	39.6	Total Delay for Signalled Lanes (pcuHr):	3.80	Cycle Time (s): 60
C1	Stream: 2 PRC for Signalled Lanes (%):	0.0	Total Delay for Signalled Lanes (pcuHr):	0.00	Cycle Time (s): 60
C1	Stream: 3 PRC for Signalled Lanes (%):	16.3	Total Delay for Signalled Lanes (pcuHr):	6.91	Cycle Time (s): 60
	PRC Over All Lanes (%):	16.3	Total Delay Over All Lanes(pcuHr):	10.71	

Basic Results Summary

Scenario 4: '2022 DS AM (225% Rd) - 0730-0830' (FG9: '2022 DS AM (225% Rd)', Plan 1: 'Network Control Plan 1')

Network Layout 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	-	-	-		-	-	-	-	-	-	**103.6%**	**0**	**0**	**0**	**67.7**	-	-
Norman Road/Picardy Manorway	-	-	-		-	-	-	-	-	-	**103.6%**	**0**	**0**	**0**	**67.7**	-	-
1/1	Norman Road entry Left	U	B		1	10	-	73	1860	341	21.4%	-	-	-	0.6	27.5	1.2
3/1	Picardy Manorway WB entry Ahead	U	G		1	41	-	1343	1990	1393	96.4%	-	-	-	12.8	34.3	30.2
3/2	Picardy Manorway WB entry Ahead	U	G		1	41	-	1343	1990	1393	96.4%	-	-	-	12.8	34.3	30.2
5/2+5/1	Picardy Manorway EB entry Ahead Left	U	A E		1	40:42	-	1360	2155:1832	0+1313	0.0 : 103.6%	-	-	-	37.9	100.2	58.6
5/3	Picardy Manorway EB entry Ahead	U	A		1	40	-	1119	2116	1446	77.4%	-	-	-	3.7	11.8	14.1

C1	Stream: 1 PRC for Signalled Lanes (%):	-15.1	Total Delay for Signalled Lanes (pcuHr):	42.10	Cycle Time (s):	60
C1	Stream: 2 PRC for Signalled Lanes (%):	0.0	Total Delay for Signalled Lanes (pcuHr):	0.00	Cycle Time (s):	60
C1	Stream: 3 PRC for Signalled Lanes (%):	-7.1	Total Delay for Signalled Lanes (pcuHr):	25.56	Cycle Time (s):	60
	PRC Over All Lanes (%):	-15.1	Total Delay Over All Lanes(pcuHr):	67.65		

Junctions 9

ARCADY 9 - Roundabout Module

Filename: Junction 3_Failure Test_160.j9
Path: \\pba.int\cbh\Projects\42166 Riverside 2\Transport\5. Drawings & Models\Traffic Modelling\Failure Tests\AM Peak
Report generation date: 24/01/2019 11:23:27

Summary of junction performance

	0600 - 0700				0700 - 0800				0730 - 0830			
	Queue (PCU)	Delay (s)	RFC	LOS	Queue (PCU)	Delay (s)	RFC	LOS	Queue (PCU)	Delay (s)	RFC	LOS
	2022 DS AM - 100% Construction traffic											
1 - A2016 Picardy Manorway	0.8	2.82	0.42	A								
2 - Anderson Way	0.2	1.97	0.14	A								
3 - A2016 Bronze Age Way	2.4	4.92	0.69	A								
4 - B253 Picardy Manorway	0.7	5.32	0.38	A								
	2022 DS AM - 100% Construction Traffic											
1 - A2016 Picardy Manorway					1.0	3.17	0.48	A	1.3	3.71	0.55	A
2 - Anderson Way					0.2	2.13	0.17	A	0.3	2.37	0.20	A
3 - A2016 Bronze Age Way					4.7	8.57	0.81	A	5.2	9.71	0.83	A
4 - B253 Picardy Manorway					2.5	12.81	0.70	B	4.3	18.98	0.80	C
	2022 DS AM - 160% Construction Traffic											
1 - A2016 Picardy Manorway									1.4	3.71	0.55	A
2 - Anderson Way									0.3	2.37	0.20	A
3 - A2016 Bronze Age Way									9.4	16.45	0.90	C
4 - B253 Picardy Manorway									28.3	101.15	1.03	F

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

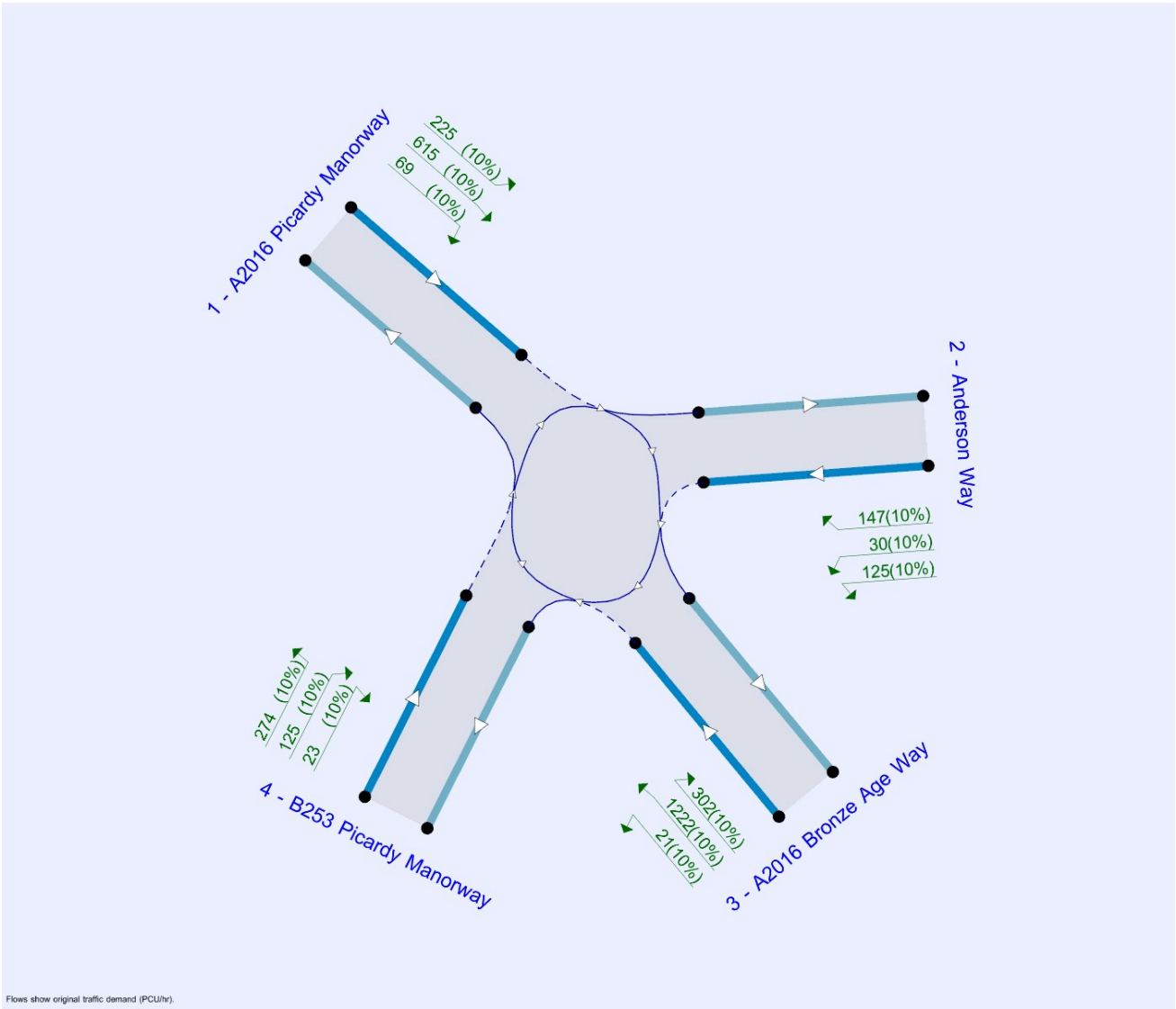
File summary

File Description

Title	Junction 3 - Senstivity Test
Location	Picardy Manorway
Site number	
Date	09/07/2018
Version	
Status	(new file)
Identifier	
Client	
Jobnumber	
Enumerator	PBA\jtsmith
Description	

Units

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



The junction diagram reflects the last run of Junctions.

Analysis Options

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)
D2	2022 DS AM - 100% Construction traffic	0600 - 0700	ONE HOUR	05:45	07:15	15
D4	2022 DS AM - 100% Construction Traffic	0700 - 0800	ONE HOUR	06:45	08:15	15
D6	2022 DS AM - 100% Construction Traffic	0730 - 0830	ONE HOUR	07:15	08:45	15
D7	2022 DS AM - 160% Construction Traffic	0730 - 0830	ONE HOUR	07:15	08:45	15

Analysis Set Details

ID	Network flow scaling factor (%)
A1	100.000

2022 DS AM - 100% Construction traffic, 0600 - 0700

Data Errors and Warnings

No errors or warnings

Junction Network

Junctions

Junction	Name	Junction Type	Arm order	Junction Delay (s)	Junction LOS
1	untitled	Standard Roundabout	1, 2, 3, 4	4.10	A

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

Arms

Arms

Arm	Name	Description
1	A2016 Picardy Manorway	
2	Anderson Way	
3	A2016 Bronze Age Way	
4	B253 Picardy Manorway	

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 - A2016 Picardy Manorway	7.70	10.50	4.9	35.0	62.0	11.5	
2 - Anderson Way	7.50	16.00	8.9	29.0	62.0	24.0	
3 - A2016 Bronze Age Way	7.50	10.50	6.7	35.0	62.0	20.5	
4 - B253 Picardy Manorway	4.50	10.30	30.0	28.6	62.0	20.0	

Slope / Intercept / Capacity

Roundabout Slope and Intercept used in model

Arm	Final slope	Final intercept (PCU/hr)
1 - A2016 Picardy Manorway	0.764	2857
2 - Anderson Way	0.778	3012
3 - A2016 Bronze Age Way	0.745	2789
4 - B253 Picardy Manorway	0.706	2570

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)
D2	2022 DS AM - 100% Construction traffic	0600 - 0700	ONE HOUR	05:45	07:15	15

Default vehicle mix	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 - A2016 Picardy Manorway		✓	932	100.000
2 - Anderson Way		✓	302	100.000
3 - A2016 Bronze Age Way		✓	1602	100.000
4 - B253 Picardy Manorway		✓	422	100.000

Origin-Destination Data

Demand (PCU/hr)

		To			
		1 - A2016 Picardy Manorway	2 - Anderson Way	3 - A2016 Bronze Age Way	4 - B253 Picardy Manorway
From	1 - A2016 Picardy Manorway	23	225	615	69
	2 - Anderson Way	147	0	125	30
	3 - A2016 Bronze Age Way	1222	302	57	21
	4 - B253 Picardy Manorway	274	125	23	0

Vehicle Mix

Heavy Vehicle Percentages

		To			
		1 - A2016 Picardy Manorway	2 - Anderson Way	3 - A2016 Bronze Age Way	4 - B253 Picardy Manorway
From	1 - A2016 Picardy Manorway	10	10	10	10
	2 - Anderson Way	10	10	10	10
	3 - A2016 Bronze Age Way	10	10	10	10
	4 - B253 Picardy Manorway	10	10	10	10

Detailed Demand Data

Demand for each time segment

Time Segment	Arm	Demand (PCU/hr)	Demand in PCU (PCU/hr)
05:45-06:00	1 - A2016 Picardy Manorway	702	702
	2 - Anderson Way	227	227
	3 - A2016 Bronze Age Way	1206	1206
	4 - B253 Picardy Manorway	318	318
06:00-06:15	1 - A2016 Picardy Manorway	838	838
	2 - Anderson Way	271	271
	3 - A2016 Bronze Age Way	1440	1440
	4 - B253 Picardy Manorway	379	379
06:15-06:30	1 - A2016 Picardy Manorway	1026	1026
	2 - Anderson Way	333	333
	3 - A2016 Bronze Age Way	1764	1764
	4 - B253 Picardy Manorway	465	465
06:30-06:45	1 - A2016 Picardy Manorway	1026	1026
	2 - Anderson Way	333	333
	3 - A2016 Bronze Age Way	1764	1764
	4 - B253 Picardy Manorway	465	465
06:45-07:00	1 - A2016 Picardy Manorway	838	838
	2 - Anderson Way	271	271
	3 - A2016 Bronze Age Way	1440	1440
	4 - B253 Picardy Manorway	379	379
07:00-07:15	1 - A2016 Picardy Manorway	702	702
	2 - Anderson Way	227	227
	3 - A2016 Bronze Age Way	1206	1206
	4 - B253 Picardy Manorway	318	318

Results

Results Summary for whole modelled period

Arm	Max RFC	Max delay (s)	Max Queue (PCU)	Max LOS
1 - A2016 Picardy Manorway	0.42	2.82	0.8	A
2 - Anderson Way	0.14	1.97	0.2	A
3 - A2016 Bronze Age Way	0.69	4.92	2.4	A
4 - B253 Picardy Manorway	0.38	5.32	0.7	A

Main Results for each time segment

05:45 - 06:00

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
1 - A2016 Picardy Manorway	702	381	2566	0.273	700	0.4	2.119	A
2 - Anderson Way	227	591	2552	0.089	227	0.1	1.702	A
3 - A2016 Bronze Age Way	1206	202	2638	0.457	1202	0.9	2.751	A
4 - B253 Picardy Manorway	318	1314	1642	0.194	317	0.3	2.984	A

06:00 - 06:15

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
1 - A2016 Picardy Manorway	838	455	2509	0.334	837	0.5	2.368	A
2 - Anderson Way	271	707	2462	0.110	271	0.1	1.806	A
3 - A2016 Bronze Age Way	1440	242	2609	0.552	1438	1.3	3.379	A
4 - B253 Picardy Manorway	379	1572	1459	0.260	379	0.4	3.662	A

06:15 - 06:30

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
1 - A2016 Picardy Manorway	1026	557	2432	0.422	1025	0.8	2.814	A
2 - Anderson Way	333	866	2339	0.142	332	0.2	1.973	A
3 - A2016 Bronze Age Way	1764	296	2568	0.687	1760	2.4	4.874	A
4 - B253 Picardy Manorway	465	1924	1211	0.384	463	0.7	5.286	A

06:30 - 06:45

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
1 - A2016 Picardy Manorway	1026	558	2431	0.422	1026	0.8	2.819	A
2 - Anderson Way	333	866	2338	0.142	333	0.2	1.974	A
3 - A2016 Bronze Age Way	1764	296	2568	0.687	1764	2.4	4.920	A
4 - B253 Picardy Manorway	465	1928	1208	0.385	465	0.7	5.324	A

06:45 - 07:00

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
1 - A2016 Picardy Manorway	838	457	2508	0.334	839	0.6	2.373	A
2 - Anderson Way	271	708	2461	0.110	272	0.1	1.808	A
3 - A2016 Bronze Age Way	1440	242	2609	0.552	1444	1.4	3.412	A
4 - B253 Picardy Manorway	379	1578	1455	0.261	381	0.4	3.690	A

07:00 - 07:15

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
1 - A2016 Picardy Manorway	702	382	2565	0.274	702	0.4	2.127	A
2 - Anderson Way	227	593	2551	0.089	227	0.1	1.703	A
3 - A2016 Bronze Age Way	1206	203	2638	0.457	1208	0.9	2.771	A
4 - B253 Picardy Manorway	318	1320	1638	0.194	318	0.3	3.003	A

2022 DS AM - 100% Construction Traffic, 0700 - 0800

Data Errors and Warnings

No errors or warnings

Junction Network

Junctions

Junction	Name	Junction Type	Arm order	Junction Delay (s)	Junction LOS
1	untitled	Standard Roundabout	1, 2, 3, 4	7.25	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	2022 DS AM - 100% Construction Traffic	0700 - 0800	ONE HOUR	06:45	08:15	15

Default vehicle mix	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 - A2016 Picardy Manorway		✓	1045	100.000
2 - Anderson Way		✓	351	100.000
3 - A2016 Bronze Age Way		✓	1828	100.000
4 - B253 Picardy Manorway		✓	657	100.000

Origin-Destination Data

Demand (PCU/hr)

		To			
		1 - A2016 Picardy Manorway	2 - Anderson Way	3 - A2016 Bronze Age Way	4 - B253 Picardy Manorway
From	1 - A2016 Picardy Manorway	13	244	644	144
	2 - Anderson Way	181	0	125	45
	3 - A2016 Bronze Age Way	1454	284	47	43
	4 - B253 Picardy Manorway	446	159	50	2

Vehicle Mix

Heavy Vehicle Percentages

		To			
		1 - A2016 Picardy Manorway	2 - Anderson Way	3 - A2016 Bronze Age Way	4 - B253 Picardy Manorway
From	1 - A2016 Picardy Manorway	10	10	10	10
	2 - Anderson Way	10	10	10	10
	3 - A2016 Bronze Age Way	10	10	10	10
	4 - B253 Picardy Manorway	10	10	10	10

Detailed Demand Data

Demand for each time segment

Time Segment	Arm	Demand (PCU/hr)	Demand in PCU (PCU/hr)
06:45-07:00	1 - A2016 Picardy Manorway	787	787
	2 - Anderson Way	264	264
	3 - A2016 Bronze Age Way	1376	1376
	4 - B253 Picardy Manorway	495	495
07:00-07:15	1 - A2016 Picardy Manorway	939	939
	2 - Anderson Way	316	316
	3 - A2016 Bronze Age Way	1643	1643
	4 - B253 Picardy Manorway	591	591
07:15-07:30	1 - A2016 Picardy Manorway	1151	1151
	2 - Anderson Way	386	386
	3 - A2016 Bronze Age Way	2013	2013
	4 - B253 Picardy Manorway	723	723
07:30-07:45	1 - A2016 Picardy Manorway	1151	1151
	2 - Anderson Way	386	386
	3 - A2016 Bronze Age Way	2013	2013
	4 - B253 Picardy Manorway	723	723
07:45-08:00	1 - A2016 Picardy Manorway	939	939
	2 - Anderson Way	316	316
	3 - A2016 Bronze Age Way	1643	1643
	4 - B253 Picardy Manorway	591	591
08:00-08:15	1 - A2016 Picardy Manorway	787	787
	2 - Anderson Way	264	264
	3 - A2016 Bronze Age Way	1376	1376
	4 - B253 Picardy Manorway	495	495

Results

Results Summary for whole modelled period

Arm	Max RFC	Max delay (s)	Max Queue (PCU)	Max LOS
1 - A2016 Picardy Manorway	0.48	3.17	1.0	A
2 - Anderson Way	0.17	2.13	0.2	A
3 - A2016 Bronze Age Way	0.81	8.57	4.7	A
4 - B253 Picardy Manorway	0.70	12.81	2.5	B

Main Results for each time segment

06:45 - 07:00

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
1 - A2016 Picardy Manorway	787	406	2547	0.309	785	0.5	2.246	A
2 - Anderson Way	264	676	2486	0.106	264	0.1	1.781	A
3 - A2016 Bronze Age Way	1376	289	2573	0.535	1371	1.3	3.281	A
4 - B253 Picardy Manorway	495	1485	1521	0.325	493	0.5	3.841	A

07:00 - 07:15

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
1 - A2016 Picardy Manorway	939	486	2486	0.378	939	0.7	2.558	A
2 - Anderson Way	316	808	2383	0.132	315	0.2	1.914	A
3 - A2016 Bronze Age Way	1643	346	2531	0.649	1640	2.0	4.430	A
4 - B253 Picardy Manorway	591	1776	1316	0.449	589	0.9	5.440	A

07:15 - 07:30

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
1 - A2016 Picardy Manorway	1151	593	2404	0.479	1149	1.0	3.153	A
2 - Anderson Way	386	989	2243	0.172	386	0.2	2.133	A
3 - A2016 Bronze Age Way	2013	424	2473	0.814	2002	4.6	8.231	A
4 - B253 Picardy Manorway	723	2169	1038	0.697	717	2.4	12.117	B

07:30 - 07:45

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
1 - A2016 Picardy Manorway	1151	597	2401	0.479	1151	1.0	3.165	A
2 - Anderson Way	386	991	2241	0.172	386	0.2	2.134	A
3 - A2016 Bronze Age Way	2013	424	2473	0.814	2012	4.7	8.569	A
4 - B253 Picardy Manorway	723	2178	1031	0.701	723	2.5	12.813	B

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)	LOS
1 - A2016 Picardy Manorway	939	491	2482	0.379	941	0.7	2.571	A
2 - Anderson Way	316	811	2381	0.133	316	0.2	1.919	A
3 - A2016 Bronze Age Way	1643	346	2531	0.649	1654	2.1	4.568	A
4 - B253 Picardy Manorway	591	1789	1306	0.452	597	0.9	5.635	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)	LOS
1 - A2016 Picardy Manorway	787	409	2545	0.309	787	0.5	2.254	A
2 - Anderson Way	264	678	2484	0.106	264	0.1	1.785	A
3 - A2016 Bronze Age Way	1376	290	2573	0.535	1379	1.3	3.326	A
4 - B253 Picardy Manorway	495	1493	1515	0.326	496	0.5	3.892	A

2022 DS AM - 100% Construction Traffic, 0730 - 0830

Data Errors and Warnings

No errors or warnings

Junction Network

Junctions

Junction	Name	Junction Type	Arm order	Junction Delay (s)	Junction LOS
1	untitled	Standard Roundabout	1, 2, 3, 4	9.04	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	2022 DS AM - 100% Construction Traffic	0730 - 0830	ONE HOUR	07:15	08:45	15

Default vehicle mix	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 - A2016 Picardy Manorway		✓	1192	100.000
2 - Anderson Way		✓	372	100.000
3 - A2016 Bronze Age Way		✓	1805	100.000
4 - B253 Picardy Manorway		✓	766	100.000

Origin-Destination Data

Demand (PCU/hr)

		To			
		1 - A2016 Picardy Manorway	2 - Anderson Way	3 - A2016 Bronze Age Way	4 - B253 Picardy Manorway
From	1 - A2016 Picardy Manorway	12	235	714	231
	2 - Anderson Way	186	0	135	51
	3 - A2016 Bronze Age Way	1427	274	58	46
	4 - B253 Picardy Manorway	530	166	67	3

Vehicle Mix

Heavy Vehicle Percentages

		To			
		1 - A2016 Picardy Manorway	2 - Anderson Way	3 - A2016 Bronze Age Way	4 - B253 Picardy Manorway
From	1 - A2016 Picardy Manorway	10	10	10	10
	2 - Anderson Way	10	10	10	10
	3 - A2016 Bronze Age Way	10	10	10	10
	4 - B253 Picardy Manorway	10	10	10	10

Detailed Demand Data

Demand for each time segment

Time Segment	Arm	Demand (PCU/hr)	Demand in PCU (PCU/hr)
07:15-07:30	1 - A2016 Picardy Manorway	897	897
	2 - Anderson Way	280	280
	3 - A2016 Bronze Age Way	1359	1359
	4 - B253 Picardy Manorway	577	577
07:30-07:45	1 - A2016 Picardy Manorway	1072	1072
	2 - Anderson Way	334	334
	3 - A2016 Bronze Age Way	1623	1623
	4 - B253 Picardy Manorway	689	689
07:45-08:00	1 - A2016 Picardy Manorway	1312	1312
	2 - Anderson Way	410	410
	3 - A2016 Bronze Age Way	1987	1987
	4 - B253 Picardy Manorway	843	843
08:00-08:15	1 - A2016 Picardy Manorway	1312	1312
	2 - Anderson Way	410	410
	3 - A2016 Bronze Age Way	1987	1987
	4 - B253 Picardy Manorway	843	843
08:15-08:30	1 - A2016 Picardy Manorway	1072	1072
	2 - Anderson Way	334	334
	3 - A2016 Bronze Age Way	1623	1623
	4 - B253 Picardy Manorway	689	689
08:30-08:45	1 - A2016 Picardy Manorway	897	897
	2 - Anderson Way	280	280
	3 - A2016 Bronze Age Way	1359	1359
	4 - B253 Picardy Manorway	577	577

Results

Results Summary for whole modelled period

Arm	Max RFC	Max delay (s)	Max Queue (PCU)	Max LOS
1 - A2016 Picardy Manorway	0.55	3.71	1.3	A
2 - Anderson Way	0.20	2.37	0.3	A
3 - A2016 Bronze Age Way	0.83	9.71	5.2	A
4 - B253 Picardy Manorway	0.80	18.98	4.3	C

Main Results for each time segment

07:15 - 07:30

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
1 - A2016 Picardy Manorway	897	426	2532	0.354	895	0.6	2.416	A
2 - Anderson Way	280	815	2378	0.118	279	0.1	1.886	A
3 - A2016 Bronze Age Way	1359	363	2519	0.540	1354	1.3	3.384	A
4 - B253 Picardy Manorway	577	1468	1533	0.376	574	0.7	4.118	A

07:30 - 07:45

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
1 - A2016 Picardy Manorway	1072	509	2468	0.434	1071	0.8	2.833	A
2 - Anderson Way	334	974	2254	0.148	334	0.2	2.062	A
3 - A2016 Bronze Age Way	1623	434	2466	0.658	1619	2.1	4.662	A
4 - B253 Picardy Manorway	689	1756	1330	0.518	687	1.2	6.137	A

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)	LOS
1 - A2016 Picardy Manorway	1312	620	2384	0.551	1310	1.3	3.684	A
2 - Anderson Way	410	1192	2085	0.196	409	0.3	2.363	A
3 - A2016 Bronze Age Way	1987	531	2393	0.830	1975	5.1	9.221	A
4 - B253 Picardy Manorway	843	2143	1056	0.798	832	4.0	16.881	C

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)	LOS
1 - A2016 Picardy Manorway	1312	625	2380	0.552	1312	1.3	3.709	A
2 - Anderson Way	410	1194	2083	0.197	410	0.3	2.366	A
3 - A2016 Bronze Age Way	1987	532	2393	0.831	1987	5.2	9.714	A
4 - B253 Picardy Manorway	843	2154	1048	0.804	842	4.3	18.978	C

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)	LOS
1 - A2016 Picardy Manorway	1072	517	2462	0.435	1074	0.9	2.857	A
2 - Anderson Way	334	978	2251	0.149	335	0.2	2.066	A
3 - A2016 Bronze Age Way	1623	435	2465	0.658	1635	2.2	4.839	A
4 - B253 Picardy Manorway	689	1771	1319	0.522	701	1.2	6.532	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)	LOS
1 - A2016 Picardy Manorway	897	429	2529	0.355	898	0.6	2.428	A
2 - Anderson Way	280	818	2376	0.118	280	0.1	1.891	A
3 - A2016 Bronze Age Way	1359	364	2518	0.540	1362	1.3	3.436	A
4 - B253 Picardy Manorway	577	1477	1527	0.378	579	0.7	4.185	A

2022 DS AM - 160% Construction Traffic, 0730 - 0830

Data Errors and Warnings

No errors or warnings

Junction Network

Junctions

Junction	Name	Junction Type	Arm order	Junction Delay (s)	Junction LOS
1	untitled	Standard Roundabout	1, 2, 3, 4	28.47	D

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)
D7	2022 DS AM - 160% Construction Traffic	0730 - 0830	ONE HOUR	07:15	08:45	15

Default vehicle mix	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 - A2016 Picardy Manorway		✓	1198	100.000
2 - Anderson Way		✓	372	100.000
3 - A2016 Bronze Age Way		✓	1961	100.000
4 - B253 Picardy Manorway		✓	866	100.000

Origin-Destination Data

Demand (PCU/hr)

		To			
		1 - A2016 Picardy Manorway	2 - Anderson Way	3 - A2016 Bronze Age Way	4 - B253 Picardy Manorway
From	1 - A2016 Picardy Manorway	14	235	718	231
	2 - Anderson Way	186	0	135	51
	3 - A2016 Bronze Age Way	1583	274	58	46
	4 - B253 Picardy Manorway	627	166	70	3

Vehicle Mix

Heavy Vehicle Percentages

		To			
		1 - A2016 Picardy Manorway	2 - Anderson Way	3 - A2016 Bronze Age Way	4 - B253 Picardy Manorway
From	1 - A2016 Picardy Manorway	10	10	10	10
	2 - Anderson Way	10	10	10	10
	3 - A2016 Bronze Age Way	10	10	10	10
	4 - B253 Picardy Manorway	10	10	10	10

Detailed Demand Data

Demand for each time segment

Time Segment	Arm	Demand (PCU/hr)	Demand in PCU (PCU/hr)
07:15-07:30	1 - A2016 Picardy Manorway	902	902
	2 - Anderson Way	280	280
	3 - A2016 Bronze Age Way	1476	1476
	4 - B253 Picardy Manorway	652	652
07:30-07:45	1 - A2016 Picardy Manorway	1077	1077
	2 - Anderson Way	334	334
	3 - A2016 Bronze Age Way	1763	1763
	4 - B253 Picardy Manorway	779	779
07:45-08:00	1 - A2016 Picardy Manorway	1319	1319
	2 - Anderson Way	410	410
	3 - A2016 Bronze Age Way	2159	2159
	4 - B253 Picardy Manorway	953	953
08:00-08:15	1 - A2016 Picardy Manorway	1319	1319
	2 - Anderson Way	410	410
	3 - A2016 Bronze Age Way	2159	2159
	4 - B253 Picardy Manorway	953	953
08:15-08:30	1 - A2016 Picardy Manorway	1077	1077
	2 - Anderson Way	334	334
	3 - A2016 Bronze Age Way	1763	1763
	4 - B253 Picardy Manorway	779	779
08:30-08:45	1 - A2016 Picardy Manorway	902	902
	2 - Anderson Way	280	280
	3 - A2016 Bronze Age Way	1476	1476
	4 - B253 Picardy Manorway	652	652

Results

Results Summary for whole modelled period

Arm	Max RFC	Max delay (s)	Max Queue (PCU)	Max LOS
1 - A2016 Picardy Manorway	0.55	3.71	1.4	A
2 - Anderson Way	0.20	2.37	0.3	A
3 - A2016 Bronze Age Way	0.90	16.45	9.4	C
4 - B253 Picardy Manorway	1.03	101.15	28.3	F

Main Results for each time segment

07:15 - 07:30

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
1 - A2016 Picardy Manorway	902	428	2530	0.356	899	0.6	2.425	A
2 - Anderson Way	280	821	2373	0.118	279	0.1	1.890	A
3 - A2016 Bronze Age Way	1476	364	2518	0.586	1470	1.5	3.760	A
4 - B253 Picardy Manorway	652	1586	1450	0.450	648	0.9	4.919	A

07:30 - 07:45

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
1 - A2016 Picardy Manorway	1077	511	2466	0.437	1076	0.8	2.847	A
2 - Anderson Way	334	982	2248	0.149	334	0.2	2.069	A
3 - A2016 Bronze Age Way	1763	436	2464	0.715	1758	2.7	5.571	A
4 - B253 Picardy Manorway	779	1897	1230	0.633	775	1.8	8.618	A

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)	LOS
1 - A2016 Picardy Manorway	1319	608	2393	0.551	1317	1.3	3.675	A
2 - Anderson Way	410	1197	2081	0.197	409	0.3	2.369	A
3 - A2016 Bronze Age Way	2159	533	2392	0.903	2135	8.8	14.248	B
4 - B253 Picardy Manorway	953	2305	942	1.012	892	17.3	52.712	F

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)	LOS
1 - A2016 Picardy Manorway	1319	616	2386	0.553	1319	1.4	3.709	A
2 - Anderson Way	410	1201	2078	0.197	410	0.3	2.373	A
3 - A2016 Bronze Age Way	2159	534	2391	0.903	2157	9.4	16.451	C
4 - B253 Picardy Manorway	953	2326	927	1.029	910	28.3	101.146	F

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)	LOS
1 - A2016 Picardy Manorway	1077	547	2439	0.442	1079	0.9	2.914	A
2 - Anderson Way	334	995	2238	0.149	335	0.2	2.081	A
3 - A2016 Bronze Age Way	1763	437	2463	0.716	1789	2.8	6.094	A
4 - B253 Picardy Manorway	779	1927	1209	0.644	883	2.1	16.514	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)	LOS
1 - A2016 Picardy Manorway	902	432	2527	0.357	903	0.6	2.439	A
2 - Anderson Way	280	825	2370	0.118	280	0.1	1.893	A
3 - A2016 Bronze Age Way	1476	365	2517	0.587	1481	1.6	3.844	A
4 - B253 Picardy Manorway	652	1597	1442	0.452	657	0.9	5.073	A

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Meeting Title: Riverside Energy Park TfL Engagement – Pre-Examination

Attendees: TfL: Julia Bray (JB) – Spatial Planning, Neil Chester (NC) – Consents and Environment Manager, Tim DeLaat (TD) – Case Officer, Michal Miklasz (MM) – Planning/Network Performance

PBA: Adrian Neve - PBA (AN), Morteza, Mortezai-Nejad - PBA (MMN)

Cory: Richard Wilkinson (RW)

cc: All present + Cory Riverside Energy + PBA core team

Date of Meeting: 13/03/19

Item	Subject	Actions
1.	**DCO process and submission** • DCO Submitted 16 Nov 19 • Relevant Representation received mid-Feb • Awaiting formal confirmation from PINS on Preliminary meeting • TD attending on 10th April Preliminary meeting • Deadlines of 30th April and 20th May noted	
2.	**Review of recent progress on sensitivity analysis** AN • noted that TfL did not object to the operational impact • TA states shift – 08:00 – 18:00hrs. Actual anticipated time 07:00 – 19:00hrs • parking figures used to derive workforce flows NS - questioned parking spaces and why so high? Silvertown tunnel circa 100 spaces – not for commuters. AN – CTMP will look at this in more detail. RW – There is no commercial reason to over provide and the level is as part of the transport mitigation. NC – should be looking at agreeing a number and provide more detail on the reasoning for the reduced parking number. He is happy in general with the way forward as discussed and accepts that there would still be an impact for a temporary period. AN – sensitivity testing of the Picardy Manorway junction has shown it to operate with spare capacity during construction period. He ran through junction flow profiles for Bexley Road roundabout and James Watt Way. The work looked at potential solutions: • Driving parking provision down to 275 • Site working day (07:00-19:00hrs) would mean trips unlikely to take place during peak hours.	PBA to review CTMP

	He ran through sensitivity testing summaries and peak period comparison for Bexley Road roundabout and James Watt Way summary table highlighting differences between scenarios. The information presented could be captured in the Statement of Common Ground (SOCG). Detail of how that is presented will be captured in the CTMP. MM – Cory would need to commit to peak hours NC – happy with approach if numbers provide sufficient comfort that the impacts would be low. MM – is there a model showing that the junctions would work with 275 parking – or any type of assessment? AN – ran through reasons why additional modelling would be futile. EC construction is standard Utility road works; very temporary as works move along the corridor; physical mitigation would be inappropriate and cause more disruption than the temporary works themselves; models would need multiple iterations and would not show the precise impact. NC – queried whether Cory has provided reasons from contractor as to why 275 parking spaces are required? RW – explained benefits of scheme and the need for balance between providing sufficient phased spaces for the specialist workforce; changing profiles of workforce across the programme period; without over-providing and managing spaces within the workforce travel plan. NC – need to package as much information as possible in terms of parking and contractor details in CTMP. RW – noted that there could be an intermediate step between outline and detailed CTMP which could be put to the Examination through a revised Outline CTMP. NC – the approach should be on pushing forward and detailing the story and mitigation measures to get to a stage where TfL could agree that all options have been looked at and the best possible measures have been offered despite the fact that TfL think there would be an impact on the network. MM – raised point re bus impacts and how modelling could help quantify this. NC: • raised point re impacts of cable connection; • raised point re river/road balance; and	PBA to review CTMP

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	• proportional impacts need to be agreed and secured as part of the DCO. AN – explained cable connection process, as set out in the DCO documents, and that UKPN are looking at ways to optimise the route and minimise impacts. MM – raised that TfL are concerned about the uncertainty over the cable connection which is not within their control and up to UKPN. Hoping by the end of March to have the engineering information from UKPN – will be shared with TfL as soon as it is known TD – all uncertainty re cable connection causes TfL anxiety RW – Cory know it's temporary and required for connecting to the grid and that they will be providing full details as part of the detailed CTMP – secured by the DCO. Won't have further details until the route is decided by UKPN and engineering design undertaken. UKPN has statutory requirements and will work in a safe and efficient manner. TD – TfL to look through DCO Requirements and whether additional details/measures could be added to give more comfort. RW – The way forward is that Cory/PBA will provide a technical note and more information on the points covered at the meeting and to reflect the UKPN process to date and looking at addressing remaining concerns in the SoCG. The SoCG would be reviewed and reissued to reflect the point discussed at the meeting and agree further changes. MM – is to share the network flow diagrams to assist with reviewing the sensitivity analysis.	TfL to review Requirements PBA to provide technical notes PBA to circulate network flow diagrams
3.	TfL next steps • TfL to be present at the Preliminary Meeting • JB proposed that TfL hold an internal working group with affected teams to review the further information to determine whether further information is required. • TfL will review snapshots from video evidence of the operation of the Bexley Road and James Watt Way junctions to understand the operation of the network. • MM on leave 8-22 April	TFL to hold working group TfL to review technical notes

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Meeting Title: Riverside Energy Park TfL Engagement – Relevant Representation Response, Written Representation and Statement of Common Ground

Attendees: Tim DeLaat – TfL Case Office (TD), Michal Miklasz – Tfl Planning/ Network Performance Modelling Liaison (MM), Adrian Neve - PBA (AN), Morteza Mortezai-Nejad - PBA (MMN), Richard Wilkinson – CRE (RW)

cc: All present + Cory Riverside Energy + PBA Environmental Statement project

Date of Meeting: 31/05/19

Item	Subject	Actions
1.	**Submission Update** AN provided an update on the DCO progress including upcoming deadlines. TD mentioned that TfL will not be present at the Examination Hearing on 04/06/19 but staff from the GLA will be present. TfL, represented by TD, will be present at the Hearing on 05/06/19. AN stressed that the SoCG with TfL should be completed by deadline three (18 June 2019), to which TD agreed.	
2.	**Responses to Relevant Representations – Operational Phase** TD confirmed that no further action is required in relation to the operational phase assessment. TD stated that TfL accept the following points in Requirement 14 of the Draft DCO (Revision 1) : - Cap of 90 HGVs per day - IBA by river only - 300 HGVs per day to ERF during jetty outage - 30 HGVs between 07:30-09:00 and 16:30-18:00 during jetty outage - IBA by road during jetty outage TD stated that TfL do not agree to the inclusion of the use of residual RRRF movements within Requirement 14. Citing aspiration for reduction in goods vehicles in the Draft London Plan (Policy T2) and Policy 7.25 (Blue Ribbon). RW and AN responded that there would be no capacity/ performance issues or implications with using the residual RRRF movements and that the assessments undertaken within the ES and TA assume 100% of waste input by road. TD and MM agreed that there would be no operational issues regarding highway capacity in using the residual RRRF movements and that the decision is driven by sustainability and policy considerations.	
3.	**Responses to Relevant Representations – Construction Phase** AN summarised the work undertaken in TN9 and TN13 and the proposed approach for the construction phase.	

	TD stated that TfL acknowledge the positive effects of having the working construction working day between 0700-1900 on a single shift. Agreed that this would be included within the SoCG. TD stated that TfL will be able to unilaterally enter an SoCG – separate to the GLA. TD stated that the reduction in parking provision to 275 for the construction phase was a positive step and acknowledged that it is a large reduction from the original provision of 552 parking spaces. However, it was requested that the Applicant considers further reductions in the parking provision if possible or provide information to TfL on how the 275-parking spaces were derived and why this level of provision was required. This is to help TfL understand the parking requirements and help TfL look at other examples in other developments where parking reductions were achieved and their appropriateness for this development. RW responded that the parking provision has been reduced significantly and this coupled with the working day of 0700-1900 would mitigate the potential effects of construction workers. RW stressed that the provision of 275 spaces cannot be reduced any further and is appropriate given the nature of sensitive/ precision engineering required, the location of the site and the suitable mitigation evidenced by measures in CTMP. MM queried the date on which the traffic surveys were undertaken for A206 / James Watt Way and the A206/ Boundary St/ Dell View Rd junctions. MMN and AN confirmed that the surveys were undertaken on 24/05/18 (Thursday). MM queried the source of trip distribution used for the construction worker commuting vehicle trips to which MMN responded '2011 Census data' which is the most appropriate source available at this stage. AN confirmed that the wording within the CTMP would include that the working day would be between 0700-1900. MM confirmed that the evidence regarding the peak-hour impacts during the construction phase is robust and that the working day of 0700-0900 (single shift) and the reduction of parking spaces to 275 is appropriate with regard to highway capacity in relation to mitigating construction worker commuting trip impacts. On the construction of the electrical connection route, MM questioned whether programming of the Electrical Connection construction for critical sections could be carried out at times of lower background traffic (i.e. summer holidays). MM stated that TfL have access to traffic flow data at Erith Roundabout and James Watt Way which would be checked by TfL to inform if this could be help reduce impacts. MM also stated that the A206/ James Watt Way junction operates under SCOOT and so there would be opportunities to reduce impacts through SCOOT.	TfL Action – TD to liaise with Network Performance/ Planning Interventions team on parking figures and SoCG wording. TfL Action – MM to check video footage of the junctions along the A206 between 0600-0700 against the evidence produced in TN9 and TN13 and subsequently pass comments onto TfL Surface team.

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	RW responded that commitments to specific mitigation measures of such nature cannot be made at this stage and will be subject to consultation with UKPN. However, all information and recommendations by TfL will be taken into consideration in the preparation of the CTMP.	
4.	**Next Steps on Construction Phase Assessments** Regarding the need for any additional assessments for the construction phase, TD and MM mentioned that TfL would have to consider potentially significant impacts on buses along the electrical connection route and consult with other interested parties before stating decision. AN and RW responded that CRE's position is that no further modelling would be required. AN stated that the selected route would have less interaction with buses than the route via local side-roads in Erith and that the construction of each segment would be temporary (4-6 weeks). Additionally, it was stated by AN that physical mitigation would not be appropriate for the temporary construction works and that CRE would work with UKPN to reduce the impacts of the electrical connection as much as possible in terms of exact routes of construction, hours of working and methods of construction. MMN stated that additional assessments, including modelling, would not be appropriate and proportionate given that the impacts are temporary, the Electrical Connection route is not fixed and will depend on UKPN and that modelling a large number of scenarios for the Electrical Construction route would not provide useful information that could result in practical solutions. MM agreed that modelling a large number of scenarios would not be useful and agreed that the temporary nature of the construction works would "not be the end of the world". MM stated that he will present his findings to other interested parties in TfL to provide a final decision regarding the need for further modelling work. MM also mentioned the positive in being able to adjust SCOOT timing to reduce impacts during the Electrical Connection construction.	TfL Action – MM to discuss if any further assessments would be required on the construction phase with A.Duff and J. Courtney by 04/06/19.

Appendix ~~C~~ D – Amended Requirements (dDCO submitted at Deadline 5)

Commented [TdL76]: To be reviewed. Not yet agreed. Several issues outstanding in as set out in Deadline 3 and Deadline 4.

Commented [NA77]: All sections from dDCO to be updated to cover amendments made at Deadline 5

Construction traffic management plan(s)

13.—(1) No part of the pre–commencement works may be carried out and no part of the authorised development may commence until a construction traffic management plan for that part has been submitted to and approved by the relevant planning authority (in consultation with the relevant highway authority and, for streets within the London Borough of Bexley, Transport for London). The construction traffic management plan(s) must be substantially in accordance with the outline construction traffic management plan and must include the following (as applicable for the part of the authorised development to which the construction traffic management plan relates)—

(a) construction vehicle routing plans in respect of both workers and deliveries;

(b) proposals for the scheduling and timing of movements of delivery vehicles including details of abnormal indivisible loads;

(c) site access plans;

(d) where practicable, temporary diversions of any public rights of way;

(e) measures to ensure the protection of users of any footpath within the Order limits which may be affected by the construction of the authorised development;

(f) proposals for the management of junctions to and crossings of highways and other public rights of way;

(g) a construction logistics plan; and

(h) a construction worker travel plan, including details of the temporal distribution of workers at Work No. 5(q), Work No. 8 and Work No. ~~9(e~~9(d), the likely number of worker vehicle movements and the management of workforce parking.

(2) The construction traffic management plan(s) submitted pursuant to sub–paragraph (1) must be accompanied by a statement explaining how the likely construction traffic impacts identified in the environmental statement are addressed through the measures contained in the construction traffic management plan(s).

(3) The construction traffic management plan(s) must be implemented as approved by the relevant planning authority ~~in consultation with the relevant highway authority and, for roads within the London Borough of Bexley, Transport for London~~.

Heavy commercial vehicle movements delivering waste

14.—(1) Subject to ~~sub-paragraphs~~ sub-paragraph (2)~~, (3) and (4),~~ the number of two-way vehicle movements (one vehicle in and one vehicle out) made by heavy commercial vehicles delivering waste to work number 1A and work number 1B from the street known as Norman Road during commissioning and the operational period must not exceed a maximum of 90 per day (90 vehicles in and 90 vehicles out).

~~(1) Where the daily number of two-way vehicle movements made by heavy commercial vehicles delivering waste to the Riverside Resource Recovery Facility is below the maximum number permitted by condition 28 of planning permission reference 16/02167/FUL (or as permitted under any other planning permission for the Riverside Resource Recovery Facility) so that there is an unused number of two-way heavy commercial vehicles permitted to deliver waste to the Riverside Resource Recovery Facility ("the surplus"), the undertaker may utilise all or part of the surplus for the purposes of work number 1A in addition to the maximum number permitted by sub-paragraph (1).~~

~~(2) In the event of a jetty outage, the number of two-way vehicle movements (one vehicle in and one vehicle out) made by heavy commercial vehicles delivering waste to work number 1A during the operational period must not exceed a maximum of 300 per day (300 vehicles in and 300 vehicles out) and must not exceed:~~

(2) In the event of a jetty outage, the number of two–way vehicle movements (one vehicle in and one vehicle out) made by heavy commercial vehicles delivering waste to work number 1A and work number 1B from the street known as Norman Road during commissioning and the operational period must not exceed a maximum of 300 per day (300 vehicles in and 300 vehicles out) and must not exceed—

(a) between the hours of 0730–0900, a maximum of 30 (30 vehicles in and 30 vehicles out); and

(b) between the hours of 1630–1800, a maximum of 30 (30 vehicles in and 30 vehicles out).

~~(3) In the event of a jetty outage affecting both the Riverside Resource Recovery Facility and work number 1A, where the daily number of two-way vehicle movements made by heavy commercial vehicles delivering waste to the Riverside Resource Recovery Facility is below the maximum number permitted by condition 27 of planning permission reference 16/02167/FUL (or as permitted under any other planning permission for the Riverside Resource Recovery Facility) so that there is an unused number of two-way heavy commercial vehicles permitted to deliver waste to the Riverside Resource Recovery Facility ("the jetty outage surplus"), the undertaker may utilise all or part of the jetty outage surplus for the purposes of work number 1A in addition to the maximum number permitted by sub-paragraph (3).~~

(3) ~~(4)~~Save where there is a jetty outage, incinerator bottom ash must only be removed via river.

(4) ~~(5)~~On the first anniversary of the date of final commissioning and annually thereafter, and following any reasonable request by the relevant planning authority (up to a maximum of four requests per year), the undertaker must provide the relevant planning authority with a record of the following for the preceding ~~period:~~period—

(a) confirmation whether or not a jetty outage occurred during the period; and

(b) the number of two–way vehicle movements (one vehicle in and one vehicle out) made by heavy commercial vehicles delivering waste to work number 1A and work number 1B from the street known as Norman Road in that period, such number to be split out clearly so that the number of movements during any jetty outage can be ascertained~~; and~~,

~~(c) confirmation as to whether there any surplus and/or jetty outage surplus was utilised by the undertaker in that period and, if so, evidence of that surplus and jetty outage surplus (as applicable) being available for use by the undertaker.~~

(5) ~~(6)~~In this article—

(a) "heavy commercial vehicle" has the meaning given by section 138 of the Road Traffic Regulation Act 1984; and

(b) "jetty outage" means circumstances caused by factors beyond the undertaker's control in which waste has not or could not be received at the jetty or ash containers have not been or could not be despatched from the jetty ~~; and~~for a period in excess of 48 hours.

~~(c)"operational period" means the period starting with the date on which the commissioning of numbered work 1 is completed and notified as such by the undertaker to the relevant planning authority pursuant to requirement [19] of Schedule 2 of this Order.~~

Operational worker travel plan

15.—(1) Prior to the date of final commissioning, an operational worker travel plan for those working at the authorised development must be submitted to and approved by the relevant planning authority (in consultation with the relevant highway authority and, for streets within the London Borough of Bexley, Transport for London). The operational worker travel plan must be in substantial accordance with the outline worker travel plan and set out measures to encourage staff working at Work Nos. 1, 2, 3, 4 and 5 to use sustainable modes of transport.

(2) The operational worker travel plan must be implemented as approved.