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Date: 11 January 2019
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Dear Ms Mignano

Planning Act 2008 (as amended)
Application by Roxhill (Junction 15) Limited for an Order granting Development Consent for the Northampton Gateway Strategic Rail Freight Interchange
Examination – Updated Cumulative Impact Assessment

We refer to our letter of 8 January 2019 with which we enclosed the Applicant's Deadline 4 submissions in accordance with the procedural decision contained in the Rule 8 letter issued on 17 October 2018.

As indicated in that letter, we now enclose the Applicant's Updated Cumulative Impact Assessment (including Appendices 1 – 3). This is based on the accepted Rail Central application.

This is being sent by e mail only, as agreed. Please advise if hard copies are required. I would be grateful if you would confirm safe receipt.

If there are any queries in connection with the enclosed please do not hesitate to contact me or my colleague, Morag Thomson.

Yours sincerely

[redacted]

pp · **Laura-Beth Hutton**
Senior Associate
Planning and Infrastructure Consenting
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Enclosures

NORTHAMPTON GATEWAY
STRATEGIC RAIL FREIGHT INTERCHANGE

UPDATED CUMULATIVE IMPACT ASSESSMENT WITH RAIL CENTRAL

DOCUMENT 8.13

The Northampton Gateway Rail Freight Interchange Order 201X

UPDATED CUMULATIVE IMPACT ASSESSMENT
WITH RAIL CENTRAL | 11 JANUARY 2019

www.northampton-gateway.co.uk

ROXHILL

Northampton Gateway SRFI

Updated Cumulative Impact Assessment with proposed Rail Central scheme as accepted by Examination

January 2019

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CONTENTS **PAGE**

Appendices:

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1.0 INTRODUCTION

1.1 In response to the ExA's first written questions (e.g. ExQ 1.9.1) the Applicant confirmed it would provide an updated Cumulative Impact Assessment (CIA) of the Proposed Development based on the updated 'Rail Central' SRFI proposals. Updates on the progress of the CIA were provided, as requested by the ExA, at Deadline 2 and 3 Documents 8.8 and 8.8A as part of the responses to the Rail Central submissions.

1.2 The answer to ExQ1.9.1 and the updates explain that originally it was anticipated that further transportation work would be undertaken by Rail Central, to update the Rail Central CIA and to address issues with the Rail Central submission material, however no such additional material has been made available to the Applicant. Accordingly, this assessment is based on the RC scheme as accepted for Examination. Details of all Rail Central application documents can be found on the Planning Inspectorate website through the following link:

https://infrastructure.planninginspectorate.gov.uk/projects/east-midlands/rail-central-strategic-rail-freight-interchange/

1.3 A review of the Rail Central application documentation has therefore been undertaken by the Northampton Gateway application team. This review identifies a number of short comings in the Rail Central application material and some of these concerns, where relevant to the cumulative impact assessment, are drawn out here. Where necessary therefore, in order to complete the assessment, judgements have been made based on the information available.

1.4 As with the original Northampton Gateway ES, each topic assesses the cumulative impacts of the Northampton Gateway scheme and Rail Central scheme in a bespoke way which best suits the topic concerned, and there is no prescribed or fixed approach for all topics. This enables each topic author to reflect the likelihood and extent of any cumulative effects, given the nature of the topic assessed, the specific characteristics of, and the relationships between, the sites, as well as reflecting the scale and nature of any likely effects associated with the development proposals. For example, for some topics there is limited likelihood of any significant cumulative effects whereas there are considered to be significant cumulative effects in relation to other topics.

1.5 The assessment of cumulative effects with other committed developments (for clarity this excludes Rail Central which is not committed development) has not been revisited in this CIA report. The assessment of effects with committed developments is unaffected by any changes as a result of the submitted Rail Central scheme, and remains as described in the submitted ES topic chapters (Document 5.2), and as summarised in Chapter 15 of the ES.

1.6 Submissions at Deadline 3 (by the promoters of the Rail Central SRFI) have queried the identification of the committed developments considered in the ES to

form part of the assessment of potential cumulative impacts. The Rail Central Environmental Statement appears to consider a significantly longer list of committed developments listed in the Rail Central application as being of potential relevance to the Rail Central application. The ES refers to 35 such potential projects in total.

1.7 Implicit in the queries and criticisms raised by Rail Central of the Northampton Gateway approach is the suggestion that listing a wide range of development sites and approvals ensures a full assessment of potential cumulative effects. However, in practice the vast majority of the 35 projects referred to are subsequently shown not to be relevant in terms of the likelihood of cumulative effects with the Rail Central application, by virtue either of the distance between the RC site and the committed site, or the size and nature of the listed commitments. For example, some of the listed commitments are on the southern side of Towcester, with another at Silverstone some 12km away. Many are small developments. Therefore, although included in the Rail Central Environmental Statement, the majority are then shown not to have any likely cumulative effects with Rail Central.

1.8 The NG approach is somewhat different – through the scoping exercise a common-sense judgement was taken regarding the likelihood of committed developments to have a direct relationship or create potentially significant cumulative effects with the Proposed Development. This focused on the largest and closest commitments, and those which would be likely to share receptors with the Northampton Gateway proposals. The list of commitments was agreed with the local planning authorities, and was expanded in response to their suggestion that the South of Brackmills SUE be added. The process included use of the 'matrices' encouraged by Planning Inspectorate as part of the NSIP process – see Section 15.4 of the Northampton Gateway ES.

1.9 The Northampton Gateway ES includes an assessment of likely cumulative effects with relevant committed developments as part of the ES. In the context of Transportation, Air Quality, and Noise & Vibration assessments this includes consideration of the cumulative effects of the Proposed Development with a comprehensive list of committed growth and developments as planned for through the Joint Core Strategy (including site allocations), or as already approved by the granting of planning permissions.

1.10 Those topic specific assessments therefore take account of the housing and employment growth (including DIRFT), and associated traffic growth, planned for over the longer-term. All of that traffic growth already forms part of the Northamptonshire Strategic Transport Model (owned and operated by the County Council) which has been used to undertake the Applicant's assessment of the traffic and transport impacts, and to inform the package of highway mitigation measures proposed as part of Northampton Gateway. The assessment also takes into account the Highways England Smart Motorways proposals which are planned for the M1 motorway including Junction 15. Further details of the scope of the Transport Assessment is included in ES Appendix 12.1.

1.11 The other parts of the ES, informed by the agreed approach through the ES Scoping process, considered the potential cumulative effects of the closest major sites to the Northampton Gateway Proposed Development site. That is the following committed developments:

- 'Northampton South' Sustainable Urban Extension (SUE) – located at Collingtree on the opposite side of the M1 from the Proposed Development, for approx. 1,000 dwellings, with a new local centre and primary school. This site is located on the opposite side of the M1 to the Northampton Gateway main site, and further north-west, to the west of Collingtree;
- 'South of Brackmills' SUE – located on the eastern edge of Northampton adjacent to the Brackmills industrial area, for approximately 1300 dwellings, new local centre and primary school. This site is located some 5km from the Northampton Gateway site, separated by Wooton and Grange Park; and
- Highways England's 'Smart Motorways' programme – M1 Junction 13 - 16.

1.12 In addition, to these 'committed developments', all topic specific chapters within the ES – including the transport, air quality and noise and vibration chapters - considered the additional potential effects with the emerging Rail Central SRFI on land to the west of the Northampton Loop Railway line. Rail Central is not 'committed', and therefore is dealt with separately to the approved and/or planned growth and development sites listed above and included in the Transport Assessment. The cumulative assessments carried out in each chapter of the ES firstly deal with committed development and then address the additional impact of the Rail Central proposals. This report updates the second element of the cumulative assessment, i.e. that dealing solely with the addition of Rail Central.

1.13 The assessment undertaken and submitted as part of the Northampton Gateway ES was based on the best and most up to date information available about the Rail Central scheme at that time. During the spring of 2018, when the Northampton Gateway CIA was being prepared, Rail Central held a Stage 2 Consultation process, with a draft, but incomplete, Environmental Statement and other supporting information. The Northampton Gateway CIA as submitted was principally based on the Rail Central Stage 2 Consultation. It was therefore, necessarily, an interim assessment in the absence of a final set of application details.

1.14 This CIA update is based on the Rail Central proposals which have been finalised since the Northampton Gateway ES was submitted. This updated CIA is based on the Rail Central application which was submitted to Planning Inspectorate in October 2018, and was accepted for Examination on 15th November 2018. The following thematic headed sections of this report, set out

by ES chapter topic in the same order as that contained in the ES, contain an updated assessment and judgements about the potential cumulative effects following a review of the submitted (accepted) Rail Central proposals.

1.15 For the avoidance of doubt, this revised and updated CIA includes the following caveats and limitations:

- This updated CIA is based on the Northampton Gateway team's review of the Rail Central ES as accepted for Examination. Where relevant to assessing the likely cumulative impacts, it refers to any deficiencies, gaps, and other methodological issues or queries regarding the final Rail Central proposals, but does not seek to provide full and detailed comments about the Rail Central application.

- The Rail Central application does not include a complete or up to date cumulative impact assessment of Rail Central with Northampton Gateway for reasons that are not explained. Information that might be expected to be available is not therefore available to assist this assessment.

1.16 The transport information supplied with the Rail Central application is incomplete and flawed, in particular in respect of the transport modelling. This also has not assisted this assessment. The difficulties are apparent from a meeting between the respective traffic consultants, a note of which is contained in Appendix 2 to Document 8.8B submitted for Deadline 4.

1.17 The abbreviations 'NGW' for Northampton Gateway, and 'RC' for Rail Central are used throughout the report.

Rail Central Project Overview

1.18 The Rail Central site is located between the villages of Milton Malsor and Blisworth. The West Coast Main line runs to its southern boundary with the Northampton Loop line of the West Coast Main line forming its eastern boundary. Access will be gained from a new junction on the A43 on the western edge of the site. The Northampton Road / Towcester Road linking Milton Malsor with Blisworth will remain, running through the centre of the site, effectively splitting the site into two discrete, but linked, parts. The site is currently mainly arable farmland.

1.19 The Rail Central proposal is described by Rail Central as follows (see pages 4 and 5 of the Rail Central Planning Statement (Document 7.1 of the Rail Central application)):

- Demolition of existing buildings and structures;

- An intermodal freight terminal with direct connections to the Northampton Loop Line, capable of accommodating trains of up to

775m long, including up to 3 gantry cranes, container storage, a train maintenance depot and facilities to transfer containers to Heavy Goods Vehicles (HGV);

- An express freight terminal with direct connections to the West Coast Main Line, capable of accommodating trains of up to 240m long, a freight platform with associated loading and unloading facilities;
- Up to 702,097 square metres (sq.m) (GEA) of rail connected and rail served warehousing and ancillary service buildings including a lorry park, terminal
- control building and bus terminal;
- New road infrastructure including a new separated access point on the A43(T), an internal site underpass (under Northampton Road) and necessary utilities infrastructure;
- Strategic landscaping and open space including alterations to public rights of way, the creation of new ecological enhancement areas and publicly accessible open areas, flood attenuation, and the partial diversion of the Milton Malsor brook;
- Improvements to Junctoin 15a of the M1, including carriageway widening, reconfiguration and signalisation of hihjways, and provision of ecological mitigation to the south-west of J15a to partyl mitigate habitat loss at the main SRFI site and landscaping around the junction; and
- A range of additional highways improvements to various junctions.

1.20 Key parameters for the Rail Central development are set out on a Parameters Plans and an Illustrative Landscape Masterplan demonstrates a means of bringing forward the proposed development. These are included at Appendix One (as Appendix 1A and 1B) for ease of reference.

1.21 The following sections of this report cover the topics assessed, followed by a conclusions section.

2.0 CUMULATIVE IMPACTS ASSESSMENT – TOPIC SPECIFIC SECTIONS

Socio Economic

Introduction

2.1. The cumulative impact assessment as submitted (Section 3.9 of the ES, Document 5.2) has been updated in light of the accepted Rail Central application.

2.2. The revised cumulative effects of the Northampton Gateway proposals (including committed development) with the Rail Central proposal are considered below in respect of employment/economy, population/workforce.

Employment / economy

2.3. Northampton Gateway (with committed development and Rail Central) could generate a total of some 36,000 jobs over the period to 2026 and beyond. This will deliver growth in productivity and employment within the Study Area and beyond, contributing to the South East Midlands Local Enterprise Partnership's vision to enable the economy to double in size by 2050 (measured as Gross Value Added)[1].

2.4. Logistics is one of the existing key strengths of the area and presents opportunities as one of the 'showcase sectors' going ahead. In respect of that, together, the Northampton Gateway and Rail Central proposals would provide direct employment on-site for up to 15,634 people when complete and fully occupied. After taking account of job leakage beyond the study area and the effect of people moving between jobs, the net additional employment could amount to 10,074 positions[2]. Jobs supported indirectly or induced would add about 7,360 further jobs to this.

2.5. The estimate of productivity as measured by GVA in the wider study area of Northampton Gateway and Rail Central combined would represent an annual figure of approximately £716 million. This would contribute towards the South East Midlands Local Enterprise Partnership (SEMLEP) target to increase the size of the sub-regional economy. At the national scale the GVA contribution to the economy would be £909 million.

2.6. An estimate of the Business Rates for the proposed Northampton Gateway development indicates that this will create a potential receipt of some £12-13 million annually depending on the confirmed rating valuations, and the Rail Central a further £14.6 million.

2.7. Whilst currently 50% of business rates goes to central government, the government has committed to altering this so that 100% of business rates

[1] South East Midlands Local Enterprise Partnership, Strategic Economics Plan (2017).

[2] across the 6 LPA's identified, plus Coventry which is included in the wider study area for the Rail Central assessment.

raised can be retained locally. The new arrangements are likely to come into effect at an early stage of Northampton Gateway's operation. The revenue could be used to support existing and provide new services/facilities in South Northamptonshire and the County.

2.8. Whilst it is not possible to state the total amount of Business Rates in combination with the other cumulative schemes listed above, it is clear that these will combine to represent a substantial and positive In relation to the jobs growth target in the WNJCS, this includes a net growth of 28,500 jobs through to 2029addition to the local authority revenue.

2.9. The Northampton Gateway proposal will yield a beneficial effect for employment opportunities, and the direct economic effects of the scheme are considered to be major beneficial over the long-term at the regional level and therefore assessed to be of major significance. In terms of cumulative effects, the job creation and additional input to the economy associated with Rail Central and the other cumulative schemes is also considered to be major beneficial at the regional level over the long-term.

Population/Workforce

2.10. The first group of commitments identified above in the list of cumulative projects are Strategic Urban Extensions. These are focussed on the delivery of additional new homes as part of the West Northamptonshire Joint Core Strategy (WNJCS) and form a key part of the overall housing delivery projections for the six planning authorities in the Study Area used for this socio-economic assessment. In relation to the jobs growth target in the WNJCS, this includes a net growth of 28,500 jobs through to 2029.

2.11. The growth of the population forecast in the WNJCS for South Northamptonshire and Northampton together is 64,470 people. In terms of potential cumulative impact in respect of employment, the residents that would be formed in these households will add to the potential workforce available in the Study Area that could be employed with the Proposed Development and within the other cumulative employment projects identified above.

2.12. A substantial number of additional new homes are to be delivered during the WNJCS period, concentrated primarily around Northampton, Daventry, Towcester and Brackley. Those in closest proximity are the sustainable urban extensions Northampton South and Northampton South of Brackmills (together at least 2,000 homes), and Towcester South within South Northamptonshire.

2.13. In the period from 2021 through to 2026, the period over which it is envisaged the Northern Gateway and Rail Central proposals would be constructed, the WNJCS projection indicates the completion of some 28,000 new households. Likewise, Milton Keynes will see the formation of some 1,500 new households each year.

2.14. Housing delivery projections across the Study Area (6 LPAs) indicate an average annual supply of 5,600 additional dwellings over the period 2021-2026. These could accommodate 13,440 people (5,600 x 2.4). The population age structure indicates that 65% can be expected to be of working age (16-64), which would be 8,736 people, of which 82% are likely to be economically active, so 7,163 people added to the existing workforce resource each year. It is expected that Northampton Gateway would be progressively occupied with some 1,000 job opportunities arising each year until completion and a comparable number would also be generated by the Rail Central scheme.

2.15. To put this in a wider context, in 2026 the projected population of working-age people resident in the Study Area is projected to be 548,738 (Population predictions, NOMIS, 2016). The additional workforce required for Northampton Gateway and Rail Central combined would represent less than 2% of the working-age population.

2.16. According to the SEMLEP Strategic Economic Plan, the Transport and Logistics sector is a significant employer within the area, accounting for 4% of employment. In respect of unemployment, the assessment acknowledges the low claimant rate that exists in South Northamptonshire in particular, and that there is a limited supply of people with the skills to support the occupation types required.

2.17. The increase in employment opportunities would arise progressively alongside the population increase associated with the new housing delivery. Given the potential labour resource outlined it is expected that a significant proportion of the jobs would be taken by people that are already resident within the Study Area, people changing jobs and moving house, or people unemployed and seeking work.

2.18. In relation to the types of job and skills required, the length of the period for these cumulative projects to progress and to be fully occupied provides the opportunity to plan for the increase in job opportunities and for training to be delivered that will provide the necessary skills required by the future occupiers of Northampton Gateway and Rail Central, as well as the employment space coming forward as part of the Local Plan commitments across the study area. SEMLEP identifies the aim to create 170,000 apprenticeship starts over the decade to 2025/26.

2.19. There is also a potential to grow the workforce as the claimant count shows there are some 8,000 people in the Study Area that are available for work. Therefore, the cumulative effects of these schemes would be positive from a socio-economic perspective over the longer-term.

2.20. Using Travel to Work Census information combined with the strategic transport model which includes the predicted movements associated with planned development, the expected commuting patterns indicate in broad terms that some 40% originate in the Northampton area and areas to the north east; 25%

from the area to the south east (M1 south); 25% from the north west (M1 north); and 10% from South Northamptonshire.

2.21. The change in commuting patterns as a result of Northampton Gateway and Rail Central combined is likely to reduce the amount of the net outward movements from South Northampton into Northampton and Milton Keynes. For Northampton, it may also potentially alter by reducing the net outward movements from Northampton to Milton Keynes.

Conclusions of socio-economic cumulative impacts assessment

2.22. In summary, the planned level of future housing growth in the area would be adequate to meet any additional demand associated with staff required for the proposals. Taking into account the future increase in housing supply, impact on housing demand is considered to be negligible.

2.23. The development of two new employment destinations is likely to alter the commuting patterns. This has been considered in the proposed highway improvements and the strategy to increase the availability of bus access, limit car travel and actively support walking and cycling trips, which is considered to be a minor beneficial effect at the local level and therefore of minor significance. This conclusion is subject to the Rail Central highways mitigation strategy being effective.

2.24. Subject to the caveat above regarding the Rail Central transport mitigation package, the cumulative effects on employment and the economy are considered to be **major beneficial** at the regional level over the long-term.

Landscape and Visual

Introduction

2.25. The cumulative landscape and visual impact assessment relating to Rail Central as submitted (paragraphs 4.7.11 – 4.7.41 of the ES, Document 5.2) has been reviewed in light of the submitted Rail Central documentation. A further site-based assessment has been undertaken by FPCR on behalf of Roxhill. This has included revisiting on site all of the relevant Rail Central viewpoints and reviewing the judgements regarding cumulative effects in the submitted Northampton Gateway ES.

2.26. The further, more detailed, work carried out in relation to the accepted application has confirmed the narrative and overall conclusions set out in the submitted cumulative assessment. Accordingly, this text has amended where necessary and forms the basis of the assessment provided at paragraphs 2.35 to 2.65 below. In addition, more detailed and comprehensive cumulative effects tables have been prepared and attached at Appendix 2.

2.27. Prior to setting out the cumulative impacts assessment the paragraphs below review in brief the relevant elements of the Rail Central application.

Review of the Rail Central Application

2.28. The landscape and visual impact assessment contained at Chapter 15 of the Rail Central ES does not include any major flaws or failings, although there are a number of matters in relation to the methodology and subsequent judgements that are not considered to be correct or justifiable.

2.29. In terms of the methodology, this is broadly in line with the relevant guidelines (GLVIA3), although it does include some misinterpreted or misapplied detailed points. It is also evident that the subsequent assessment does not follow the stated approach in places.

2.30. It is notable that the Landscape Value of the Main SRFI site and its environs has been changed from ‘Low’, within the Stage 2 RC ES chapter to ‘Medium’ within the final submitted RC ES chapter. There is no explanation for this change but the ‘Medium’ Landscape Value judgement is considered to be fair. For reference, NGW has assessed the Landscape Value of the NGW Main SRFI site and its immediate context to be ‘Low/ Medium’.

2.31. The RC ES assessment confirms that the proposed Rail Central development will have a Significant effect upon local landscape character at the site-specific level during construction and at years 1, 7 and 15 (ie at every assessed stage). NGW has assessed the proposed NG development as having a Significant effect upon the landscape of the site and its immediate context during construction and at year 0 (i.e. completed development and the equivalent of Rail central`s year 1) but not at year 15.

2.32. In visual terms, the RC assessment identifies the following Significant visual effects for the proposed Rail Central development:

- 30 (of 61) Receptor locations experiencing a Significant visual effect during construction;
- 31 (of 61) Receptor locations experiencing a Significant visual effect at year 1; and
- 13 (of 61) Receptor locations experiencing a Significant visual effect at year 15.

2.33. By comparison, the NGW assessment of the proposed NGW development identifies the following Significant visual effects;

- 17 (of 62) Receptor locations experiencing a Significant visual effect during construction;
- 8 (of 62) Receptor locations experiencing a Significant visual effect at year 1; and
- 0 (of 62) Receptor locations experiencing a Significant visual effect at year 15.

2.34. Overall, the RC assessment includes a number of flaws in terms of its approach and a number of under estimated effects for some landscape and visual receptors. However, it does acknowledge that the site is rural in character and of Medium Landscape Value and that the proposed development will give rise to a Significant effect upon the landscape of the site and its environs at every assessed stage of the project. It also appears to recognise that in cumulative landscape and visual terms, the RC development would have a greater relative effect than the NG development should both come forward.

Cumulative Landscape Effects – Rail Central SRFI

2.35. The Rail Central proposed development will encompass similar uses, activities and features to that of the Proposed (Northampton Gateway) Development i.e. large scale employment buildings and rail infrastructure, with large scale landscape areas.

2.36. In combination the two projects, would occupy a large landscape swathe extending between the M1 motorway in the east and the A43 in the west. Inevitably, the Rail Central proposal will extend the urbanising and large scale development influences across the countryside to the west of the Main Site and will dominate the land extending westwards to the A43. In combined terms, this will have a significant effect upon the character of the landscape. There would be an increased combined landscape effect upon the Tove Catchment LCA (6a) and Bugbrooke and Daventry LCA (13b), as defined in the Northamptonshire Current Landscape Character Assessment and most markedly upon the more localised landscape.

2.37. In combination, the urbanising and large scale development influences is likely to result in a **Major Adverse** cumulative landscape effect (during construction at a localised and combined site wide scale. Upon completion of the respective proposed developments, the combined cumulative effect upon the landscape of the Northampton Gateway Main Site and its immediate context is likely to be Moderate/Major Adverse, whereas the equivalent combined cumulative effect upon the landscape of the Rail Central Main Site and its immediate context is likely to be Major Adverse. The longer term (15 years) residual cumulative landscape effects are also likely to remain relatively greater for the Rail Central Main Site and its immediate context.

2.38. Despite the close positioning of the two respective sites, they do differ in landscape terms and are separated at a localised scale. The Proposed (Northampton Gateway) Development Main Site has a gentle fall eastwards towards the M1 motorway corridor and the edge of Northampton and away from the Rail Central site. The Proposed (Northampton Gateway) Development Main Site is well contained in visual terms, whereas the Rail Central site occupies a more open and rural landscape to the west.

2.39. Consequently, despite both sites lying effectively adjacent to each other, the significant new mounding and planting and the conserved woodlands to the western side and perimeter of the Proposed (Northampton Gateway) Development (Main Site) will create a strong degree of localised separation from the Rail Central site and the landscape to the west. This would not necessarily lessen the combined landscape effects of the respective developments but would create a clearer distinction between their respective effects over the landscapes to the east and west of the Northampton Loop Line. The Rail Central proposal is likely to dominate and significantly increase the cumulative landscape effects over the more open and rural landscape to the west, whereas the Northampton Gateway proposal will dominate a more enclosed, active and urban influenced context.

2.40. After 15 years and the management and growth of the respective GI areas and associated planting, both schemes would be set within maturing and visually stronger landscape settings, albeit that the landscape and planting proposals for the Rail Central proposal are less well connected and will be less effective in mitigating the landscape effects. Notwithstanding the GI proposals, the combined cumulative landscape effects of the two rail schemes is likely to remain significant. At this time, the maturing planting to the mounding on the western side of the Main Site would further reinforce the separation to the Rail Central site to the west.

2.41. In combination, the two rail schemes would inevitably result in significant effects upon the character and features of the landscape between the M1 motorway and the A43. There is however, likely to be a difference between the effect of the Proposed (Northampton Gateway) Development over a more contained landscape with more existing active and urbanising influences and that of the

Rail Central proposal over a broader and more open and rural landscape to the west.

2.42. In this context it is likely that the Rail Central proposed development would have a relatively greater adverse landscape effect and contribute a greater proportion of the combined adverse effect upon the landscape.

Cumulative Visual Effects – Rail Central SRFI

2.43. The most notable effects will arise from the Proposed Development on the Main Site in combination with the Rail Central proposal. Subject to the construction periods of the respective development projects this could include some cumulative visual effects during construction.

2.44. The visual receptors likely to be most affected in cumulative terms will be those with views towards the Proposed Development and the Rail Central proposal from west, north west and south west of the Main Site. These will include properties on the edge of Milton Malsor and Blisworth and a number or Public Rights of Way (PROW) west of the Main Site and south of the West Coast Main Line (WCML). There would be no cumulative visual effects with the Roade Bypass proposals.

Settlement and Properties

2.45. There will be views southwards towards the Rail Central proposal for properties and locations on the southern side of Milton Malsor (Receptor P1). From these locations and properties, the cumulative combined visual effects will be dominated by the Rail Central proposal with any views towards the Proposed (Northampton Gateway) Development more limited and restricted principally to the perimeter mounding and planting along the north west edge of the Main Site.

2.46. The resultant cumulative visual effect is likely to vary up to Major Adverse for those settlement edge properties with views to the south, south east and south west. For those properties with the clearest views in these directions, the Rail Central proposal would be closer and more prominent.

2.47. Any cumulative visual effects arising upon any properties at Collingtree (Ref P4) would be unlikely, with only very limited potential for restricted westwards views beyond the Proposed (Northampton Gateway) Development. There would however be some cumulative visual effects upon residents of West Lodge Cottages (Ref P5) and Courteenhall West Lodge/ Farm (Ref P6) to the south of the Main Site. Views northwards and north westwards from this property would include both development projects and is likely to result in a Moderate/Major Adverse and significant effect (during construction and upon completion). Potential views towards both development projects from West Lodge Cottages would be more limited and is likely to result in a Moderate Adverse effect.

2.48. From the limited number of properties on the edge of Blisworth (Refs P9 & P10) with views towards the Proposed (Northampton Gateway) Development Main Site, the Rail Central proposal would be clearly visible as a dominant feature in the landscape. This scheme would substantially obscure elevated north easterly views towards the Proposed (Northampton Gateway) Development. The resultant cumulative effect upon these properties is likely to be Major Adverse (during construction and upon completion) and significant and these levels of visual effect would arise as a result of views towards the Rail Central scheme only.

2.49. Similar cumulative visual effects are likely to arise for other properties on Northampton Rd (P11) and Gayton Rd (P12). From both of these locations the Rail Central proposal would be visible as a dominant feature in the landscape and would obscure easterly views towards the Proposed Northampton Gateway) Development. The resultant cumulative effect upon these properties is likely to be Major Adverse (during construction and upon completion) and significant and these visual effects would also arise as a result of views towards the Rail Central scheme only.

2.50. Elevated and expansive views potentially encompassing both schemes are likely to be possible from some parts of the urban area (at Wootton Spyglass Hill, Merefield and Blacky More (Refs P14 & P15)). Receptors at these locations are unlikely to experience any significant cumulative visual effects.

Public Rights of Way (PROW) and Other Footpaths etc.

2.51. Some significant cumulative visual effects upon users of PROW will arise from the Rail Central proposal in combination with the Proposed (Northampton Gateway) Development. The most notable cumulative effects will arise for users of the PROW to the west of the Main Site (Refs F3 – F8). These PROW extend across the site of the Rail Central proposal and across the rising land to the south and west of this site. This includes PROW around and to the east of Blisworth.

2.52. The combined visual effects upon users of these PROW are likely to arise almost entirely from the Rail Central proposal, given its position and likely prominence within this landscape. The Proposed (Northampton Gateway) Development will also potentially be visible from elevated positions on the PROW to the south west, yet to a considerably lesser degree. Any views of the Proposed (Northampton Gateway) Development from these positions will be notably more limited and where visible it is only likely to be seen in small part beyond the visually dominant Rail Central proposal. The cumulative visual effects upon users of these PROW (Refs F3 – F8) is likely to be Major Adverse (during construction and upon completion) and significant and these visual effects would arise either as a result of the Rail Central scheme only, or predominantly as a result of the Rail Central scheme.

2.53. There will also be some likely significant visual effects arising from the Rail Central proposal on PROW to the north of Blisworth, including from the Great Union Canal Walk (Refs F9 & F10). From these routes, any views will only be towards the Rail Central proposal as this would obscure any more limited and distant views towards the Proposed (Northampton Gateway) Development.

Roads

2.54. Cumulative visual effects will be experienced by users of Courteenhall Road (Ref R6), linking Blisworth with the A508. For users of this road, there would be views from stretches of it towards both the Rail Central proposal and the Proposed (Northampton Gateway) Development. In these views, the Rail Central proposal would be the more visually prominent of the two schemes and the resultant cumulative visual effect is likely to be up to Major Adverse (during construction) and Moderate Adverse (upon completion) where visible along the road.

2.55. Cumulative visual effects upon users of the A43, Northampton Road (Ref R8) and Gayton Road (Blisworth) (Ref R7) will also be dominated by the Rail Central proposal with any potential views towards the Proposed (Northampton Gateway) Development obscured by the intervening Rail Central proposals. The cumulative visual effects upon these road users are likely to be Moderate/Major or Moderate Adverse (during construction and upon completion) and these visual effects would arise as a result of views towards the Rail Central scheme only.

Other Receptors

2.56. Cumulative visual effects will be experienced by users of the rail lines (NLRL (Ref O1) and WCML (Ref O2)). For users of the NLRL, the Proposed (Northampton Gateway) Development will be sited to the east and the Rail Central proposal to the west of this line. Close views towards both proposals will arise for the relatively short stretch of the line immediately adjoining the respective site areas. The more open existing views from this stretch of the NLRL are generally across the landscape and Rail Central site to the west. Views towards the Proposed (Northampton Gateway) Development Main Site are more restricted by the rising ground.

2.57. The Proposed (Northampton Gateway) Development will include substantial mounding and planting alongside the NLRL and a tunnel access to the northern part of the site. Both the proposed built and rail related development would be effectively screened by these perimeter earthworks and landscape proposals. The Rail Central proposal is also likely to be screened yet to a lesser degree by mounding and planting proposals and would result in a relatively greater degree of visual change and effect. The cumulative visual effect for users of the NLRL over this short stretch of the line is likely to be Moderate/Major Adverse (during construction) and Moderate Adverse (upon completion).

2.58. For users of the WCML, close and clear views of the Rail Central proposal will be possible for the stretch of line adjoining this site. It is unlikely that there will be any views beyond this proposal to any part of the Proposed (Northampton Gateway) Development. The cumulative visual effect for users of the WCML over this short stretch of the line is likely to be significant (Moderate/ Major Adverse) during construction and Moderate Adverse upon completion. These cumulative visual effects will arise only from the Rail Central proposal.

Cumulative Effects – Rail Central and the Bypass Corridor / Highway Mitigation Measures

2.59. There would be no cumulative landscape or visual effects with Rail Central arising from the Bypass Corridor proposals and no significant cumulative visual effects with Rail Central arising from the Highway Mitigation Measures. There would be some potential cumulative effects arising from works at Junction 15A, yet these are not likely to result in any significant cumulative effects.

2.60. However, it is important to note that it is not clear what highway works might be necessary to accommodate both schemes, if both were approved. Although some consideration has been given to the likely cumulative transport effects based on both SRFIs as proposed, if more highways mitigation interventions were required the cumulative effects could increase.

Cumulative Landscape and Visual Effects - Summary

2.61. The cumulative landscape and visual effects of the proposed development have been assessed in addition to, and in combination with the two committed (allocated) SUEs (South Northampton SUE and South of Brackmills). In addition, consideration has been given to the proposed Rail Central SRFI on an adjacent, alternative site.

2.62. The cumulative effects alongside the committed (allocated) SUEs are largely limited or negligible, and would not be significant. However, there are likely to be some significant cumulative landscape and visual effects arising from the Rail Central SRFI project in combination with the Proposed Development.

2.63. A **significant cumulative effect** upon the character and features of the landscape stretching between the M1 motorway in the east and the A43 in the west is likely to arise from the combined effects of the Rail Central proposal, if approved, alongside the Proposed (Northampton Gateway) Development.

2.64. In this context however, there is likely to be a difference between the effect of the Proposed (Northampton Gateway) Development over a more contained landscape with existing active and urbanising influences and that of the Rail Central proposal over a broader and more open and rural landscape. Consequently, the Rail Central proposal would have a relatively greater adverse landscape effect and contribute a greater proportion of the combined cumulative effect upon this landscape.

2.65. In visual terms, the most notable cumulative effects will arise for receptors to the west, north west and south west of the Main Site. Some properties at Milton Malsor, Blisworth and in the general vicinity of these settlements will experience significant cumulative visual effects from the Rail Central proposal in combination with the Proposed (Northampton Gateway) Development. Similarly, users of a series of PROW will also experience significant cumulative visual effects arising from the combined proposals.

2.66. The Rail Central proposal would contribute a significantly greater proportion of any combined visual effects upon these receptors and from a number of receptors and locations the Rail Central proposal would screen any views towards the Proposed (Northampton Gateway) Development. From west and south west of the Main Site boundary, the Proposed (Northampton Gateway) Development would generally constitute a more limited and distant part of any views towards the combined proposals. In the medium and longer term, the perimeter mounding and planting to the western side of the Main Site would be increasingly effective in visually separating the Proposed (Northampton Gateway) Development from the Rail Central site and landscape to the west.

Ecology and Nature

Introduction

2.67. The submitted ES for NGW (Document 5.2) considered the scope for any likely additional cumulative effects with the then emerging Rail Central SRFI application, based at that time on the draft ES and other emerging material. That assessment is unchanged from paragraphs 5.8.6 – 5.8.11.

2.68. In light of the submitted Rail Central application of November 2018 the assessment of potential additional cumulative ecological impacts with Rail Central has been revisited. In particular, the review has been undertaken with regard to ES chapter 14 (Document Ref 6.1) and baseline appendices (Ref 6.1.14.1 to 6.1.14.14), the Habitats Regulations Assessment No Significant Effects Report (Document ref 5.3), Landscape and Ecological Infrastructure Strategy (Document 7.12), Biodiversity Offsetting Report (Document 7.13) and other ES Chapters that include an assessment of Ecological Impact including Chapter 19: Lighting (Document ref 6.1 and appendix 6.1.19.5).

2.69. The following sections of this report describe the likely environmental effects of NGW (including committed development) and Rail Central. Overall the assessment of cumulative Ecological impacts remains largely unchanged from that contained in the submitted Northampton Gateway ES. However, a number of issues have been identified with the Rail Central application, including the ES, as submitted for examination which makes reaching definitive conclusions and judgements problematic. These are referred to below.

2.70. Prior to describing the cumulative effects, the relevant parts of the Rail Central application are reviewed in brief.

Review of the Rail Central application

2.71. It is evident that the order limits of the Rail Central proposal support a similar range of fauna to that identified within the NGW order limits. . Habitats include a network of hedgerows, some areas of woodland and scrub and wetland features, including ponds, watercourses and a section of canal.

2.72. It is considered by the Rail Central applicants that there is sufficient scope for Rail Central to avoid, mitigate and off-set the majority of impacts to ecological receptors (as described in Rail Central ES, Chapter 14). This, Rail Central suggest, would be achieved through the adoption of best practice, including Natural England licences, and appropriate design, such as the maintenance of ecological corridors and compensatory habitat creation and management (as and if required). As a result, Rail Central conclude that additional or significant cumulative impacts associated with committed development and with Northampton Gateway are not anticipated.

2.73. Based on the information available, and as set out below, the potential for significant cumulative effects on Ecology is considered unlikely. However,

there appear to be some significant gaps in the RC Ecology ES Chapter, with a number of protected species surveys being incomplete or inadequate. On this basis it is considered that RC's conclusion that, with the implementation of appropriate mitigation there will be '*minor and/or minor negligible*' residual effects related to loss of veteran trees, important hedgerow features and bats, is premature and may be misleading. In particular, the conclusions of the RC Biodiversity Assessment detailed in the Biodiversity Off-Setting Report (Document 7.13) are misleading because it fails to include or take account of some fundamental aspects of the methodology used that may indicate that the change, overall, is negative.

2.74. Some of the main deficiencies and problems with the Rail Central assessment of biodiversity effects include:

- Inconsistency between the Veteran Tree Survey Report (ref 6.1.14.13), which states that no field survey has been completed and Chapter 14 Table 14.6, which suggests one has. Further clarification of methods is required as it is difficult to assess impacts without this understanding.

- Table 14.6 also indicates that buildings within the order limits were surveyed for roosting bats. This is not the case and prevents a full assessment of impacts on bats being undertaken. It is unlikely that this would affect the assessment of cumulative impact of the two schemes.

- It is stated that great crested newt surveys were completed in accordance with English Nature survey guidelines. This is not the case due to suboptimal weather conditions, which can reduce the efficacy of presence/absence surveys, and also due to failure to survey all waterbodies considered to be suitable in the RC Phase 1 Habitat Survey Report (RC Document ref 6.1.14.2). Reliance on these surveys for impact assessment is therefore questionable with regard to how fully they provide understanding of the population status and spatial distribution of any metapopulation of great crested newts that could be present (but as yet undetected). This makes the assessment of cumulative effects potentially problematic.

- Evidence of badgers was observed widely within the RC site, although it is suggested that no active setts were observed within the RC order limits. There are a number of areas of the site that were not fully inspected and the presence of badger setts could not be ruled out, with resurvey recommended by the surveyors. Reliance on these surveys for impact assessment, including an assessment of cumulative impact, is therefore potentially problematic.

- There are further inconsistencies between the Tables 14.24 to 14.27 and the impact matrix provided at Table 14.7. These Tables do not

appear to follow the methodology set out in the ES Chapter. Of particular note and for example is the assessment of effect on foraging bats at J15a where county significant receptors suffering effects of high magnitude are described as having an impact of 'moderate' and 'negligible' significance during the construction and operational phases respectively. This does not appear logical, with Table 14.7 implying a 'Major' effect is more likely.

- The Schedule of Adaptive Mitigation provided at Table 14.28 appears to rule out significant residual effects on many receptors including effects on European Protected Species (EPS). There are a number of other cases where current baseline data appears incomplete (e.g. such as the survey of potential bat roosts in trees and buildings, which appear to be affected but will, it is stated, require further survey) such that confidence in any assessment of residual effects on EPS is lacking.

Assessment of likely Cumulative Effects with Rail Central

2.75. As stated above, the habitats within the Rail Central order limits are similar to those within the NG order limits, including a network of hedgerows, some areas of woodland and scrub and wetland features, including ponds and watercourses. Notwithstanding deficiencies with the quality of the assessment and analysis included within the Rail Central ES, including those described above, it seems clear that there are few potential differences in terms of biodiversity between the two sites. While cumulatively there would be an increase in the magnitude of loss of such habitats if both sites were consented and developed, given the similar nature and extent of the remaining surrounding farm land the loss is **unlikely to be significant**.

2.76. However, additional features present within the Rail Central scheme include frequent veteran trees and a section of canal. The Rail Central proposals would result in the loss of four ancient and ten veteran trees (as compared to 1 on the NGW (Bypass) site) which would be lost through disease in any event). Given the relatively high number lost as a result of the RC proposals and their irreplaceable nature, which means that compensation can only partially compensate for loss or damage (as explained in the relevant national guidance https://www.gov.uk/guidance/ancient-woodland-and-veteran-trees-protection-surveys-licences), this loss is significant.

2.77. It is evident that the Rail Central order limits supports a similar range of fauna to that identified within the Proposed Development order limits, and there do not appear to be any particularly sensitive species or metapopulations common between the two areas. As such any cumulative effects are likely to be limited, and not significant.

2.78. The potential exception to this is specialist farmland birds, which, it is suggested in the Rail Central application material (Rail Central ES Chapter 14),

could be displaced and may not be fully compensated by the Rail Central proposals. However, both applications share a similar strategy of on-site mitigation to reduce the magnitude of the majority of adverse impacts from habitat loss upon most birds. Also, based on the anticipated number likely to be affected, it is considered that cumulatively the developments will not significantly increase the magnitude of any of the identified impacts to breeding or wintering farmland species. In this context and given that both schemes support only common and widespread species common to much of the wider countryside in both a local and wider context, it is unlikely that any cumulative effect from displacement would be significant in species population terms at any more than **Local significance**.

2.79. Further potential residual effects associated with the Rail Central proposals include potential loss of habitat for commuting and foraging bats. However, given the habitat creation proposed and low levels of bats activity within the Rail Central site this is not considered likely to lead to any significant cumulative effects. As concluded in the NGW ES, any effects are likely to be of **Local significance.** This conclusion is provisional given the deficiencies of survey information referred to in paragraph 2.73 above.

2.80. Part of the Rail Central site includes approximately 13.8ha of land which is common to both the Northampton Gateway and Rail Central DCO order limits. This area is not highlighted for any specific ecological mitigation, and as a result no further cumulative effects are anticipated from activity or development in that area.

2.81. There would be no cumulative Ecological effects with Rail Central arising from the Bypass Corridor proposals given the distance and intervening land-uses and infrastructure.

2.82. It is also highly unlikely that any significant cumulative effects would arise as a result of the Highway Mitigation measures. However, it is unclear what, if any, additional transport mitigation measures might be required to accommodate the Rail Central scheme given the issues relating to the adequacy of the works proposed for J15A raised in the Transportation section of this CIA report. Given the relatively minor nature of works required for Northampton Gateway at and around Junction 15A any further cumulative effects on biodiversity at and around Junction 15A are likely to be driven by any larger-scale infrastructure improvements needed to accommodate traffic associated with Rail Central.

Conclusions regarding cumulative effects on Ecology

2.83. The order limits share very similar existing (baseline) characteristics, and sit within a wider context of similar habitats dominated by agriculture, with hedgerows, woodlands, and local water features. However, there are some weaknesses and gaps in the Rail Central baseline survey assessments which make it hard to reach definitive conclusions regarding the nature of the residual impacts of that development.

2.84. It is evident that cumulatively both schemes are likely to have an impact on bats, GCN, farmland birds and badgers. The assemblage of farmland birds is broadly similar for both sites, and bat roosts would be lost from both main sites. Similarly, badger habitat and a main sett (on the NG site) would be affected. A similar range of mitigation measures are proposed to mitigate these impacts across both sites, and based on the information available at present, the residual cumulative effects are likely to be **negligible or no worse than minor**. Notwithstanding the gaps in the Rail Central ES, it is considered unlikely that cumulative effects would be significant.

2.85. As noted above, there are questions about the adequacy of the highways mitigation measures proposed at Junction 15A by Rail Central, and there may be a need for this to be revisited. Even taking into account this area of ongoing uncertainty, **no significant cumulative effects on biodiversity are likely** as a result of Rail Central coming forward in addition to Northampton Gateway and the identified committed developments.

Geology, Soils and Groundwater

Introduction

2.86. The submitted NGW ES (Document 5.2) considered the potential for cumulative impacts both with committed developments, and also any likely additional effects with the proposed Rail Central SRFI based on the draft ES and emerging proposals at that time.

2.87. As explained in Section 6.7 of the NGW ES, due to the physical separation of the sites considered, with each site remote from the other, the assessment concludes that there are no known or likely cumulative effects on soils, geology, and groundwater.

2.88. As confirmed below, the conclusion is unaffected by the submission of the final Rail Central application.

Review of the Rail Central Application

2.89. The submitted Rail Central application has been reviewed, and with regard to 'ground conditions' is largely unchanged from the draft version which informed the original CIA included in the submitted NGW ES (at Section 6.7 of ES Chapter 6).

2.90. It is stated by Rail Central, following a review of the Northampton Gateway application, that they do not believe that there will be any significant cumulative impact from that development which would impact on or with Northampton Gateway (summarised in the RC ES paragraphs 12.172 to 12.176).

2.91. Based on a review of the Rail Central application and relevant assessments, NGW concur with that conclusion.

Assessment of likely cumulative impacts with Rail Central

2.92. Apart from the overlap of land within both site boundaries along the Northampton Railway Line Loop eastern side, and Junction 15A, there is no interface between the Northampton Gateway and Rail Central proposals. Therefore, there is no likely or discernible cumulative impact with respect to geology or soils. This is considered a sound conclusion, particularly in light of the fact that the detailed geotechnical design to be carried out for both schemes will ensure the works are stable and therefore will not impact upon neighbouring lands, infrastructure or adjacent proposed developments.

2.93. Similarly, no significant contamination has been identified in soil or groundwaters and no significant soil gas has been identified beneath either the Northampton Gateway site, or the Rail Central site. This is evidenced in the baseline assessments for both schemes (including Chapter 12 of the Rail Central ES and supporting technical appendices), with no evidence that would

suggest any significant potential to generate soil gas after the developments have been undertaken. Therefore, it is not considered that there will be any significant effects regarding the migration of gas between the two sites which might have potential impacts adjacent land or infrastructure associated with either one of the proposed developments.

2.94. There is limited scope for cumulative effects with regard to the hydraulic gradients of the groundwater flows. Given the relationship between the two sites, with railway infrastructure separating them, and in light of the proposed works, it is not considered likely that groundwater flows will be impacted or changed significantly.

2.95. As referred to above, NGW shares the view expressed by Rail Central that there is **limited potential for any significant cumulative impacts** on soils, geology, and groundwater (ground conditions) from Northampton Gateway with Rail Central.

Water Resources and Drainage

Introduction

2.96. The Northampton Gateway ES sets out likely cumulative effects of the Proposed Development relating to Water Resources and Drainage in Chapter 7 (Section 7.8). This included an assessment of the Rail Central proposals in addition to relevant committed development, but is based on the draft Rail Central proposals and ES as available at that time.

2.97. The final Rail Central application (Chapter 13 and associated figures and appendices) has now been reviewed, and the assessment of likely cumulative impacts revisited and reviewed. However, as set out below, the conclusions reached regarding the relatively limited scope for cumulative effects on issues relating to drainage and flood-risk remain largely unchanged from that as presented in the Northampton Gateway ES.

Review of the Rail Central application

2.98. There is clear national and local policy, as well as regulations and legislation which require all major applications to consider drainage and flood-risk issues. The use of Sustainable Drainage Systems (SuDS) is required and expected wherever practical and suitable, and an underlying principle of the regulatory and policy framework is that new developments do not exacerbate existing or create new flood risk issues for offsite areas. The Rail Central application (including ES Chapter 13, and Appendix 13.1) confirms the proposed use of SuDS as part of the Rail Central proposals.

2.99. Within the Rail Central site there are two watercourses, one of which is Main River (Milton Malsor Brook) and falls under the jurisdiction of the Environment Agency (EA), and the other an Ordinary Watercourse where the Lead Local Flood Authority (LLFA) are responsible for consenting works. The proposed Indicative Masterplan (and Parameters Plan) show a diverted route of the Milton Malsor Brook, and other Ordinary Watercourses. Hydraulic modelling shows that fluvial flood risk post development can be managed with the Proposed Development being at low risk (Flood Zone 1), with the exception of the designed watercourse corridors.

2.100. However, the Rail Central drainage strategy (including information provided by the Illustrative Masterplan, and ES Appendix 13.1) relies heavily on below ground storage in attenuation tanks. While the strategy also includes diversions to existing watercourses and some new linear surface water features, best practice for sustainable drainage would be to provide as much as possible in open basins or ponds. Such features not only provide surface water attenuation, but also offer greater opportunity for biodiversity/landscape enhancements. It is not clear from the submitted material whether the Lead Local Flood Authority (LLFA) has been engaged in the preparation of this

strategy, but it is expected that justification for such an unusually extensive use of below ground storage on a greenfield site will be necessary.

2.101. Based on the submitted ES and drainage strategy, the overarching principle of providing sufficient attenuation to allow a restriction to pre-development greenfield runoff rates is shown to be achievable. The Rail Central application (ES paragraph 13.214) identifies 'moderate beneficial' effects with regard to flood risk and foul water drainage, and the Rail Central assessment identifies no significant cumulative effects with Northampton Gateway or with committed developments.

2.102. However, the NGW application assesses the magnitude of the impact as Low, with a receptor sensitivity of Medium, leading to an assessment of the effect as minor, beneficial. To achieve a moderate beneficial outcome would require the impact to be of medium magnitude and in the view of the NGW Team further justification would be required by the Rail Central promotors as to why this is so. As submitted, the Rail Central application provides limited information or details about the likely betterment, making a full assessment and comparison more difficult.

2.103. Furthermore, without clarity regarding the position of the LLFA it is unclear whether, if Rail Central were required (by the LLFA) to provide more attenuation and storage in surface ponds and basins, the Proposed Development site is capable of accommodating surface water in accordance with the development and other parameters identified.

2.104. It is also noted that the RC application does not include a separate Water Framework Directive (WFD) Compliance Assessment regarding any effects on the quality and status of local water bodies.

Assessment of likely Cumulative Impacts with Rail Central

2.105. With all developments required to comply with legislation, and best practice, regarding drainage and flood-risk, some betterment (or at least nil detriment) can be inherently assumed for all new developments. Therefore, notwithstanding the lack of clarity in the submitted Rail Central application with regard to the extent of the betterment anticipated, the cumulative impacts of the relevant committed developments, as well as Rail Central, being constructed, has the potential to offer **at least a minor, beneficial impact** across the wider drainage catchment areas they sit within. This is due to increased proportions of these catchments having sustainable drainage systems designed to restrict runoff and delivering a betterment on the peak runoff rates seen currently for rainfall events which generate high volumes of surface water.

Noise and Vibration

Introduction

2.106. The Northampton Gateway (NGW) ES noise chapter contains an assessment of the cumulative effects of both NGW (and committed development) with Rail Central (RC). This is based on the information given in the Rail Central (RC) Preliminary Environmental Information Report (PEIR) issued in March 2018.

2.107. The accepted RC ES includes an assessment of the potential effects of noise and vibration. The results stated in that final RC ES noise chapter are largely unchanged from their PEIR of spring 2018. Furthermore, the RC ES largely reproduces the cumulative assessment included in the NGW ES noise chapter.

2.108. Following a review of the RC ES, the cumulative assessment of noise and vibration has been updated where relevant, and is set out below. The potential cumulative impacts of noise and vibration have been considered as far as is practicable, but it should be noted that, whilst the potential sources of noise and vibration are similar for both schemes, the results are not necessarily easily combined due to methodological differences – these are explained in further detail for the different types of noise below following a brief review of the Rail Central application.

Review of the Rail Central Application

2.109. The methods used in the RC ES to identify and assess noise and vibration effects contain several weaknesses, summarised as follows:

- The approach used to identify and implement LOAELs (Lowest Observed Adverse Effect Levels) and SOAELs (Significant Observed Adverse Effect Levels), key concepts in current Government policy on the effective management of environmental noise, is incomplete, inconsistent, and, in places, disconnected from the evidence base, making it difficult to draw meaningful conclusions on the potential noise effects of RC in terms of Government policy;
- No predictions of railway noise or vibration have been carried out and therefore l conclusions on any potential impacts and effects from these sources are also difficult;
- One set of receptors has been used for the assessment of all noise types, and when considering road traffic noise, it appears that these do not represent those noise-sensitive receptors adjacent to roads and potentially worst affected, resulting in a likely underestimate of any potential impacts and effects;
- Not all the relevant sources of operational sound have been adequately considered in the assessment, in particular, the operation of freight trains within the SRFI site; and
- Limited information has been provided on the baseline noise and vibration survey methodology, making it unclear whether the results can be considered representative of the receptors considered in the assessment, particularly where the monitoring positions are a large distance from the receptors they are meant to represent.

2.110. It is clear that the two assessments do not consider the various sources of operational sound in the same way. The first difference concerns the operation of freight trains within the SRFI. Appendix 16.11 of the RC ES indicates that this has been modelled by using point sources, i.e. noise sources at fixed points, to represent diesel locomotives idling and shunting locomotives under full loads. Rail operations within the SRFI will include the arrival and departure of diesel locomotives carrying large numbers of wagons and shunting manoeuvres of the wagons around the internal track. It is not considered adequate to model points sources to represent the potential noise from on-site rail movements. In particular, Figure 1 of Appendix 16.11 of the RC ES indicates that no noise source is considered from the curved section of track in the south-east corner of the site, close to the receptor NSR 05.

2.111. Table 16.42 of the RC ES noise chapter suggests impulsive noise might occur from the use of gantry cranes and reach stackers which could be potentially significant. However, the sources of operational sound listed on the last page of Appendix 16.11 make no reference to the impulsive activities that this equipment would carry out, e.g. spreader bar engagement and container placement. Considering how often these events might occur, the lack of assessment of these activities potentially results in an underestimation of the noise impact.

2.112. Due to the shortcomings identified, it is considered that the RC ES Noise & Vibration chapter does not provide a sufficiently robust assessment to make identification of the likely potentially adverse and significantly adverse noise and vibration effects, possible.

2.113. The cumulative assessment of the RC and NG schemes is therefore undertaken within this context. NGW has used the accepted RC ES and, where necessary applied its own judgements, to inform an assessment of the likely cumulative effects on noise and vibration.

Assessment of cumulative impacts of NGW with Rail Central

2.114. The assessment of noise and vibration is primarily based on the potential effects as predicted at specific sensitive receptors in the area around a Proposed Development.

2.115. The NGW and RC noise and vibration assessments use largely different receptors for the prediction of potential effects. In general, receptors are selected to represent those likely to be most exposed to a particular type of noise or vibration from a scheme. Accordingly, when assessing on-site noise (such as from construction and SRFI operations), the two assessments have selected receptors close to the perimeter of the respective sites.

2.116. Consequently, there are only two receptors for which information is available in both the NGW and RC ES noise chapters. These two shared receptors are to the north and south of the boundary between the two sites (effectively the

Northampton Loop railway line). Both are residential and are likely to be those that would experience the greatest cumulative effects from both SRFIs with respect to noise.

2.117. These two receptors are given different designations in each ES, as described in the following table.

Table 1: Designations of receptors that appear in both the NGW and RC noise assessments

NGW Receptor Designation	Rail Central Receptor Designation
R21 Barn Lane	NSR 04 Barn Lane, Milton Malsor
R28 Courteenhall Rd	NSR 05 West Lodge Farm

2.118. The receptors are referred to by their NGW designations in the rest of this assessment.

2.119. It should be noted that the NGW receptor R21 is located on the eastern façade at the mid-point of the row of residences at 3-25 Barn Lane, as this would be the most exposed façade to the NGW Main Site. From the images in RC Appendix 16.12, the equivalent RC receptor NSR 04 appears to be located on the western façade of the southernmost property of the row of residences, which would be most exposed to the RC SFRI.

2.120. While both sides of the residences at 3-25 Barn Lane are exposed to the RC SRFI site, the eastern façades are largely screened from it. Therefore, it is likely to be the case that only some façades/elements of these residences would experience the combined effects of noise that have been predicted in the NGW and RC assessments.

2.121. From the images in RC Appendix 16.12, the NGW receptor R28 and RC receptor NSR 05 appear to be in comparable locations.

2.122. While differences in the methods of prediction used by the two schemes are apparent, an indication of the cumulative effects at the shared receptors can be estimated by combining the predicted noise levels where this is possible. This is discussed for different types of noise source in the following sections.

Construction Noise and Vibration

2.123. It is possible that, if both schemes were to be approved, the associated construction works could take place at the same time. Therefore, cumulative effects from construction noise and vibration could occur.

2.124. There are some differences in methods of prediction for construction noise. The RC assessment has included predicted construction noise levels at the two shared receptors for five groups of 3-4 construction activities assumed to be taking place at the same time on the RC SRFI site, i.e. five noise levels are

predicted at each receptor, as set out in Table 16.26 of the RC ES. The NGW assessment provides predicted noise levels for 14 activities taking place on the NGW SRFI site separately.

2.125. However, the predictions appear to have been calculated in broadly the same way and therefore an indication of the worst-case cumulative effects at the shared receptors can be approximated by summing the predictions for the activities likely to result in the highest levels of construction noise at the receptors, as shown in the following table.

Table 2: Indicative cumulative construction noise levels from NGW and RC at shared receptors

Receptor	**Construction Activity / Predicted Noise Level (dB $L_{Aeq,T}$)**		
	NGW	**RC**	**Total**
R21 Barn Lane	Bulk Earthworks & Onsite Infrastructure / (53)	Plateau preparation / (55)	57
R28 Courteenhall Road	Road Construction / (40)	Plateau preparation / (48)	49

2.126. It can be seen that the combined predicted construction noise levels from both schemes are below the daytime construction noise LOAEL of 65 dB LAeq,T as stated in Table 8.1 of the NGW ES at both receptors. Therefore, no cumulative adverse or significant adverse effects from construction noise are expected at the shared receptors.

2.127. While neither assessment has carried out predictions of construction vibration, no significant levels of construction vibration are expected at any sensitive receptor as a result of the associated construction works. Therefore, no potential cumulative adverse or significant adverse effects from the two schemes are expected.

Railway Noise and Vibration

2.128. Both the NGW and RC assessments contain forecasts of the number of freight trains expected to serve the respective SRFIs in the years 2023, 2033 and 2043. However, as referred to above, only the NGW assessment includes predictions of railway noise and vibration exposure at specific receptors. The RC assessment is based on simple comparisons of the forecasts and no actual rail noise or vibration levels are predicted. This is a deficiency in the RC approach. Therefore, it is not possible to produce an estimate of cumulative railway noise or vibration exposure by simply comparing the results from the two assessments.

2.129. The RC chapter quotes the number of freight trains expected to serve the RC SRFI in Tables 16.34 & 16.35. Therefore, the following indicative assessments use these values, assuming that the number of trains serving each SRFI as

quoted in the respective applications are simply combined for each assessment year.

2.130. Based on the assumptions made for the detailed NGW railway noise modelling, it is estimated that there may be cumulative significant adverse effects from average railway noise during the night time due to operation of both schemes at one of the receptors considered in the NGW assessment in 2043. This is based on the NGW assessment methodology described in Paragraphs 8.3.13-8.3.32 of the ES. The receptor affected is R01 Woodpecker Way, on the southern outskirts of Northampton where no significant adverse effects for average railway noise are identified when considering NGW alone.

2.131. The NGW assessment also includes predictions at six receptors of potential noise induced awakenings from night time maximum railway noise levels. Based on the assumptions made for the NGW modelling and the assessment methodology described in Paragraphs 8.3.28-8.3.32, it is estimated that there may be cumulative significant adverse effects from railway noise induced awakenings due to operation of both schemes at five of the six receptors in the years 2033 and 2043 with both open and closed windows. These are NGW receptors R01, R18, R32, R39 and R54. Regarding railway vibration, based on the NGW prediction and assessment methodology, no cumulative adverse or significant adverse effects due to operation of both schemes are expected at the two receptors considered in the NGW assessment.

2.132. It should be noted that the potential cumulative effects discussed above are largely based on assumptions made for the detailed modelling of railway noise and vibration carried out by NGW, and may not be valid when considering RC operations. However, the RC chapter contains very limited information on this subject.

Road Traffic Noise

2.133. The NGW ES noise chapter includes a full cumulative assessment of the likely changes in road traffic noise from both schemes at all relevant receptors listed in Table 8.12 of the NGW ES based on traffic data supplied by the NGW traffic consultant (the 2031 NSMT2 ‘J3 scenario‘ described at Section 2 of Technical Note 12, which is Appendix 12.2 of the NWG ES). As described above, the submitted cumulative assessment in the NGW application was based on the RC PEIR. Whilst the overall traffic levels for RC have not changed between that report and the accepted RC ES, RC has revised their highway mitigation strategy. This would result in a different pattern of traffic flows on the highway network.

2.134. The changes to the RC highway mitigation strategy are summarised in the Transportation section of this report. As explained with regards to the updated CIA relating to highways effects it has not been possible within the available time to update and run the Northamptonshire Strategic Transport Model

(NSTM2) to provide traffic data for the updated CIA. As a result there is also no updated data to inform the updated CIA of road traffic noise.

2.135. Notwithstanding this limitation, the assessment of the likely traffic impacts of the revised RC highway mitigation strategy in the transportation section of this report, concludes that the revised RC highway mitigation strategy would not materially alter the conclusions drawn in the NGW ES as submitted regarding traffic conditions on the A508 corridor to the south of the M1.

2.136. Therefore, it is considered that the cumulative assessment of road traffic noise set out in paragraphs 8.8.9 - 8.8.17 of the NGW ES for the NGW Main Site and A508, including the Roade Bypass, remains relevant and would not materially change in the updated CIA scenario.

2.137. The transportation section of this report, identifies that elsewhere on the highway network the revised RC highway mitigation would be likely to alter traffic conditions from those assessed in the original CIA. These include at M1J15A, the A5076 Ring Road, towards Northampton Town Centre, along the Towcester Road and A5076 Upton Way corridors, and potential additional rat running traffic through the villages adjacent to the A43. These changes are identified by the transport consultant as material in terms of junction performance and congestion. However, when taking into account the conclusions of the original CIA, it is considered that the likely traffic flow changes would not be large enough to alter materially the conclusions drawn in the submitted NGW ES regarding road traffic noise impacts on receptors in these areas.

2.138. In general, the predicted road traffic noise levels for the cumulative 2031 scenarios at the relevant receptors are within ±1 dB(A) of the levels for the DS scenario without RC.

2.139. In terms of significant adverse effects, the cumulative 2031 DS scenarios are predicted to produce the same results as the DS scenario without RC, i.e. they are indicated at R30 and R57. These are summarised in Table 8.19 (in Section 8.5) of the NGW ES.

2.140. Tables 7 and 14 of Appendix 8.22 of the NGW ES present the differences in effect level and impact magnitude between the cumulative and NGW only 2031 DS day and night-time scenarios respectively. Broadly, any differences are a result of small changes in the DS road traffic noise level and largely result in negligible impacts.

2.141. At the Roade Bypass receptor R41 Blisworth Rd N-W during the daytime period, a minor adverse impact has increased to a moderate adverse impact due to an increase of 0.6 dB(A) as a result of the RC scheme.

Operational Sound from SRFI Activities

2.142. The RC operational sound assessment has been based on the principles of BS 4142:2014. This is the same basis as used for the assessment of the NGW assessment. However, there appear to be differences in the approach adopted to identifying significant adverse effects in the RC assessment compared with that used for NGW. In particular, no consideration of the absolute levels of operational sound appears to have been undertaken for the RC assessment. Consequently, the conclusions from the two assessments are not directly comparable.

2.143. The results of the NGW assessment at the two shared receptors has indicated that no significant adverse effects are expected during the day or night-time periods under either of the two wind conditions considered. It is possible that an adverse impact may occur at R28 during the night-time under broadly south-westerly winds.

2.144. The background sound levels used for the initial estimate of impact have been based on survey measurements in both assessments. For NGW, the most relevant situation for these receptors was with broadly south-westerly winds. It is unclear which conditions apply to the background sound levels used for RC.

2.145. Nevertheless, the background sound values used in the RC assessment are between 5 and 10 dB(A) higher during the daytime and 6 and 7 dB(A) higher during the night-time at these receptors compared with the equivalent values used for NGW.

2.146. At receptor R21, this may be due to the corresponding RC survey position being more exposed to road traffic noise from the A43 to the west. The relevant NGW survey position was at the boundary of the rear garden of the receptor, representative of the location most exposed to the NGW SRFI. The screening provided by the building, approximately 20 m to the west of the NGW survey position, may have reduced the levels of road traffic noise from the A43 at this location, as would be the case in the rear garden. The RC survey position was approximately 500m to the south of the receptor, in a fully exposed location. Differences are to be expected when considering receptor locations that are on different façades of the same building, though if the RC receptor is on the west side, a fully exposed survey position may also not be representative.

2.147. At receptor R28, the NGW survey position was again at the boundary of the rear garden of the receptor, approximately 27 m from the residential building. The RC survey position was approximately 180 m to the south of the receptor, close to Courteenhall Road and the railway lines, and at a ground level 10 m higher than the receptor. This location is likely to be more exposed to the prevailing noise than the NGW receptor and could be the reason why the noise levels measured by RC are different from and higher than those measured at the receptor by NGW.

2.148. As the assessment methodology requires a comparison between the operational sound and the background sound, using the higher RC background sound levels would reduce the apparent magnitude of the impact, before context is considered.

2.149. The process for arriving at the rating levels for operational sound is broadly the same in both assessments in that a +3 dB(A) penalty has been added to the predicted specific sound levels to account for any distinctive acoustic features. It is also the case that, in both assessments, operational sound is considered at ground floor level during the daytime and at upper floor level during the night-time.

2.150. As identified in the review of the Rail Central application (above) the two assessments do not consider the various sources of operational sound in the same way. Queries exist about the robustness of the approach to freight trains within the SRFI, as well as others sources of noise, which means the RC assessment underestimates the likely noise effects of RC.

2.151. It is acknowledged that the RC assessment includes a large number of mechanical plant sources on the roofs of the warehouses. It is unlikely that accurate details of this plant would be known at this stage and therefore, the sources used are probably speculative. For many such schemes, these sources are omitted from the noise assessment at this stage because of the uncertainty. Instead their potential impact is addressed at the detailed design stage when the warehouse unit occupier is known, and the precise mechanical plant required can be identified. Furthermore, the mitigation of noise from such plant is relatively straightforward to implement so that Government policy can be met.

2.152. These differences aside, the cumulative rating level from both proposals can be approximated by logarithmically summing the individual rating levels for each scheme. The rating levels for each scheme at the two receptors, as well as the cumulative rating level, are shown in the table below.

Table 3: Cumulative rating levels for Northampton Gateway and Rail Central (Table 8.23 of the NGW ES)

Receptor	**Daytime Rating Level, dB $L_{Ar,1hr}$**			**Night-Time Rating Level, dB $L_{Ar,15min}$**		
	NGW	**RC**	**Cumulative**	**NGW**	**RC**	**Cumulative**
R21 Barn Lane	**42**	**47**	**48**	**42**	**48**	**49**
R28 Courteenhall Road	**42**	**45**	**47**	**43**	**47**	**48**

2.153. It is understood that the rating levels quoted for RC include the currently proposed mitigation measures for that scheme. The rating levels from the RC

development are expected to be greater than those from NGW at the two receptors by between 3 and 5 dB(A) during the day and between 4 and 6 dB(A) during the night.

2.154. An initial estimate of the potential impact has been carried out using the background sound levels identified in the NGW assessment (i.e. under broadly south-westerly winds). Table 4 compares the rating levels from Table 3 with the NGW background sound levels (BSL) for the daytime period, and Table 5 does the same for the night-time period.

Table 4: Initial estimate of impact from NGW, RC and cumulative SRFI operations under broadly south-westerly winds for daytime period (Table 8.24 from the NGW ES)

Receptor	***Daytime (07:00-23:00)***						
	BSL	***NGW***		***RC***		***Cumulative***	
		Rating	***Difference***	***Rating***	***Difference***	***Rating***	***Difference***
R21 Barn Lane	40	42	+2	47	+7	48	+8
R28 Courteenhall Road	36	42	+6	45	+9	47	+11

Table 5: Initial estimate of impact from NGW, RC and cumulative SRFI operations under broadly south-westerly winds for night-time period (Table 8.25 from the NGW ES)

Receptor	**Night-Time (23:00-07:00)**						
	BSL	**NGW**		**RC**		**Cumulative**	
		Rating	**Difference**	**Rating**	**Difference**	**Rating**	**Difference**
R21 Barn Lane	36	42	+6	48	+12	49	+13
R28 Courteenhall Road	35	43	+8	47	+12	48	+13

2.155. It can be seen from Tables 4 and 5 that the initial estimates of cumulative operational sound impact under broadly south-westerly winds are generally dominated by the RC SRFI. During the night-time in particular, potentially significant adverse impacts are initially indicated at both receptors as a result of RC SRFI operations.

2.156. Regarding context, when the cumulative daytime rating levels are compared to the corresponding desirable guideline external sound levels for dwellings, as summarised in Table 8.11 of the NGW ES, the cumulative rating levels are below the lower threshold for external amenity space. Assuming a typical reduction of 12 dB(A) for external sound passing through an open window into

a habitable room, the cumulative rating levels would be equal to and 1 dB(A) above the lower threshold for resting inside living rooms. This would just indicate a potential adverse effect.

2.157. During the night-time, assuming a typical reduction of 12 dB(A) for external sound passing through an open window into a habitable room, the cumulative rating levels would exceed the upper threshold for sleeping inside bedrooms by 1 and 2 dB(A). This would indicate a potential adverse effect.

2.158. Based on the results of both the initial estimate of impact and the consideration of context, the cumulative assessment of sound from operational activities taking place at both the Northampton Gateway and Rail Central under broadly south-westerly winds has indicated that adverse impacts and effects could occur during both the daytime and night-time period at the two shared receptor locations. In particular, the impact would be greater with the addition of RC compared with NGW operating on its own.

Summary of Cumulative Assessment with Rail Central

2.159. An indicative cumulative assessment of the potential levels of **construction noise** as a result of the works associated with both NGW and RC taking place at the same time indicates that **no adverse or significant adverse effects** from construction noise would be expected at the two shared receptors.

2.160. An indicative cumulative assessment of the potential increase in **railway noise** as a result of concurrent operation of the two schemes indicates that additional **significant adverse effects** during the night-time may occur, both in terms of average railway noise levels and noise induced awakenings

2.161. The assessment of the potential change in **road traffic noise** as a result of the cumulative effects of both the NGW and RC schemes on the roads around the Main Site, Roade Bypass and other highway works has shown that there is **no change** in terms of expected significant adverse effects to the scenario featuring only NGW traffic. A small number of (not significant) changes in impact magnitudes at some receptors are indicated however; at one receptor close to the Roade Bypass is expected to increase from minor adverse to moderate adverse.

2.162. While these conclusions are based on traffic data from the RC PEIR and, as discussed above, there may be some differences in traffic conditions caused by the revised highway mitigation strategy included in the RC ES, it is not considered that these are likely to materially alter the results of the original cumulative road traffic noise assessment.

2.163. The assessment of sound from **operational activities** taking place at both the NGW and RC has shown that those from the RC SRFI are likely to dominate at the two shared receptors, with adverse impacts and effects possibly occurring during both the daytime and night-time periods. However, it is apparent that

there are differences in the background sound levels and operational sound assumptions of the two assessments that mean these conclusions should be treated with some caution.

2.164. Overall, the cumulative impact of both the NGW and RC SRFIs operating at the same time is likely to result in **a greater number of adverse noise effects** when compared to NGW operating on its own. Based on the results of the two assessments, and accepting the methodological differences highlighted, additional potential significant adverse effects could occur as a result of night-time railway noise arising from the additional freight train movements from RC in addition to NGW.

Air Quality

Introduction

2.165 The Northampton Gateway (NGW) ES Air Quality chapter contains an assessment of the cumulative effects of both NGW and RC based on the information given in the RC Preliminary Environmental Information Report (PEIR) issued in March 2018.

2.166 The submitted Rail Central (RC) ES includes an assessment of the potential effects of Air Quality. The results stated in the final RC Air Quality chapter are largely unchanged from their PEIR of spring 2018 (although covering a larger study area) and largely reproduces the cumulative assessment included in the NGW ES Air Quality chapter.

2.167 Following a review of the RC ES, the NGW cumulative assessment of Air Quality has been updated where relevant, and is set out below. This has involved a review of Chapter 8 of the RC ES, and relevant appendices.

Review of the Rail Central Application

2.168 The general quality of the Rail Central Air Quality Assessment is reasonably robust and is based on the latest relevant guidance.

2.169 However, the assessment does not include two key assessments:

- An assessment of the developments impact and compliance with Air Quality Directive limit values for the East Midland Zone; and
- The potential cumulative impacts of RC on Air Quality have been considered as far as is practicable, but it should be noted that RC are still yet to complete their own CIA of operational traffic.

Assessment of Cumulative Impacts with Rail Central

Construction

Dust

2.170 On the basis that the Proposed Development and all other relevant local committed developments (e.g. the Northampton South SUE), as well as Rail Central, incorporate appropriate mitigation measures the residual cumulative effect from construction dust would be 'not significant'. This point accords with the RC AQ chapter (paragraph 8.182).

2.171 For Northampton Gateway, the CEMP sets out a requirement for Soil Management Plans within each phase specific CEMP (P-CEMP), with reference to a range of details required within those plans. The NGW ES (paragraph 9.6.1), CEMP, and P-CEMP refer to measures based on medium and highest risk sites, and this will ensure appropriate mitigation or elimination of any likely significant effects.

2.172 A similar range of common and standard measures can reasonably be anticipated on all other major construction sites, and it is noted that the Rail Central application includes a draft CEMP incorporating similar dust management and mitigation measures (submitted as Appendix 5.2b of the Rail Central ES) to minimise dust effects. The Air Quality and Dust Management Plan included in RC's CEMP is appropriate and should ensure that there are no significant cumulative effects from dust. It should be noted that both development's CEMPs include the consideration of dust monitoring, which can be used to continuously evaluate and assess the appropriateness of each site's dust mitigation measures. Further mitigation measures can then be undertaken, if required, to ensure no significant cumulative effects.

2.173 Although the two application sites share some receptors, given the transient nature of the construction process, the timing of the various construction phases, and the intervening topography, there will be few locations where both sites activities will co-incidentally cause any effects. The most affected locations are likely to be residential properties east of Milton Malsor Village, in the area that overlaps the NGW and RC Construction Phases as shown in Figure 9.18 of the NGW ES.

2.174 Therefore, and in light of the mitigation measures proposed across both sites, there are considered to be **no significant cumulative effects** likely from dust.

Construction traffic

2.175 Given the current status of the two SUEs considered within the ES as 'committed development' there is insufficiently detailed information and no specific data regarding the assignment of construction vehicles along the local highway network. The location of the NGW and RC construction traffic access points are on opposite sides of the developments, with NGW located along the A45 and RC access points will be accessed from the north on the M1, or north via the A43 and A5123.

2.176 Appendix 16.4 of the RC ES confirms that over 70% of the construction traffic HGVs, and over 60% of construction related car traffic will head either north on the M1, or north via the A43 and A5123 into Northampton. The NGW ES (Document 5.2, Transport Assessment Appendix 33) assumes that over 65% of construction car traffic will be via the M1 south, or the A45 into Northampton, with nearly 20% of car construction traffic routed via the A508. All construction HGV traffic will be routed north to the M1 or A45. The detail of construction traffic routeing will be agreed via CEMPs for both NGW and RC, but the two applications suggest there will limited scope for any significant cumulative construction traffic effects.

2.177 Given the locations of the construction access points and the different scheme routes proposed the NGW air quality assessment suggests that there is significant headroom at the identified receptor locations (shown in Appendix 9.11 of the NGW ES regarding Construction traffic). The NGW construction phase

traffic contribution was assessed at the AQMAs adjacent to identified NGW construction routes along the M1 North and A45 in Appendix 9.11 of the ES. The NGW annual mean NO_2 and PM_{10} contribution were both 0.2% of the air quality objective level, making the contribution *Negligible*. Considering this, the required traffic and resulting pollutant contribution from the RC construction fleet would have to be significantly higher (annual mean NO2 and PM10 contribution at > 1.8%) to cause the cumulative contribution to become "*significant*". This is highly unlikely. This provides certainty that cumulative construction impacts due to the proposed development and local committed developments would remain **not significant**.

2.178 In considering this issue, it is reasonable to assume best practice measures would be followed at all major sites with HGV construction vehicles assigned wherever possible along major routes, which are often furthest from sensitive residential uses. Each committed development will have different access locations to the strategic network (i.e. take different minor routes to the major roads).

Operational stage

Traffic

2.179 The Northamptonshire Strategic Transport Model (NSTM2) has informed the transport assessment and thereby also the Air Quality assessment. The NSTM2 model takes account of other local committed developments including the SUEs at Northampton South, and South of Brackmills and a comprehensive list of other allocated sites and consented developments.

2.180 The cumulative impact assessment of Air Quality effects considers the potential effects of Rail Central in addition to the comprehensive list of committed developments in the NSTM2. The assessment identified that the cumulative impacts are predicted to be negligible at all receptors, which is **not significant** in assessment terms.

2.181 The initial conclusions drawn regarding the likely cumulative impacts on air quality with Rail Central have been revisited following submission of the Rail Central application which includes an updated highway mitigation strategy. It is understood that the highways mitigation strategy is not agreed with the highway authorities and is, therefore, potentially subject to change. Accordingly the conclusions in regard to cumulative impact of operational traffic are subject to that caveat. It is further understood that Rail Central are undertaking an assessment of likely cumulative impacts based on this new mitigation strategy however this is not yet available.

2.182 The NGW review of the RC application suggests that there are potential deficiencies in the Transport Assessment, and the review undertaken suggests there are likely to be more significant traffic effects on key routes in Northampton associated with the A43, and in several local villages. If there are significant changes to congestion and queuing as a result of Rail Central this would have

implications for the assessment of cumulative impacts on air quality. Given the sensitivity of some areas in western and urban Northampton, including parts of the ring road, this could have implications for some AQMAs.

2.183 Subject to that limitation, it is the view of NGW that there is likely to be sufficient headroom at each sensitive receptor to suggest that the cumulative impacts would not be significant.

Cultural Heritage

Introduction

2.184 The likely cumulative effects of NGW (with committed developments) and Rail Central is as set out in Chapter 10 of the ES with regard to both Built Heritage, and Archaeology (Section 10.9).

2.185 The assessment has been revisited in light of the accepted Rail Central application in November 2018, and is set out below following a review of the Rail Central application.

Review of the Rail Central application

2.186 The Rail Central baseline for their ES Chapter follows a commonly used approach regarding archaeological matters - a desk-based assessment (DBA), which was followed by a geophysical survey and subsequent archaeological trial trench evaluation.

2.187 The Rail Central assessment follows the guidelines outlined in the Design Manual for Roads and Bridges (DMRB), which is commonly used for heritage chapters in the current absence of ES guidance from CIfA. The Rail Central ES Chapter notes its own limitations relating to a lack of field work in areas of the order limits, such as minor highways works, but considers that the data they obtained from the Historic Environment Record (HER) is sufficient to provide a reliable assessment of the archaeological baseline and likely impacts in those areas.

2.188 All the heritage receptors identified in the ES have been attributed a sensitivity level of between negligible and medium; this seems reasonable. A Minor Adverse residual level of effect on these receptors is identified by the Chapter when taking into account embedded mitigation (preservation by record). NGW would agree with this assessment.

2.189 With regard to Built Heritage, the Rail Central assessment work has been carried out with regard to best practice guidance, and, whilst there are some inconsistencies, these do not hinder the ability to carry out a cumulative assessment.

2.190 It is noted that the order limits of Rail Central include several designated heritage assets (including designated assets associated with the Grand Union Canal).

Assessment of likely cumulative impacts with Rail Central

Built Heritage

2.191 The RC ES Chapter identifies that the Rail Central scheme has potential for impact on a number of built heritage receptors. As the majority of these

receptors are not shared with the Northampton Gateway scheme there will be no cumulative impact on most receptors.

2.192 However, it is considered that there is scope for cumulative impacts on the Milton Malsor Conservation Area, and Mortimers, a Grade II listed residential building in Milton Malsor.

2.193 The Rail Central ES Chapter identifies potential for moderate adverse effects to both the Milton Malsor Conservation Area and Mortimers. The combination of both Northampton Gateway and Rail Central would lead to the further reduction of the rural setting of these two assets and would result in increased adverse impacts to those identified from NGW alone. It is considered that the cumulative significance of effect on both Milton Malsor Conservation Area and Mortimers would be moderate adverse. This is consistent with the likely effects on those receptors identified by the applicant for the Rail Central Scheme, but a larger magnitude of impact than considered likely from NGW alone (assessed as negligible, and minor adverse respectively). The increase to moderate adverse is as a result of the Rail Central scheme which on its own would have a moderate adverse impact.

2.194 Therefore, similar to the conclusions reached in the Landscape and Visual assessment, the primary and most apparent impact on these receptors will arise from the Rail Central scheme which would have a much more direct relationship with these assets than Northampton Gateway.

Archaeology

2.195 The Rail Central proposals will have no direct impact on any designated archaeological assets, such as Scheduled Monuments. It is also considered that there will be no setting impacts on Scheduled Monuments; therefore, impacts relating to the development will be on site specific buried archaeological remains which would be mitigated through a programme of excavation. The archaeological investigations carried out on the site identified archaeological remains predominantly relating to late Prehistoric and Romano-British activity. This correlates with the findings from the Northampton Gateway site. The proposed mitigation for Rail Central, i.e. archaeological excavation, recording, assessment and publication is also as suggested for Northampton Gateway.

2.196 The cumulative effect of the archaeological mitigation will result in a broader understanding of the local archaeological record. No cumulative effects of any significance are considered likely.

Summary conclusions regarding Cultural Heritage cumulative impacts

2.197 Following a review of the Rail Central application, it is evident that neither the NGW proposals or RC will have a direct impact on any designated

archaeological assets, such as Scheduled Monuments. It is also considered that there will be no setting impacts on Scheduled Monuments from either proposal.

2.198 There are not considered to be any significant differences between the two sites in terms of effects on archaeology. The archaeological investigations carried out on both sites identified archaeological remains predominantly relating to late Prehistoric and Romano-British activity. The proposed mitigation, i.e. archaeological excavation, recording, assessment and publication is the same for both sites.

2.199 With regard to built heritage, both the Rail Central and Northampton Gateway schemes both have potential to impact upon the Milton Malsor Conservation Area and Mortimers (a listed building in Milton Malsor).

2.200 However, it is clear that the Rail Central scheme has a far more direct visual and proximate relationship with these designated heritage assets. NGW is assessed to have a negligible impact on the Conservation Area and a minor adverse impact on Mortimers. RC is assessed by both RC and NGW to have a moderate adverse impact on both receptors. The cumulative impact on these shared receptors is anticipated to be **moderate adverse**.

Lighting

Introduction

2.201 The submitted NGW ES (Document 5.2) considered the cumulative impact of NGW (with committed development) and Rail Central in Section 11.8 based on the information then available. The cumulative assessment has been updated to reflect the contents of the Rail Central accepted application and is set out below, following a review of the Rail Central application.

2.202 In the following updated assessment of likely cumulative effects Northampton Gateway receptors that are close to the proposed Roade Bypass but unaffected by the Northampton Gateway Main Site have been excluded as these same receptors will also be unaffected by Rail Central given the distance from the Rail Central site, and the intervening topography.

2.203 Also excluded is a NGW receptor that would no longer exist (due to demolition) if the Rail Central development went ahead. In all other respects, the information given below can be compared alongside the assessments given in Appendix 11.4 of the Northampton Gateway environmental statement.

Review of the Rail Central application

2.204 The full RC external lighting impact assessment is split between ES Chapter 19 'Lighting' and Chapter 15 'Landscape and Visual', while ecology effects are touched on in Chapter 14 'Biodiversity'. Chapter 19 is only concerned with those aspects of light pollution that are measurable or calculable. These are: light spill (lux), glare (candelas) and upward light emission (as % of total light). Chapter 15 deals with the visual effects of lighting associated with the development.

2.205 The conclusions reached in Rail Central's ES Chapter 19 are that effects due to light spill, glare and upward light emission will be negligible. This is to be expected given that the external lighting will be designed in accordance with national guidance, which gives recommended limits for these three types of light pollution. By way of comparison, the Northampton Gateway submission also assesses effects from these three types of light pollution as being negligible.

2.206 Operational phase night time visual effects are dealt with in Chapter 15, supported by several night time photomontages. It appears that night time visual effects have been assessed by relying on the night time photomontages. However, the only effects considered are those caused by light presence - that is the appearance of light sources and other lit elements in dark views. Local sky glow is not mentioned, even though it is likely to be significant. This is surprising given that the chapter's review of baseline conditions repeatedly notes the prevalence of this form of light pollution in the area.

2.207 While night time photomontages do assist with envisioning the impact of the development at night they have limitations that can affect the robustness of the impact assessment. For example, it is extremely difficult to represent night time visual effects with any degree of realism. It is noted that none of the submitted RC photomontages depict any local sky glow from the SRFI and yet this will inevitably be present in every view to a greater or lesser extent. Indeed, this is likely to be the most prevalent form of light pollution. Therefore, the usefulness and robustness of those montages as a basis of the assessment are questioned. Accordingly they have not been used as the basis for this cumulative assessment.

Assessment of Cumulative Impacts with Rail Central

Construction

2.208 Table 1 below provides an assessment of cumulative lighting effects of NGW an RC during the construction phase on the assumption that construction of the two SRFI's would proceed more or less concurrently.

2.209 Construction related effects are temporary by nature and change over the course of the construction period. The construction lighting effect for Northampton Gateway will be managed as part of the Construction Environmental Management Plan (CEMP) (Doc reference 6.11). It is assumed that similar provisions for the construction phase of Rail Central will also be implemented, as stated in Table 15.15 of the Rail Central ES.

2.210 The 'description' column in Table 1 refers to numbered categories of lighting effects – these are as described in the Northampton Gateway ES (Document 5.2) Table 11.2, with more detailed information given in Northampton Gateway ES Appendix 11.1. The most frequently cited references to types of likely effect in the assessments given in Tables 1 and 2 below are visual effects of (4) *light presence of lit elements appearing in dark views*, and (5) *local sky glow appearing over new lit development*. Categories (7) and (8) are '*hazard*' effects. Categories (9) and (10) are *ecological disturbance* effects.

Table 1: Assessment of cumulative lighting effects (NG and RC) during construction

(For a full list of numbered references to lighting effects 1-10, see NGW ES Appendix 11.1)

Receptor	Distance from construction lighting	Sensitivity	Magnitude of change	Significance of effect	Description
Milton Malsor – residential properties at east and southeast fringe with full or partial direct views of the Site (B)	200m	High	Medium/ Small	Moderate/ Minor Adverse	(4) will increase until the bunding is formed, when it will fall back to pre-construction levels. (5) will marginally increase.
Milton Malsor – other residential properties (B)	200m +	Medium	Negligible	Negligible	(4) will be unchanged. There will be a barely noticeable increase in (5).
63 Collingtree Road (Manor Farm Bungalow) (B)	200m	High	Medium/ Small	Moderate/ Minor Adverse	(4) will increase until the bunding is formed, when it will reduce. (5) will marginally increase.
Blisworth – residential properties at northeast fringe with full or partial direct views towards the Site (B)	500m	High	Small	Minor Adverse	Views are distant and the Main Site is in a depression. It will be seen against the existing backdrop of lighting associated with the Northampton conurbation, Grange Park and the M1 motorway junctions. Changes to (4) and (5) will therefore be small.

Receptor	Distance from construction lighting	Sensitivity	Magnitude of change	Significance of effect	Description
Blisworth – other residential properties (B)	500m +	Medium	Negligible	Negligible	Changes to (4) and (5) will be imperceptible due to screening by intervening properties and distance.
Courteenhall village (B)	1200m	High	Negligible	Negligible	Changes to (4) and (5) will be imperceptible due to existing screening and distance.
Courteenhall parkland (C)	400m +	High	Negligible	Negligible	Changes to (4) and (5) will be imperceptible due to existing screening and distance.
Collingtree (A, B)	75m +	Medium	Negligible	Negligible	Effects (1), (2) and (3) will be nil. Changes to (4) and (5) will be imperceptible due to existing screening.
Road users on the M1 motorway, A508 and M1/A508/A45 junction (D)	Adjacent	Medium	Negligible	Negligible	There will be no (7) and (8) effects.
Railways (D)	Adjacent	High	Negligible	Negligible	There will be no (7) and (8) effects.
Grand Union Canal (C)	70m +	High	Medium/ Small	Moderate/ Minor Adverse	Changes to (4) and (5) will be seen due to the extent of the proposals and intermittent glimpses of light sources.
Night sky views from dark locations (E)	—	—	Negligible	Negligible	Changes to (6) will be imperceptible.

Receptor	Distance from construction lighting	Sensitivity	Magnitude of change	Significance of effect	Description
Ecology – woodland, hedgerows and water margins (F)	—	—	—	Negligible	(9) and (10) are fully preventable.

2.211 In summary, as set out above, the cumulative effects from construction are likely to be negligible for many receptors. However, a limited number of medium magnitude changes are likely, including some temporary changes for receptors in Milton Malsor and Collingtree in advance of the earthworks bunding being created. Blisworth will only experience small lighting changes as a result of the construction of both sites. There would be no nuisance of ecological disturbance effects (as a result of the mitigation measures proposed).

Operational Phase

2.212 Any development will inevitably introduce a new potential element of night time lighting. The cumulative effects of NGW (with committed developments) are as assessed in the NGW ES (Doc 5.2 - see ES paragraph 11.8.4 and Lighting Appendix 11.4). This found that the cumulative effect of the committed development with NGW would be very similar to NGW alone principally due to the limited number of shared receptors and the distances involved between the sites.

2.213 However, the additional cumulative effects in conjunction with the proposed Rail Central SRFI scheme are likely to be somewhat different.

2.214 Table 2 provides an assessment of cumulative lighting visual effects during the operational phase. It is assumed that other types of effect (nuisance, loss of amenity, hazard, ecological disturbance) would be eliminated through the mitigation and design measures proposed, even so cumulative effects are likely to be significant (i.e. greater than minor adverse) on a relatively large number of receptors if both RC and NGW proceed.

Table 2: Assessment of cumulative lighting effects during operation

(For a full list of numbered references to lighting effects 1-10, see NGW ES Appendix 11.1)

Receptor	Distance from new lighting	Sensitivity	Magnitude of change	Significance of effect	Description
Milton Malsor – residential properties at east and southeast fringe with full or partial direct views of the Site (B)	200m	High	Small (4) Medium (5)	Minor Adverse (4) Moderate Adverse (5)	Some properties may glimpse the tops of some of the new Rail Central buildings above new mounding. These will inevitably be illuminated by light reflected from below, albeit dimly. There will be a small increase in (4). New lit development will extend over an angle of view of approximately 150 degrees, over which local sky glow will appear where previously there was a relatively dark view. This will be especially noticeable on hazy/misty evenings/nights. There will be a medium increase in (5).
Milton Malsor – other residential properties (B)	200m +	Medium	Negligible (4) Small (5)	Negligible (4) Minor Adverse (5)	(4) will be unchanged. There will be a noticeable increase in (5), given the extent of lit development and its proximity.

Receptor	Distance from new lighting	Sensitivity	Magnitude of change	Significance of effect	Description
63 Collingtree Road (Manor Farm Bungalow) (B)	200m	High	Medium	Moderate Adverse	There will be a substantial change in the night time view, with lit Rail Central gantry cranes being visible even when vegetation is in leaf (4). The development will create significant local sky glow in views from here (5). Northampton Gateway mounding will provide very limited mitigation to these effects.
Blisworth – residential properties at northeast fringe with full or partial direct views towards the Site (B)	500m	High	Medium	Moderate Adverse	Some properties will glimpse the tops of many of the new Rail Central buildings. These will inevitably be illuminated by light reflected from below. There will be a medium increase in (4). New lit development will extend over an angle of view of approximately 150 degrees, over which local sky glow will appear. This will be especially noticeable on hazy/misty evenings/nights. There will be a medium increase in (5).
Blisworth – other residential properties (B)	500m +	Medium	Negligible (4) Small (5)	Negligible (4) Minor Adverse (5)	(4) will be unchanged. There will be a noticeable increase in (5), given the extent of lit development and its proximity.

Receptor	Distance from new lighting	Sensitivity	Magnitude of change	Significance of effect	Description
Courteenhall village (B)	1200m	High	Negligible	Negligible	Changes to (4) and (5) will be imperceptible due to existing screening and distance.
Courteenhall parkland (C)	400m +	High	Negligible	Negligible	Changes to (4) and (5) will be imperceptible due to existing screening and distance.
Collingtree (A,B)	75m +	Medium	Negligible	Negligible	Effects (1), (2) and (3) will be nil. Changes to (4) and (5) will be limited by existing screening for those properties with views south, and negligible for all other properties.
Road users on the M1 motorway, A508 and M1/A508/A45 junction (D)	Adjacent	Medium	Negligible	Negligible	There will be no (7) and (8) effects.
Railways (D)	Adjacent	High	Negligible	Negligible	There will be no (7) and (8) effects.

Receptor	Distance from new lighting	Sensitivity	Magnitude of change	Significance of effect	Description
Grand Union Canal (C)	70m +	High	Medium (4) Large (5)	Moderate Adverse (4) Major Adverse (5)	The Grand Union Canal in this area currently benefits from a predominantly dark environment, giving a sense of remoteness. Given the extent of the Rail Central proposals, it is almost inevitable that lit elements will be glimpsed from some locations along the Grand Union Canal, especially when trees and shrubs are not in leaf. The change in (4) is assessed as Medium. New lit development will extend over a very wide angle of view, over which local sky glow will appear where previously there was a relatively dark view. This will be especially noticeable on hazy/misty evenings/nights. It will change the character of the night time environment by removing the sense of remoteness. The change in (5) is assessed as Large.

Receptor	Distance from new lighting	Sensitivity	Magnitude of change	Significance of effect	Description
Night sky views from dark locations (E)	—	—	Negligible	Negligible	The lighting associated with the Development will not emit any upward light although a proportion will be reflected upwards from illuminated surfaces. However, the amount will be inconsequential in the context of the existing night time environment and therefore there will be negligible change to (6).
Ecology – woodland, hedgerows and water margins (F)	—	—	—	Negligible	(9) and (10) are fully preventable.

Summary Conclusions regarding Lighting Effects

2.215 Overall, this updated assessment confirms that the conclusions reached in Section 11.8 of the submitted NGW ES remain valid.

2.216 Even assuming best practice measures, the cumulative effects are likely to be **significant for many receptors**. This is mostly due to the topography and proximity of the Rail Central site in the context of the surrounding settlements and residential properties, with the Rail Central site sitting lower in the landscape than many surrounding receptors and in a more exposed and open area of countryside close to large parts of the boundaries of both Milton Malsor and Blisworth.

2.217 The most common likely effects will be visual, in the form of increased light presence and local sky glow. Table 3 below gives a side by side comparison between NGW only and NGW cumulative with RC (derived from Tables 1 and 2 above and Doc 5.2 ES Appendix 11.4).

Table 3: Summary comparison of cumulative lighting effects for NGW (with committed development) without RC, and NGW (with committed development) with RC.

NOTE - the **bold emphasis** is used to identify key changes to the likely effects when Rail Central is included

Receptor	Construction: NGW only	Construction: NGW with RC	Operation: NGW only	Operation: NGW with RC
Milton Malsor – residential properties at east and southeast fringe with full or partial direct views of the Site	Moderate/ Minor Adverse	Moderate/ Minor Adverse	Minor Adverse	**Moderate/ Minor Adverse**
Milton Malsor – other residential properties	Negligible	Negligible	Negligible	**Minor Adverse/ Negligible**
63 Collingtree Road (Manor Farm Bungalow)	Moderate/ Minor Adverse	Moderate/ Minor Adverse	Minor Adverse	**Moderate Adverse**
Blisworth – residential properties at northeast fringe with full or partial direct views towards the Site	Minor Adverse	Minor Adverse	Minor Adverse	**Moderate Adverse**
Blisworth – other residential properties	Negligible	Negligible	Negligible	**Minor Adverse/ Negligible**
Courteenhall village	Negligible	Negligible	Negligible	Negligible
Courteenhall parkland	Negligible	Negligible	Negligible	Negligible
Collingtree	Negligible	Negligible	Negligible	Negligible
Road users on the M1 motorway, A508 and M1/A508/A45 junction	Negligible	Negligible	Negligible	Negligible
Railways	Negligible	Negligible	Negligible	Negligible
Grand Union Canal	Negligible	**Moderate/ Minor Adverse**	Negligible	**Major/ Moderate Adverse**

Receptor	Construction: NGW only	Construction: NGW with RC	Operation: NGW only	Operation: NGW with RC
Night sky views from dark locations	Negligible	Negligible	Negligible	Negligible
Ecology – woodland, hedgerows and water margins	Negligible	Negligible	Negligible	Negligible

Transportation

Introduction

2.218 The submitted Northampton Gateway ES (Document 5.2) includes an assessment which includes all committed development, as agreed with the Transport Working Group. The model also includes the committed infrastructure schemes and those highly likely to come forward before the forecast assessment year, including Highways England's Smart Motorway Projects. The cumulative impacts of the development in combination with committed development and infrastructures scheme has therefore been assessed as part of the overall modelling work undertaken, with full details provided at TA Appendix 36.

2.219 Although not a commitment, the submitted cumulative impact assessment (CIA) work also included an assessment with the proposed Rail Central proposals (at ES paragraphs 12.8.2 to 12.8.28, and Technical Note 12 at ES Appendix 12.2). The original CIA was prepared using the Rail Central information that was publicly available at the time, and the assessment comprised the following elements:

- Strategic modelling using NSTM2 (J3 scenario), which included both the Northampton Gateway and Rail Central schemes and associated highway mitigation proposals at that time.
- VISSIM micro-simulation modelling of M1J15 and MJ15A using traffic flow data from the NSTM2 J3 scenario.
- Further detailed junction modelling of all junctions within the Northampton Gateway study area, again using traffic flow data from the NSTM2 J3 scenario.
- Assessment of the cumulative impact of disruption due to construction.
- Assessment of the cumulative impact of the respective Public Transport Strategies and impacts on Public Rights of Way.
- Assessment of how changes to the Rail Central highway mitigation that were released as part of the Rail Central Stage 2 Consultation (after the completion of the NSTM2 J3 scenario strategic modelling) could affect the conclusions of the CIA.

2.220 There have been no changes to the Northampton Gateway highway mitigation strategy since the original CIA was undertaken in 2018. However, the Rail Central highway mitigation strategy has been amended since the proposals released at the Rail Central Stage 2 Statutory Consultation. These changes are explained below. The Examining Authority (at ExA Q1.9.1) requested that an updated CIA taking account of any further information in relation to Rail Central is provided. Due consideration was given to the timescales involved in updating the Northampton Gateway CIA assessment, as described above. However, there was not sufficient time before the ExA's 8 January 2019 deadline to update the strategic NSTM2 and VISSIM micro-simulation modelling.

2.221 Nonetheless, there was sufficient information available to undertake an updated CIA building on the work already undertaken, using detailed junction modelling

to provide quantitative assessment of the performance of key highway network locations and allow qualitative conclusions to be made on the cumulative effects.

2.222 Therefore, in response to Ex Q1.9.1, the approach taken to undertaking an updated CIA with respect to transportation, has been as follows:

- A review of the Rail Central transport mitigation strategy and highway mitigation proposals.
- Based on an understanding of the Rail Central proposals and assessments submitted to date, comment on any interaction between the respective Northampton Gateway and Rail Central highway mitigation strategies and identify where they may be incompatible.
- Undertake detailed junction modelling at the identified locations to provide quantitative data to inform a qualitative assessment of the likely residual impacts.
- Provide an updated CIA report, explaining the significance of the cumulative effects and how the significance has been determined.

2.223 At a Transport Working Group meeting on 7 December 2018, Northamptonshire County Council (NCC) and Highways England agreed that the above proposed approach to updating the CIA was sensible and appropriate, given that there is not sufficient time to undertake further strategic or micro-simulation modelling, and also in light of the outcome of the initial assessment of the Rail Central proposals.

2.224 To inform the updated CIA a meeting was also held with transport consultants from Vectos, acting on behalf of Rail Central, on 12 December 2018. The meeting was arranged so that any additional information pertinent to the CIA could be shared. However, whilst some clarification was provided on certain issues, no additional information relevant to the updated CIA was provided by Rail Central.

2.225 The updated CIA is reported in detail at Technical Note 13, which is Appendix 3 of this CIA report. The conclusions of that report and a summary of the potential cumulative effects should both the Northampton Gateway and Rail Central scheme come forward are set out below following a review of the Rail Central application.

Review of the Rail Central application (Transport Assessment and Mitigation package)

2.226 The main conclusions of the CIA assessment submitted with the Northampton Gateway DCO (as part of Document 5.2, including Appendix 12.2) application were that:

- There would be little interaction between the two projects on the A508 and A43 corridors south of the M1, and therefore with Rail Central also in place the benefits afforded to the A508 corridor by the Northampton Gateway scheme would remain largely as detailed in the Northampton Gateway TA;

- Detailed junction modelling demonstrated that at junctions where cumulative impacts were identified, mitigation provided by either the Northampton Gateway SRFI or the Rail Central highway mitigation strategy (as defined at the Stage 2 Statutory Consultation) was likely to be sufficient to mitigate the cumulative impacts;
- The CIA VISSIM microsimulation modelling showed that overall highway network performance would be improved with both developments and the highway mitigation schemes assessed at that time in place, when compared to the 'Reference Case' (i.e. the future scenario with neither SRFI nor their associated mitigation measures delivered, where just committed developments and infrastructure are in place).
- However, the modelling also shows there would be some additional impacts in terms of queueing in the CIA scenario with Rail Central added which are not present in the Northampton Gateway only scenario – these are as follows:

    - In the morning peak hour the maximum queue length on the M1 northbound diverge at M1J15 was forecast to exceed the storage capacity on the slip road and could potentially impact on the M1 mainline;
    - In the morning peak hour the average queue on the M1 southbound diverge at M1J15 would reach back beyond the end of the slip road where it would impact on the M1 mainline flow;
    - Although still an improvement on the Reference Case scenario, the queue lengths on the M1 northbound diverge at M1J15A would extend back to the M1 mainline before the end of the CIA evening peak hour;
    - On the A43 approach to M1J15A the average and maximum queue lengths in the evening peak hour on the A43 are shown to increase significantly in the cumulative impact assessment scenario.

2.227 Since completing the CIA submitted with the Northampton Gateway DCO, the Rail Central DCO was accepted for Examination on 15 November 2018. The application is supported by an ES, with transport considered at Chapter 17. The TA, provided at ES Appendix 17.1, shows that the overarching strategy for the mitigation of the highway impacts of the Rail Central SRFI development has changed since the draft Rail Central TA was put forward at the Stage 2 Statutory Consultation.

2.228 The previous approach detailed in the Stage 2 Statutory Consultation draft TA for Rail Central was concerned with quantifying impacts at junctions across a wide study area and identifying where mitigation was required. This resulted in a study area for detailed assessment of 38 junctions, and proposals to mitigate impacts via physical highway works at 13 junctions.

2.229 However, the Rail Central TA submitted with the DCO application states at paragraph 8.18 that "the DS3 [with Stage 2 Consultation highway mitigation] modelling showed an increase in traffic flow using the Ring Road and A45 corridors. This is as a result of the additional capacity provided at junctions along

those routes attracting traffic towards them". Paragraph 8.19 of the Rail Central TA states that it was subsequently agreed with Highways England and NCC that the A45 improvements should be removed so that traffic would not be attracted to this route and would instead use the A43 where the highway improvement strategy should be focused.

2.230 Therefore, the Rail Central highway mitigation strategy has changed from systematically identifying impacts and proposing appropriate mitigation, to instead promoting the principle that the proposed highway improvements at M1J15A and the western half of the Ring Road would have the positive effect of attracting traffic away from the A45 corridor. Reduced mitigation measures are now proposed as compared to the earlier draft mitigation package. Specifically, highway improvement schemes previously proposed by Rail Central at M1J15 and four A45 junctions have been removed from the proposals and Rail Central are now promoting capacity improvement schemes at eight junctions along the A43 and A5076 corridors, including M1J15A (reduced from 13 junctions previously proposed).

2.231 Furthermore, the Rail Central mitigation proposals at M1J15A have been significantly reduced in scale since the original CIA was undertaken. However, the submitted (reduced) Rail Central scheme at Junction 15A is more substantial than the proposed mitigation identified for the Northampton Gateway SRFI on its own at the same junction. Therefore, the updated CIA continues to assume a scenario in which the Rail Central scheme at Junction 15A would be implemented should both developments come forward.

2.232 Nonetheless, for completeness, the ability of the proposed Northampton Gateway mitigation scheme at M1J15A to accommodate the traffic impacts of both developments has also been considered in Technical Note 13 (Appendix x). That work confirms that the Northampton Gateway mitigation scheme at M1J15A would not have sufficient capacity should both development schemes come forward.

2.233 Section 3 of Technical Note 13 (Appendix 3) raises concerns regarding the performance and effectiveness of the submitted Rail Central mitigation scheme at M1J15A. The VISSIM model report (Appendix W of the Rail Central TA) suggests that not all development traffic can exit the Rail Central site access in the evening peak hour, which is likely to be due to significant queueing on the A43 approach to M1J15A. This is supported by the LinSig results discussed at paragraphs 3.36 to 3.42 of Technical Note 13. In brief, it is concluded that the capacity of M1J15A has been overestimated in the Rail Central modelling, and as a result queueing on the A43 approach would be significantly worse than forecast in the Rail Central TA.

2.234 Similarly, as discussed at paragraphs 3.43 to 3.54 of Technical Note 13, the capacity of the A5076/Towcester Road/Tesco roundabout on the Ring Road within Northampton is overestimated in the Rail Central TA. Considering the deterioration in junction performance it is unlikely whether the Rail Central

mitigation strategy to draw traffic onto the A5076 (Ring Road) corridor could be achieved.

Assessment of likely cumulative effects: Disruption Due to Construction (cumulative assessment with Rail Central)

2.235 Both the Northampton Gateway SRFI and Rail Central SRFI schemes identify the same opening year, 2021. The highway infrastructure phasing for the Northampton Gateway SRFI is described at Chapter 4 of the Northampton Gateway SRFI TA, and the disruption due to the construction of the Northampton Gateway SRFI development is described at paragraphs 12.7.1 to 12.7.27 of the Northampton Gateway ES.

2.236 The Rail Central TA states at paragraph 8.32 that a "phasing assessment will be carried out to determine the level of Rail Central development that would necessitate the implementation of each improvement scheme". That assessment has yet to be submitted. However, the Rail Central TA goes on to indicate at Table 8.3 that the improvement schemes along the A43 corridor, including M1J15A, would be implemented prior to first occupation.

2.237 Paragraph 12.7.6 of the Northampton Gateway ES states that the proposed improvement to M1J15 and the A45 would also be implemented prior to occupation of the first building on the Northampton Gateway site.

2.238 The Indicative Master Programme for the Northampton Gateway highway mitigation works recognises that it would be undesirable for significant works to be undertaken at M1J15 and M1J15A at the same time (paragraph 12.7.9 of the ES). Therefore, agreement would have to be reached with Highways England and Northamptonshire County Council regarding the timing of the works at these junctions, and other commitments (such as the Smart Motorway Project), should both developments be granted consent.

2.239 For the Northampton Gateway scheme, this would be controlled via the procedures that are described in the Northampton Gateway DCO, including with regard to the need to agree with Highways England and NCC the routing of construction traffic and the traffic management associated with the construction of the highway mitigation works. It's assumed that similar procedures and controls would also apply to Rail Central. Such actions across both projects, and some coordination working with NCC and Highways England would ensure that potential adverse cumulative environmental impacts that could arise during construction would be minimised. With much construction traffic typically outside of traditional peak periods, there is considered to be limited scope for significant effects from construction traffic.

Impact on Highway Network and Vehicle Drivers (with Rail Central)

2.240 As described earlier in this section of the CIA report, the Rail Central mitigation strategy was amended since the original CIA was undertaken in spring 2018.

The following headed sections identify the likely cumulative impacts of Northampton Gateway in addition to the committed developments included within the NSTM and with the submitted (accepted) Rail Central proposals and revised mitigation package:

Beneficial impacts in the updated cumulative scenario

2.241 At **M1J15**, the detailed LinSig modelling results of the original CIA assessment (Table 2 of Technical Note 12 at Appendix 12.2 of the ES), show that the proposed Northampton Gateway M1J15 major upgrade scheme would significantly improve the performance when compared to the 2031 D1 Reference Case, although queuing on the M1 northbound and southbound diverge slips would worsen as compared to the forecast operation of the junction with only the Northampton Gateway scheme.

2.242 Based on the updated CIA work it is considered that the revised Rail Central highway mitigation strategy would not materially impact that conclusion, and the overall improvement in performance at M1J15 would not be significantly eroded in the cumulative scenario. Therefore, there would continue to be a net benefit to the highway network due to this scheme in the updated CIA scenario.

2.243 The Northampton Gateway development delivers a substantial suite of improvements to the **A508 corridor**, including the Roade Bypass. The CIA provided at Technical Note 12 demonstrates that there would be little interaction between the A508 and A43 corridors in the cumulative scenario examined in that work. It is not considered that the revised Rail Central highway mitigation strategy would materially impact that conclusion. Therefore, the benefits to the A508, afforded by the Northampton Gateway A508 corridor improvements, would remain in the updated CIA scenario.

2.244 The VISSIM modelling included in the Northampton Gateway TA of the Northampton Gateway improvement scheme at **M1J15A**, demonstrated significant improvement in the performance of both M1 diverge slips, which in the Reference Case were shown to experience queuing back to the M1 mainline, resulting in flow breakdown on the M1. The VISSIM modelling included in the original CIA showed that some of the benefit to the M1 northbound diverge would be eroded in the cumulative scenario, with queueing reaching back to the mainline M1 in the CIA scenario.

2.245 Whilst it has not been possible to run the VISSIM model for the revised Rail Central mitigation strategy, the LinSig modelling provided at the table at paragraph 4.9 Technical Note 13 (Appendix 3) indicates that, whilst the queue on the M1 northbound diverge at M1J15A would reach the mainline in the 2031 evening peak hour, it would still represent an improvement on the Reference Case position without the SRFI schemes. It is therefore concluded that this benefit would remain in the updated CIA scenario, albeit a reduced benefit than that likely with Northampton Gateway alone.

Adverse impacts in the updated cumulative scenario

2.246 The revised Rail Central highway mitigation strategy seeks to attract traffic onto the A43 and A5076 Ring Road corridors. To achieve this, improvement schemes are proposed at M1J15A and junctions on the **western section of the A5076 Ring Road corridor**, including the A5076/Towcester Road/ Mere Way/Tesco roundabout.

2.247 However, it has been demonstrated at Section 3 of Technical Note 13 (enclosed at Appendix 3) that the submitted Rail Central mitigation schemes at M1J15A and the A5076/Towcester Road/Tesco roundabout do not adequately accommodate the forecast traffic demand in the 2031 DS6 assessment scenario for Rail Central only. Based on the assessment included in Section 4 of Appendix 3 which uses the 2031 J3 cumulative scenario traffic flow set from the CIA, it is reasonable to conclude that the performance of these junctions would deteriorate further due to the combined traffic impacts of both SRFI developments with the revised (reduced) Rail Central mitigation strategy.

2.248 Technical Note 12 (ES Appendix 12.2) concluded that the CIA assessment (which included a larger highway mitigation scheme at M1J15A than was being promoted by Rail Central at that time), showed significant increases in queueing on the A43 approach to M1J15A in comparison to the Reference Case. However, Section 4 of attached Appendix 3 demonstrates that in the updated CIA scenario (with the reduced Rail Central highway mitigation at M1J15A) there would be significantly increased queueing on the A5123 approach in the morning peak hour and further significant increases in queueing on the A43 approach in both peak hours. Particularly in the evening peak hour when the MMQ would reach 311 pcus, or 1.87km.

2.249 Therefore, given that queuing on the A43 and A5123 approaches to M1J15A is forecast to significantly deteriorate in the updated CIA scenario, coupled with a revised Rail Central highway mitigation strategy that requires and encourages more traffic to use the A43 corridor, it is considered that the forecast adverse cumulative impacts of both SRFI developments on the A43 and A5123 approaches to M1J15A will be unacceptable to Highways England and NCC, and in the case of the A43 approach, would represent a severe impact.

2.250 Due to the adverse impacts described above, there are likely to be further residual impacts on the wider highway network. These impacts cannot be expressly quantified at this time, as to do so would require additional modelling using the NSTM2. However, the following discussion indicates where these impacts are likely to occur, based on the updated CIA work undertaken and presented in Technical Note 13:

Increased ‘rat-running’ traffic in villages:

- Systra’s Strategic Modelling Assessment report (Rail Central TA Appendix R)) shows that without the improvement scheme at

M1J15A there would be significant rat-running through villages to the east and west of the A43 in both the 2031 morning and evening peak hours in the Rail Central only scenario. This rat running is shown to be removed in the strategic modelling undertaken to support the Rail Central TA. However, it has been shown that in the updated CIA scenario, there would be significant queuing on A5123 approach in the morning peak hour and the A43 approach in both peak hours. Therefore, it is considered that in the cumulative scenario, drivers would be likely to avoid the congestion on the A5123 and A43 in the morning peak hour and on the A43 in the evening peak hour, potentially reassigning to the A45 and M1J15, or rat-running through neighbouring villages.

Reduced performance on key routes and junctions in Northampton:

- The CIA demonstrated that there would be a material impact at the A4500 Weedon Road/A5076 Upton Way/Tollgate Way gyratory and concluded that this impact could be mitigated by a proposal highway mitigation scheme identified by Rail Central at the time of their Stage 2 Statutory Consultation. However, this improvement scheme is no longer being promoted by Rail Central. Nevertheless, the submitted Rail Central TA, shows significant traffic increases towards Northampton Town Centre along the Towcester Road and A5076 Upton Way corridors. Considering the additional traffic drawn to the A5076 Upton Way corridor by the Rail Central highway mitigation strategy, it is highly likely that an unacceptable cumulative impact would remain at this location in the updated CIA scenario.
- Whilst the CIA did not show a material impact at the A4500 St Peters Way/A508 Horseshoe Street/A5123 St Peters Way/Towcester Road gyratory when compared to the 2031 D1 Reference Case, the junction was shown to operate significantly over capacity. The Rail Central TA shows traffic increases at this junction due to the revised Rail Central highway mitigation strategy. It is therefore considered that there may be a material cumulative impact at this junction that would require mitigation in the updated CIA scenario.

Updated CIA - Public Transport Strategy and Public Rights of Way (PRoW)

2.251 There would not be any adverse effects on public transport in the cumulative impact scenario.

2.252 Within the Northampton Gateway SRFI site, public footpaths KX17 and KX13 that cross the main site would be diverted and extended to form a loop within the landscape bunding. To the south, a public footpath would complete the new loop arrangement linking with the existing public footpath and bridge over the West Coast Mainline Northampton Loop railway. The Rail Central proposal also includes a footpath over the railway line as part of their proposed diversion of PRoW KX13, with the footpath then tracking alongside the railway line before crossing the railway again to the north. Therefore, the respective PRoW strategies for the two schemes overlap.

2.253 The location of the Rail Central proposed crossing for diverted PRoW KX13 is incompatible with the required earthworks for the Northampton Gateway scheme at the southern rail spur. However, it is considered that this could be addressed by an amendment to the Rail Central scheme, to move the location of the proposed Rail Central KX13 crossing south.

2.254 Elsewhere there are no other conflicts between the walking and cycling strategies proposed by the two schemes. However, the Rail Central DCO submission provides no details of the likely impacts on existing PRoW KX2/LA13 that crosses the A43 to the south of M1J15A, and how this route will be accommodated and/or amended as a result of the highway mitigation works that are proposed by Rail Central at M1J15A. The proposed Northampton Gateway highway mitigation scheme for this junction includes the diversion and improvement of the PRoW crossing.

Cumulative Impact Assessment conclusions regarding Transport

2.255 The attached Technical Note 13 (at Appendix 3 of this report) provides a more detailed assessment of the likely cumulative impacts of NGW with Rail Central. The above sections of this cumulative impacts report have sought to summarise the findings of that Technical Note.

2.256 In conclusion, when considered across the network, the combined highway mitigation measures proposed by both Northampton Gateway and Rail Central would result in an improvement in performance at M1J15, the A508 and on the diverge slip roads at M1J15A when compared with the Reference Case (i.e. compared to the likely transport conditions without either scheme or their mitigation measures).

2.257 Some parts of the local highway network will see limited if any cumulative impacts, with limited interaction between the two development proposals on the A508 corridor, and the A43 corridor. This means that even with both SRFIs in place, many benefits expected from the Northampton Gateway proposals would remain (such as to Roade and other parts of the A508 corridor).

2.258 However, due predominantly to the impacts of the Rail Central development, in combination there are other areas on the network where there would be **unacceptable adverse impacts**. Most notably at M1J15A on the A5123 and A43 approaches, and at the A5076/Towcester Road/Tesco junction in Northampton. There may also be potential adverse cumulative impacts on the network towards Northampton Town Centre, along the Towcester Road corridor, and on the A5076 Upton Way corridor.

2.259 In the judgement of NGW, these adverse impacts are likely to be severe and therefore the cumulative impact of both NGW and RC is considered unacceptable.

Agricultural Land

Introduction

2.260 Chapter 13 of the NGW ES (Document 5.2) provides an assessment of the likely effects of the Proposed Development on agricultural land.

2.261 This included consideration of the cumulative effects with other committed developments as agreed through the ES Scoping process. It also considered the potential for cumulative effects with Rail Central.

2.262 As referred to below, the conclusions reached in the submitted assessment of cumulative effects with Rail Central is unaffected by the final Rail Central accepted submission of November 2018.

Review of the Rail Central Application

2.263 Chapter 9 of the Rail Central ES provides an assessment of the agricultural land quality of the land affected. The assessment follows standard methodologies, making use of desk-based resources and field-based surveys.

2.264 The assessment confirms that the Rail Central site has similar soil characteristics to NGW and consists of mainly category 3b soil, with a proportion of 'best and most versatile' land in the higher quality categories 2 and 3a. The Rail Central ES concludes that if the proposed Rail Central SRFI were approved and constructed it would see the loss of approximately 274ha of agricultural land.

2.265 This loss, and the likely effects identified are assessed as not being likely to affect the viability of the farm businesses affected, or require changes in the day-to-day management of the farms. Such effects are appropriately assessed in the Rail Central ES as negligible.

2.266 The loss of farmland as a result of the Rail Central development would include in the region of 71 ha of the best and most versatile land across the order limits as a whole (including the main SRFI site and the Junction 15A highways works). That equates to around 27% of the agricultural land lost overall, with the remainder (around 73%) outside of the best and most versatile category. The RC ES considers that a **moderate adverse** effect.

Assessment of Cumulative effects with Rail Central

2.267 The Rail Central scheme would result in the loss of a larger area of agricultural land than the Northampton Gateway (NGW) proposal. As referred to above, the Rail Central proposals would result in the loss of approximately 274ha of agricultural land. This compares to 220ha at NGW. In addition to the loss of a larger area of agricultural land, the Rail Central site contains a larger proportion of 'best and most versatile' land in categories 2 and 3a than the NGW site. Both sites would result in moderate adverse effects alone.

2.268 Therefore, in addition to the NGW and the committed developments, if the Rail Central development were approved it would result in **a cumulative major adverse impact** on the agricultural land resource in the site specific and immediate local context. This is a reflection of the increased area lost, and an increase from the moderate adverse effect likely from NGW alone.

2.269 However, the agricultural land around Northampton as a whole is of relatively high quality with significant areas of grade 1 and 2 land. Based on detailed soil quality data and evidence in the public domain, work undertaken by Roxhill since publication of the ES (in response to the ExQ1.13.9) within an area of 10km of Northampton 50% of the agricultural land is in the best and most versatile category, with large swathes to the north and east of the urban area. Therefore, although including areas of high quality farmland, both the NGW site, and the RC site, represent relatively low quality land in that wider context.

2.270 In summary, it is considered that the land proposed for inclusion within these two SRFI developments is some of the lowest quality land in the wider Northampton area, and the land within both sites includes a relatively small proportion of land in the highest quality categories (1 and 2) in that context.

Waste

Introduction

2.271 The submitted Northampton Gateway ES included an assessment of the Waste effects (Document 5.2, Chapter 14), and included an assessment with committed developments, as well as any additional effects from the then emerging Rail Central SRFI proposal.

2.272 This was presented with reference to two scenarios, and for the purpose of this updated assessment of likely cumulative effects the same two scenarios have been considered:

- Scenario 1 - Cumulative impact assessing the Proposed Development with committed development (without Rail Central); and
- Scenario 2 - Cumulative impact with committed development and Rail Central.

2.273 Scenario 1 is assessed in the ES chapter and remains unchanged. However, following a review of the accepted Rail Central application (accepted in November 2018) this report updates Scenario 2 assessment.

Review of the Rail Central application

2.274 Chapter 20 of the RC ES ('Waste and Resource Efficiency', has been reviewed by NGW, and is considered generally appropriate for the development proposals. However, it is noted that NGW are predicting a higher operational phase waste arising than that predicted in the RC application for the Rail Central development.

2.275 NGW would argue that RC's use of an Industrial Unit metric from BS5906: 2005 without a separate assessment of the employees could possibly paint an overly optimistic assessment case, and this could be seen as not being robust.

Assessment of cumulative impacts with Rail Central ('Scenario 2')

2.276 Waste arising figures that relate directly to Rail Central have been sourced directly from Chapter 20 of the RC environmental statement and are not derived using the Northampton Gateway (NGW) methodology. These figures have been interpreted utilising the NGW methodology to allow this revised cumulative assessment to be completed. For completeness this methodology and scoring is detailed below:

- The type and quantity of waste (magnitude of waste impact) when compared to the current baseline, scored 1 to 5 (1 = less than 1% current baseline (<1%), 2 = Between 1 and 2% of current baseline (1 - 2%), 3 = Between 2 and 5% of current baseline (2 - 5%), 4 = Between 5 and 10% of current baseline (5 – 10%), 5 = Above 10% of

current baseline (>10%). The score is a subjective assessment based on our understanding of local conditions and infrastructure;

- The distance waste is transported for processing or disposal (the proximity principle), scored 1 to 3 where score 1 = immediately local disposal or very high locally available capacity, score 2 = regional disposal, and score 3 = distant and or limited capacity available; and
- The method of disposal with regard to the waste hierarchy (sustainability) considering mitigation and impact avoidance measures, scored 1 to 4, where score 1 = re-use, score 2 = recycle, score 3 = recovery (e.g. energy from waste), score 4 = disposal (e.g. landfill).

2.277 The multiplication of scores from the three categories provides an indication of the significance of each type of waste arising. Based on various waste arising and handling scenarios, a threshold scale of significance is subsequently used as a guide for assessment. The magnitude of impact is then calculated as per the Table 1 below:

Table 1 - Magnitude of Impact

Magnitude and Significance of Impact on Receptor			
1-9	**10-20**	**21-39**	**40-60**
Negligible Effect	**Minor Effect**	**Moderate Effect**	**Major Effect**
Description			
Large quantity & local disposal & recycling/ recovery/ landfill OR Small quantity & national disposal & landfill OR Medium quantity & regional disposal & recycling/ recovery		Large quantity & national disposal & recycling OR Medium quantity & regional disposal & landfill OR Quite small quantity & national disposal & landfill	Large quantity & regional disposal & landfill OR Medium - large quantity & national disposal & landfill

2.278 In terms of Scenario 1, as set out in Section 14.8 of Chapter 14 of the ES, it is reasonably assumed that the committed schemes will be required to follow the requirements of the local and national legislation and waste planning. Therefore, collectively, these developments are unlikely to significantly deplete the existing and planned waste capacity of Northamptonshire. Cumulative operational phase waste management effects are anticipated to be of minor significance.

2.279 In Scenario 2 if the Rail Central SRFI were also brought forward alongside Northampton Gateway and the SUEs the cumulative impact is assessed as follows:

Construction Phase

2.280 The construction waste arising estimations for RC as detailed in Chapter 20 of the Rail Central ES ('Waste and Resource Efficiency'), are presented in Table 2 below:

Table 2 - Rail Central Construction Waste Arisings

Construction Phase Waste	Waste Arising Amount
Site Clearance Waste	<100 m3
Contaminated Excavation Waste	<100m3
Contractor Waste	<100m3
Construction Waste	88,464 tonnes
Waste Oil and Empty Drums	<50m3
Miscellaneous Hazardous Waste	<50m3
Excess/Out of Specification Materials	<1,100m3
For robustness of this assessment the total RC waste arisings have been approximated based on the totals given in this table, and assuming a 1:1 ratio between $1m^3$ and 1 tonne.	90,000 tonnes

2.281 The RC total construction waste of 90,000 tonnes when combined with NGWs pre-recycling total of 82,670 result in potential waste arisings of 172,670 tonnes of waste arising over the developments construction lifetime. Adopting the NGW methodology and applying an 89% recycling rate to these amounts results in a waste arising of 18,993 tonnes. This comprises 1.4% of the Northampton Baseline waste arisings 1.35 million tonnes per annum. A score of 2 is given for this type and quantity of waste.

2.282 Large quantities of waste will be disposed of locally, however some will need to be disposed of regionally, resulting in a score of 2.

2.283 Due to a small portion of waste requiring disposal a score of 4 has been given to be robust.

2.284 Therefore, the construction phase residual cumulative impact score is 16 and is considered to comprise **a Minor Adverse cumulative impact**.

Operational Phase

2.285 The cumulative impact for the operational phase is influenced by the assessment that the RC site (as determined within Chapter 20 utilising their methodology) will result in commercial waste arisings of 3,380m3 of waste per week. While the same standard (BS BS5906:2005) has been used by both Rail Central and Northampton Gateway ES's the methods for calculating the total amounts of waste arising for each development during the operational phase differ and are therefore not directly comparable. This is demonstrated in Table 3 below:

Table 3 - RC and NGW Operational Waste Calculation Comparison

Development	METHODOLOGY	Waste Metric	Forecast Waste Arisings Per Week
Rail Central	Indicative Total Floor Area- 676,068m^2	Industrial Unit- 5 litres/m^2 Per Week	3,380,340 litres
TOTAL	3,380,340 litres/week		
Northampton Gateway	Indicative Total Floor Area- 624,858m^2	Office- 50 litres x number of employees (8,115 employees)	405,750 litres
		Industrial Unit- 5 litres/m^2 Per Week	3,124,290 litres
TOTAL	3,530,040 litres/week		

2.286 The RC methodology has not considered office uses within their employment derived waste calculations there is a risk the amounts specified in the RC application do not fully capture the likely operational waste amounts.

2.287 For the purposes of this assessment the figures provided in the RC Waste Chapter have been converted in line with the NGW methodology using a 1m3 to 1 tonne conversion factor when calculating tonnages of waste arisings.

2.288 Therefore it can be estimated that the RC operational waste arising of 3,380m3 is equivalent to 3,380 tonnes of waste. On this basis the site would generate an approximate annual arising of (3,382 x 52 weeks) 175,560 tonnes per annum.

The Northampton gateway site is predicted (prior to recycling) to generate in the region of 183,562 tonnes per annum.

2.289 When combined the two sites would produce a potential 359,122 tonnes per annum of commercial waste. In line with the criteria used throughout this assessment, the operational waste volume would be >10% of the current baseline arisings (score 5 for type and quantity of waste). Given that such wastes would be disposed of locally / regionally (score 2) and that some residual waste arising would be subject to landfilling (score 4 - although this is not representative of the whole waste stream), this indicates that prior to mitigation there would be a potential major cumulative impact (total score 40).

2.290 Assuming mitigation measures and recycling will be implemented at RC as well as all of the assessed committed developments, and as proposed at NGW, the cumulative impacts during the operational phase would be significantly reduced, so following mitigation measures **a Minor Adverse cumulative impact** is considered likely.

3.0 CUMULATIVE IMPACT ASSESSMENT - CONCLUSIONS

3.1 The preceding sections of this report provide an updated assessment of the likely cumulative impacts of Northampton Gateway with the proposed Rail Central SRFI based on the Rail Central application accepted for Examination. This assessment has been prepared in response to a specific request from the Examining Authority and is intended to help inform an Issue Specific Hearing session programmed for March 2019.

3.2 In seeking to undertake this assessment a number of constraints and issues have come to light. A key one is the absence of an up to date cumulative impact assessment as part of the Rail Central Transport Assessment and difficulties in relation to aspects of the Rail Central transport mitigation, which is not yet agreed with the highway authorities.

3.3 Subject to the above limitations, it is possible to draw a number of conclusions regarding the likely nature and scale of cumulative impacts.

3.4 With regard to a number of environmental topics there are likely to be limited or negligible cumulative impacts. These include with regard to **ground conditions, flood-risk and drainage, archaeology, and ecology/biodiversity**. This is in part due to the isolated nature of effects which don't result in interactions or cumulative effects, physical separation between the two sites, as well as use of a range of mitigation measures included or proposed as part of both proposals.

3.5 There is also the potential for some beneficial or positive cumulative effects – for example, with regard to **socio-economic** impacts, and reduced off-site (downstream) **flood-risk** to nearby communities.

3.6 However, this updated cumulative impact assessment suggests that with regard to a number of environmental topics and/or sensitive receptors the adverse cumulative impacts of Northampton Gateway and Rail Central could be potentially significant. In particular, adverse cumulative effects are considered likely in relation to landscape and visual effects, lighting and transport.

3.7 The likely cumulative **Landscape and Visual** effects are considered significant. The visual separation of the two proposed development sites, aided by the existing natural topography and characteristics, limits the extent to which the two schemes have an adverse effect on the same receptors. However, there are some shared receptors. The assessment shows that the adverse impacts in combination are not predominantly driven by the 'sum' of the combined effects and impacts of the two schemes, but more so by the individual landscape and visual effects of Rail Central as submitted.

3.8 The separation of the two sites is reinforced by the significant landscaping and bunding proposed as part of the Northampton Gateway scheme which contains and limits the extent of the visual effects on nearby receptors, including Milton Malsor and Blisworth. However, these receptors are likely to experience significant

adverse effects as a result of the Rail Central proposals alone and therefore the results of the assessment when considering the landscape and visual effects of the two schemes in combination shows significant adverse effects. In the case of Milton Malsor, this includes adverse effects on identified **heritage** receptors (the Conservation Area, and Mortimers listed building). The conclusion reached is that the cumulative landscape and visual effects would overall be unacceptable as a consequence of likely residual effects of the Rail Central proposals which are themselves considered significant and unacceptable.

3.9 To some extent the same is true for associated **lighting** effects where there are some shared receptors between the two schemes, and where the cumulative effects are more significantly adverse than those likely from Northampton Gateway. Again, the assessment of the likely cumulative effects is driven by the nature and characteristics of the Rail Central site in a more open and exposed location than the Northampton Gateway site, with more direct residual effects on a number of receptors as a result. Some of those likely effects from Rail Central would be significant, with combined visual lighting effects such as localised sky glow, and light presence effects for some receptors.

3.10 Cumulative **noise** effects would be greater on two shared receptors, albeit with the Rail Central proposals shown to have a greater impact on them than the Northampton Gateway proposals. Overall, the cumulative impact of both the NGW and RC SRFIs operating at the same time is likely to result in a greater number of adverse noise effects when compared to NGW operating on its own. Based on the results of the two assessments, and accepting the methodological differences highlighted, additional potential significant adverse effects could occur as a result of night-time railway noise arising from the additional freight train movements from RC in addition to NGW.

3.11 With regards to **Transport**, the conclusion reached is that there would be significant adverse cumulative effects as a consequence of the sub-optimal highways mitigation and infrastructure package proposed as part of the Rail Central scheme. Northampton Gateway includes a package of highways mitigation works, including substantial M1 Junction 15 improvements and a Roade Bypass, agreed with the highway authorities, which would result in an overall major beneficial effect for road users. However, the highway mitigation for the Rail Central scheme has not yet been agreed and so is uncertain. Following a review of the RC application, NGW consider that it proposes inadequate mitigation and improvement at Junction 15A of the M1, and the submitted TA appears to under-estimate the likely extent of local traffic queuing and congestion.

3.12 Therefore, in combination, the two schemes fail to deliver suitable transport mitigation or improvements, and would be likely to result in unacceptable cumulative effects. But the conclusion is that RC is unacceptable alone in transport terms, and it is its impacts which results in the unacceptable cumulative effect in terms of congestion and traffic impacts.

3.13 Uncertainty about the final RC transport impacts makes it hard to reach a definitive view on the cumulative **air quality** impacts. If there are significant changes to congestion and queuing as a result of the RC proposals there could be additional implications for AQMAs in Northampton.

3.14 In summary, the assessment undertaken has found that the Rail Central scheme as currently proposed, would on its own result in unacceptable environmental impacts, most notably in relation to transport and landscape and visual effects (including lighting). It is then these impacts that result in the findings that the cumulative effects of the two schemes would be unacceptable.

3.15 Therefore, when Northampton Gateway is assessed with the Rail Central scheme as it currently stands, the cumulative effects are judged to be unacceptable.

Appendix 1A

Rail Central Green Infrastructure Parameter Plan

N

RC ALG-PLN-2.13.4

RC ALG-PLN-2.13.1

RC ALG-PLN-2.13.2

RC ALG-PLN-2.13.3

ZONE 1
Max Plateau Level 77.540m

ZONE 1a

ZONE 2
Max Plateau Level 80.30m

ZONE 3A
Max Plateau Level 82.000m

ZONE 3B
Max Plateau Level 82.000m

ZONE 4
Max Plateau Level 83.900m

ZONE 5a
Max Plateau Level 88.550m

ZONE 5b
Max Plateau Level 88.700m

ZONE 6a
Intermodal Plateau
91.30m

Maintenance Depot 92.50m
ZONE 6

Grand Union Canal

Grange Park

0 100 200 400 600 800m

LEGEND

- Existing Vegetation (Retained where within the order limits)
- Primary Green Infrastructure (Including woodland and hedgerow planting)
- Retained Farmland (within red line)
- Proposed Screening Mound (Including woodland and hedgerow planting)
- Proposed Attenuation Feature (Capacity and design as required by the Environmental Statement)
- Proposed Milton Brook Diversion
- Existing Milton Brook Profile Retained
- Proposed Combined Cycleway / Public Footpath
- Proposed Public Footpath
- Building Line Limit
- Development Plateau
- Intermodal Area
- Approximate area to be Developed as Linear Country Park and Pocket Park
- Improvements to Existing Road Infrastructure
- Indicative New Road Infrastructure
- Estate Road Zone
- Line of Underground Oil Pipeline and 10m Easement Zone
- Minimum Bund Height (AOD) (+98m)
- Site Boundary

REV	DATE	DETAILS OF ISSUE/REVISION	DRW
I	24/10/18	Minor amendments to red line	CS
H	30/08/18	Minor amendments following final review	CS
G	07/08/18	Drawing number amended	CS
F	13/06/18	Amendments following consultation	CS
E	05/03/18	Client Name Amended	CS
D	21/02/18	Minor Amendments	CS
C	05/02/18	Retained farmland defined	CS
B	31/01/18	Minor amendments to footpaths layout	CS
A	02/08/17	Minor amendments to text in key	CS

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ASHFIELD LAND

Rail Central
Northamptonshire

THE RAIL CENTRAL RAIL FREIGHT INTERCHANGE AND HIGHWAY ORDER 201[X]

DRAWING TITLE

Parameter Plan - Green Infrastructure Keyplan

SCALE	1:10000	DRAWN	CS
PAGE SIZE	A1	REVIEWED	BC

REGULATION: 5 (2) (o)

DOCUMENT: 2.13

DRAWING STATUS: Planning

DRAWING No: RC ALG-PLN-2.13.0

REVISION: I

Appendix 1B

Rail Central Illustrative Masterplan

LEGEND

- Existing Vegetation (Retained where within the Order Limits)
- Proposed Blocks of Native Tree and Shrub Planting
- Proposed Scrub Areas
- Proposed Formal Planting
- Highway Planting to be Retained or Re-instated
- Proposed Hedgerow
- Proposed Grass and Wildflower Areas
- Retained Farmland (Within Red Line)
- Existing Footpath
- Existing Footpath (Removed)
- Proposed Footpath
- Proposed Cycleway / Footpath
- Proposed Screening Mound
- Proposed Water Body
- Existing Retained Water Body
- Order Limits
- Oversized Culvert Habitat link
- Proposed Acoustic Barrier

REV	DATE	DETAILS OF ISSUE/REVISION	DRW
O	24/10/18	Minor Amendments to Red Line	CS
N	06/09/18	Footpath routes confirmed	CS
M	30/08/18	Minor amendments following final review	CS
L	07/08/18	Drawing Number Amended	CS
K	31/07/18	Additional Section added, section lines re-numbered	CS
J	19/06/18	Further amendments following consultation feed back	CS
I	05/03/18	Client name amended	CS
H	21/02/18	Minor amendments	CS
G	06/02/18	Drawing block added	CS
F	02/02/18	Minor amendments to footpath layout and redline	CS
E	29/06/17	General amendments to layout, drawing block added	CS
D	07/04/17	Further minor amendments to layout	CS
C	24/03/17	Amended rail layout and updated plot levels	CS
B	06/03/17	Minor amendment to redline and diverted footpath route	CS
A	02/03/17	Amended rail layout and maintenance depot	CS

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Rail Central
Northamptonshire

THE RAIL CENTRAL RAIL FREIGHT INTERCHANGE AND HIGHWAY ORDER 201[X]

DRAWING TITLE

ILLUSTRATIVE LANDSCAPE MASTERPLAN KEYPLAN

SCALE	1:10000	DRAWN	CS
PAGE SIZE	A1	REVIEWED	BC

REGULATION	DOCUMENT
5 (2) (o)	2.16

DRAWING STATUS
PLANNING

DRAWING No	REVISION
RC-ALG-PLN-2.16.0	O

Appendix 2

Cumulative Landscape Effects Table

and

Cumulative Visual Effects Table

Northampton Gateway SRFI

Cumulative Landscape Effects Table (CLET)

Northampton Gateway (NGW) **Level of Landscape Effect as per ES Appendix 4.4**				**Rail Central (RC)** **Level of Landscape Effect of the RC SRFI proposed development as assessed by FPCR** (based upon the RC Proposed Development as per the Examination Submission)			**'Combined' Cumulative Landscape Effect** (**bold** identifying where the RC Proposed Development results in greater impacts than NGW alone)		
NGW Receptor	**Level of Effect (Construction)**	**Level of Effect (yr 0)**	**Level of Effect (yr 15)**	**Level of Effect (Construction)**	**Level of Effect (yr 0)**	**Level of Effect (yr 15)**	**'Combined' Effect (Construction)**	**'Combined' Effect (yr 0/1)**	**'Combined' Effect (yr 15)**
Landscape Character: National									
Northamptonshire Vales (NCA 89)	Minor Adverse	Minor Adverse	Minor Adverse/ Negligible	Minor Adverse	Minor Adverse	Minor Adverse	Minor Adverse	Minor Adverse	Minor Adverse
Landscape Character: Regional **The East Midlands Regional Landscape Character Assessment**									
Undulating Mixed Farmlands (LCT 5c)	Minor Adverse	Minor Adverse	Minor Adverse/ Negligible	Minor Adverse	Minor Adverse	Minor Adverse	Minor Adverse	Minor Adverse	**Minor Adverse**
Landscape Character: County **The Current Landscape Character Assessment for Northamptonshire**									
The Tove Catchment (LCA 6a)	Minor/ Moderate Adverse	Minor/ Moderate Adverse	Minor Adverse	Minor Adverse	Minor Adverse	Minor Adverse	Minor/ Moderate Adverse	Minor/ Moderate Adverse	**Minor/ Moderate Adverse**
Bugbrooke and Daventry (LCA 13b)	Minor Adverse	Minor Adverse	Minor Adverse/ Negligible	Minor/ Moderate Adverse	Minor/ Moderate Adverse	Minor/ Moderate Adverse	Minor/ Moderate Adverse	**Minor/ Moderate Adverse**	**Minor/ Moderate Adverse**
Landscape Character: **Local / Site Context**									
NGW Site and Immediate Landscape Context – SRFI Site ('Main Site')	Major Adverse	Moderate/ Major Adverse	Moderate Adverse	Moderate Adverse	Moderate Adverse	Minor/ Moderate Adverse	Major Adverse	Moderate/ Major Adverse	Moderate Adverse
Rail Central (RC) Site and Immediate Landscape Context – SRFI Site ('Main Site')	Moderate Adverse	Minor/ Moderate Adverse	Minor Adverse	Major Adverse	Major Adverse	Moderate/ Major Adverse	**Major Adverse**	**Major Adverse**	**Moderate/ Major Adverse**

Northampton Gateway SRFI

Cumulative Visual Effects Table (CVET)

Northampton Gateway (NGW) **Level of Visual Effect as per ES Appendix 4.5**				**Rail Central (RC)** **Level of Visual Effect of the RC SRFI proposed development as assessed by FPCR (based upon the RC Proposed Development as per the Examination Submission)**				**'Combined' Cumulative Visual Effect** (**bold** identifying where the RC Proposed Development results in a greater impacts than NGW alone)	
NGW Receptor Location	**NGW Ref**	**Level of Effect (yr 0)**	**Level of Effect (yr 15)**	**RC Equivalent Receptor Location**	**RC Ref**	**Level of Effect (yr 1)**	**Level of Effect (yr 15)**	**'Combined' Effect (yr 0/1)**	**'Combined' Effect (yr 15)**
Settlement and Residential Receptors									
Properties and locations at Milton Malsor	**P1**	Moderate Adverse	Minor/ Moderate Adverse	Properties on Barn Lane, Rectory Lane and Collingtree Rd, Milton Malsor	**R8a, R8b, R9, R10**	Up to Major Adverse	Up to Moderate / Major Adverse	**Up to Major Adverse**	**Up to Moderate Adverse**
Maple House and property south of road close to rail bridge	**P2**	Moderate Adverse	Minor/ Moderate Adverse	63 Collingtree Rd and Maple House	**R11a, R11b**	Minor Adverse and Moderate Adverse	Minor Adverse and Moderate Adverse	Moderate Adverse	Minor/ Moderate Adverse
Properties and locations at Collingtree	**P4**	Minor/ Moderate Adverse	Minor Adverse	Collingtree and Grange Park	**R15**	Minor Adverse	Minor Adverse	Minor/ Moderate Adverse	Minor Adverse
West Lodge Cottages	**P5**	Moderate Adverse	Minor/ Moderate Adverse	Courteenhall West Lodge & West Lodge Cottages	**R17b**	Minor/ Moderate Adverse	Minor/ Moderate Adverse	Moderate Adverse	Minor/ Moderate Adverse
Courteenhall West Lodge/ Farm	**P6**	Moderate/Major Adverse	Minor/ Moderate Adverse	Courteenhall West Lodge & West Lodge Cottages	**R17b**	Moderate Adverse	Minor/ Moderate Adverse	Moderate/Major Adverse	**Moderate Adverse**
Courteenhall House and associated dwellings / outbuildings (Grade II* listed)	**P7**	Minor Adverse/ Negligible	Minor Adverse/ Negligible	Courteenhall	**R16**	Negligible	Negligible	Minor Adverse/ Negligible	Minor Adverse/ Negligible
Properties and locations at Courteenhall	**P8**	Negligible/ None	Negligible/ None	Courteenhall	**R16**	Negligible/ None	Negligible/ None	Negligible/ None	Negligible/ None
Blisworth Lodge	**P9**	Minor/ Moderate Adverse	Minor Adverse	Blisworth Lodge	**R19**	Major Adverse	Major Adverse	**Major Adverse**	**Major Adverse**
Properties and locations on north eastern edge of Blisworth	**P10**	Minor/ Moderate Adverse	Minor Adverse	64-82 Courteenhall Road, Blisworth	**R18**	Major Adverse	Major Adverse	**Major Adverse**	**Major Adverse**
Properties on Northampton Rd	**P11**	Minor Adverse	Minor Adverse/ Negligible	Includes Railway Cottages and Willow Lodge	**R1- R2**	Major Adverse	Major Adverse	**Major Adverse**	**Major Adverse**
Hill Farm, Gayton Road	**P12**	Minor Adverse	Minor Adverse/ Negligible	Hill Farm, Gayton Road	**R5**	Moderate/ Major	Moderate/ Major	**Moderate/ Major Adverse**	**Moderate/ Major**

						Adverse	Adverse		**Adverse**
Properties and locations at Grange Park	**P13**	Minor Adverse	Minor Adverse/ Negligible	Collingtree and Grange Park	**R15**	Minor Adverse/ Negligible	Negligible	Minor Adverse	Minor Adverse/ Negligible
Properties and locations at Spyglass Hill, Merefield and Blacky More	**P14**	Minor Adverse	Minor Adverse/ Negligible	Northampton	**R13/ R14**	Minor Adverse	Minor Adverse/ Negligible	Minor Adverse	Minor Adverse/ Negligible
Properties and locations at Wootton	**P15**	Minor Adverse	Minor Adverse/ Negligible	Northampton	**R13/ R14**	Minor Adverse	Minor Adverse/ Negligible	Minor Adverse	Minor Adverse/ Negligible
Public Rights of Way (PROW)									
Public Footpath	**F1**	Moderate/ Major Adverse	Moderate Adverse	Public Footpath	**KX13**	Major Adverse	Major Adverse	**Major Adverse**	**Major Adverse**
Public Footpath	**F4**	Moderate Adverse	Minor/ Moderate Adverse	Public Footpath	**KX13**	Major Adverse	Major Adverse	**Major Adverse**	**Major Adverse**
Public Footpath	**F5**	Moderate Adverse	Minor/ Moderate Adverse	Public Footpath	**RD22**	Major Adverse	Major Adverse	**Major Adverse**	**Major Adverse**
Public Footpath	**F6**	Minor/ Moderate Adverse	Minor Adverse	Public Footpath	**RD3**	Major Adverse	Major Adverse	**Major Adverse**	**Major Adverse**
Public Footpath	**F7**	Minor/ Moderate Adverse	Minor Adverse	Public Footpath	**KZ14**	Major Adverse	Major Adverse	**Major Adverse**	**Major Adverse**
Public Bridleway	**F8**	Minor/ Moderate Adverse	Minor Adverse	Public Bridleway	**RD6**	Major Adverse	Major Adverse	**Major Adverse**	**Major Adverse**
Public Footpath forming part of the Grand Union Canal Walk	**F9**	Minor Adverse	Negligible/ Minor Adverse	Public Footpath forming part of the Grand Union Canal Walk	**GUCW**	Moderate/ Major Adverse	Minor/ Moderate Adverse	**Moderate/ Major Adverse**	**Minor/ Moderate Adverse**
Public Footpath	**F10**	Minor Adverse	Negligible/ Minor Adverse	Public Footpath	**RD12**	Major Adverse	Moderate Adverse	**Major Adverse**	**Moderate Adverse**
Public Footpath forming part of the Midshires Way	**F11**	Minor Adverse	Negligible/ Minor Adverse	Public Footpath forming part of the Midshires Way	**MSW**	Moderate Adverse	Moderate Adverse	**Moderate Adverse**	**Moderate Adverse**
Public Footpath	**F12**	Minor/ Moderate Adverse	Minor Adverse	Public Footpath	**KX10**	Moderate Adverse	Moderate Adverse	**Moderate Adverse**	**Moderate Adverse**
Roads									
Courteenhall Road	**R6**	Minor Adverse	Negligible/ Minor Adverse	Courteenhall Road	**CRd**	Moderate Adverse	Moderate Adverse	**Moderate Adverse**	**Moderate Adverse**
Gayton Road, Blisworth	**R7**	Negligible/ Minor Adverse	Negligible	Gayton Road, Blisworth	**GRd1 GRd2**	Minor/ Moderate Adverse	Minor Adverse	**Minor/ Moderate Adverse**	**Minor Adverse**

A43	**R8**	Negligible/ Minor Adverse	Negligible	A43	**Not identified as a visual receptor by RC**	Moderate Adverse (No assessment by RC)	Minor/ Moderate Adverse (No assessment by RC)	**Moderate Adverse**	**Minor/ Moderate Adverse**
Northampton/ Towcester Rd		Minor Adverse	Negligible/ Minor Adverse	Northampton/ Towcester Rd	**TRd**	Major Adverse	Moderate Adverse	**Major Adverse**	**Moderate Adverse**
Other Visual Receptors									
Northampton Loop Railway Line (NLRL)	**O1**	Minor/ Moderate Adverse	Minor Adverse	Northampton Loop Railway Line (NLRL)	**Not identified as a visual receptor by RC**	Moderate Adverse (No assessment by RC)	Moderate Adverse (No assessment by RC)	**Moderate Adverse**	**Moderate Adverse**
West Coast Mainline Railway (WCMLR)	**O2**	Minor Adverse	Negligible/ Minor Adverse	West Coast Mainline Railway (WCMLR)	**Not identified as a visual receptor by RC**	Moderate Adverse (No assessment by RC)	Minor/ Moderate Adverse (No assessment by RC)	**Moderate Adverse**	**Minor/ Moderate Adverse**

Appendix 3

Technical Note 13:

Updated Cumulative Impact Assessment:
Northampton Gateway with Rail Central Strategic Rail Freight Interchange

M1J15 NORTHAMPTON GATEWAY
STRATEGIC RAIL FREIGHT INTERCHANGE

TECHNICAL NOTE 13: UPDATED CUMULATIVE IMPACT ASSESSMENT WITH RAIL CENTRAL STRATEGIC RAIL FREIGHT INTERCHANGE

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CONTENTS

APPENDICES

1.0 INTRODUCTION

1.1 ADC Infrastructure Ltd is commissioned by Roxhill (Junction 15) Ltd to provide transport advice with regards to their Nationally Significant Infrastructure Project (NSIP) for the development of a Strategic Rail Freight Interchange (SRFI) facility adjacent to M1 Junction 15 in Northamptonshire (known as Northampton Gateway SRFI).

1.2 A development consent order (DCO) application was accepted for Examination for the proposed development. Transport is considered at Chapter 12 of the environmental statement (ES) and the Transport Assessment (TA) is provided at Appendix 12.1 of the ES.

1.3 The impacts of the proposed development have been assessed using the Northampton Strategic Transport Model (NSTM2) which includes all committed development and allocated sites within the Northamptonshire area. The model also includes the committed infrastructure schemes and those highly likely to come forward before the forecast assessment years. The cumulative impacts of the Northampton Gateway development in combination with other defined land uses and infrastructure schemes has therefore been assessed as part of the overall transport modelling work undertaken.

1.4 In addition, there is a proposed NSIP project on an adjacent site known as 'Rail Central'. Although not a committed development, an assessment of the potential cumulative effects of that emerging proposal in addition to the Northampton Gateway SRFI proposed development was also undertaken.

1.5 In terms of transportation (excluding rail), the cumulative impact assessment (CIA) work was presented in the Northampton Gateway DCO submission (ES paragraphs 12.8.2 to 12.8.28 and ES Appendix 12.2). It was prepared using the Rail Central information that was publicly available at the time of that assessment. The assessment comprised the following elements:

- Strategic modelling using NSTM2 (J3 scenario), which included both the Northampton Gateway and Rail Central schemes and associated highway mitigation proposals at that time.
- VISSIM micro-simulation modelling of M1J15 and MJ15A using traffic flow data from the NSTM2 J3 scenario.
- Further detailed junction modelling of all junctions within the Northampton Gateway study area, again using traffic flow data from the NSTM2 J3 scenario.
- Assessment of the cumulative impact of disruption due to construction.
- Assessment of the cumulative impact of the respective Public Transport Strategies and impacts on Public Rights of Way.
- Assessment of how changes to the Rail Central highway mitigation that were released as part of the Rail Central Stage 2 Consultation (after the completion of the NSTM2 J3 scenario strategic modelling) could affect the conclusions of the CIA.

1.6 There have been no changes to the Northampton Gateway highway mitigation strategy since the CIA was undertaken. However, the Rail Central highway mitigation strategy has been further amended since the proposals released at the Rail Central Stage 2 Statutory Consultation.

1.7 Therefore, the Examining Authority at Ex Q1.9.1 have requested that an updated CIA taking account of any further information in relation to Rail Central is provided. The updated CIA is required by Deadline 4 of the Northampton Gateway DCO Examination, which is 8 January 2019.

1.8 Due consideration was given to the timescales involved in updating the Northampton Gateway CIA assessment, as described above. However, there was not sufficient time before the 8 January 2019 deadline to update the strategic NSTM2 and VISSIM micro-simulation modelling.

1.9 Nonetheless, there was sufficient information available to undertake an updated CIA which builds on the work already undertaken. Such an updated CIA would use detailed junction modelling to provide quantitative assessment of the performance of key highway network locations. The results of this modelling, and the review of the Rail Central DCO submission, would then allow qualitative conclusions to be made on the cumulative effects.

1.10 Therefore, in response to Ex Q1.9.1, the strategy for undertaking an updated CIA with respect to transportation, is as follows:

- Undertake a review of the Rail Central transport mitigation strategy and highway mitigation proposals.
- Based on an understanding of the Rail Central proposals and assessments submitted to date, comment on any interaction between the respective Northampton Gateway and Rail Central highway mitigation strategies and identify where they may be incompatible.
- Undertake detailed junction modelling at the identified locations to provide quantitative data to inform a qualitative assessment of the likely residual impacts.
- Provide a updated CIA report, explaining the significance of the cumulative effects and how the significance has been determined.

1.11 At a Transport Working Group meeting on 7 December 2018, Northamptonshire County Council (NCC) and Highways England agreed that the above proposed approach to updating the CIA was sensible and appropriate, given that there is not sufficient time to undertake further strategic or micro-simulation modelling, and also in light of the outcome of the initial assessment of the Rail Central proposals. Correspondence confirming this agreement is provided at **Appendix A**.

1.12 Further, a meeting was also held with transports consultants from Vectos, acting on behalf of Rail Central, on 12 December 2018. Whilst Vectos have not directly undertaken the Transport Assessment for Rail Central, they have been appointed by Rail Central to provided transport advice throughout the Rail Central DCO Examination. The meeting was arranged so that any additional information pertinent to the CIA could be shared. However, whilst some clarification was provided on certain issues, no additional information relevant to the updated CIA was provided by Rail Central. Vectos also confirmed that Rail Central were undertaking a revised CIA assessment using the NSTM2, but the timescales for the completion of that work were unknown.

2.0 ORIGINAL CUMULATIVE IMPACT ASSESSMENT

Introduction

2.1 The methodology and results of the CIA submitted with the Northampton Gateway DCO application are discussed at Technical Note 12 (ADC1475 TN12, provided at ES Appendix 12.2). That CIA consisted of strategic modelling (NSTM2 scenario J3) to assess the cumulative impact of both the Northampton Gateway and Rail Central developments on the highway network, with detailed modelling to consider how key study area junctions would perform with both developments in place.

2.2 As discussed at paragraphs 1.5 to 1.8 of Technical Note 12 (ES Appenidx 12.2), the CIA was progressed based on the most up to date information for the Rail Central scheme available at the time of the assessment, which was that contained within their 'Transport and Access' 24 May 2017 Local Liaison Group Meeting presentation (Appendix A of Technical Note 12 at ES Appendix 12.2).

2.3 The following Rail Central highway mitigation proposals were included in the CIA:

- The proposed Rail Central grade-separated site access junction onto the A43, as per the Rail Central presentation of 24 May 2017;
- The proposed Rail Central improvement scheme at M1J15A, as per the Rail Central presentation of 24 May 2017. This was instead of the proposed Northampton Gateway SRFI improvement at this junction;
- The proposed Rail Central improvement scheme at A43/Tove roundabout, as per the Rail Central presentation of 24 May 2017.

2.4 The Rail Central proposals at the A45 Queen Eleanor Interchange, as per the Rail Central presentation of 24 May 2017, were excluded from the CIA as NCC are known to be preparing their own scheme at this location.

Rail Central Stage 2 Statutory Consultation

2.5 After completing of the CIA strategic and detailed modelling, Rail Central undertook their Stage 2 Statutory Consultation between 15 of March 2018 and 23 April 2018. As part of that consultation, further information was released into the public domain regarding their proposed scheme, which included changes to their emerging highway mitigation proposals. The Stage 2 Consultation proposals included a significantly reduced scheme at M1J15A and 12 other mitigation schemes at off-site junctions, from a study area of 38 junctions.

2.6 The Rail Central Stage 2 Statutory Consultation proposals no longer promoted a scheme at the A45 Queen Eleanor Interchange and the scheme at M1J15 was significantly reduced in scale. However, the proposals did include schemes at the three A45 junctions north of the Queen Eleanor interchange, along with three schemes along the A5076 Ring Road and two schemes on the A43 at Towcester.

2.7 At the time of their Stage 2 Statutory Consultation, Rail Central had not completed the strategic and detailed modelling required to demonstrate the suitability of the proposals. Therefore, the possibility remained that their highway mitigation strategy would change again before a DCO application was made. Their timescale to complete this further modelling work was unknown.

2.8 For this reason, it was not appropriate to update the NSTM2, VISSIM micro-simulation, or detailed junction modelling CIA work to incorporate the changes to the emerging Rail Central proposals. However, where relevant, the potential implications on the conclusions of the CIA, of the emerging highway mitigation from Stage 2 Statutory Consultation, were factored into the Northampton Gateway CIA.

CIA results – strategic modelling

2.9 The strategic modelling results of the CIA are presented in Section 3 of Technical Note 12 (ES Appendix 12.2).

2.10 The CIA (Figures 1 and 2 of Technical Note 12 at ES Appendix 12.2) shows a significant increase in traffic on the A508 corridor. As discussed in the Northampton Gateway SRFI TA (ES Appendix 12.1), this is largely due to the proposed A508 Roade Bypass and the improvement works at M1 Junction 15 releasing existing bottlenecks and drawing traffic, which would have previously used alternate routes to the A508, back onto the A508.

2.11 The CIA NSTM2 (J3 scenario) outputs (Figures 1 and 2 of Technical Note 12 at ES Appendix 12.2) also showed significant traffic increases on the A43 and A5 corridors, largely due to the Rail Central development, which would take access from the A43. The Northampton Gateway study area does not extend to include the A43 and A5 corridors.

2.12 The CIA demonstrated that there would be little interaction between the A508 and A43 corridors south of the M1.

2.13 To the north of the M1, the TA for the Northampton Gateway SRFI (ES Appendix 12.1) shows that traffic increases on the A5076 corridor are relatively modest when compared to the 2031 (D1) reference case. However, there is some reassignment of background traffic onto the A5076 Ring Road corridor. The CIA showed that when compared to the assessment with just the Northampton Gateway SRFI, the cumulative effect of the combined developments would be to significantly increase traffic flows along the A5123, A5076, and Swan Valley Way corridors. It was concluded that this was predominantly due to the additional Rail Central traffic.

2.14 Therefore, due to interactions between traffic generated by both SRFI developments and reassigning background traffic, the CIA indicated that traffic increases on these routes would be more significant, especially along the A5076 Ring Road.

CIA results – detailed modelling

2.15 The CIA detailed modelling results showed that there would be impacts at the A45 Barnes Meadow Interchange, the A45 Lumbertubs Interchange and the A4500/A5076 gyratory. The Northampton Gateway TA (ES Appendix 12.1) showed that there are no impacts at these junctions in the Northampton Gateway only scenario. For the Stage 2 Statutory Consultation, Rail Central proposed mitigation schemes at these junctions and it was considered that these schemes could potentially mitigate the cumulative impact at the junctions. It is noted that mitigation schemes at these locations are no longer part of the Rail Central highway mitigation strategy.

2.16 The CIA detailed modelling results also showed that there would be impacts at the A5076 Danes Camp Way/Towcester Road/Tesco gyratory and at the A5123/A5076 gyratory. Highway improvement schemes are promoted at both of these junctions to mitigate the impact of the Northampton Gateway SRFI, as detailed in the Northampton Gateway TA (ES Appendix 12.1). It has been agreed with NCC that a financial contribution to improving the A5076 corridor, including the A45 Queen Eleanor Interchange, should be made, equivalent to the cost of implementing the identified Northampton Gateway mitigation schemes. Technical Note 12 (ES Appendix 12.2) concluded that the scale of the identified Northampton Gateway schemes would be unlikely to mitigate the cumulative impact of the two SRFI developments.

2.17 The draft Rail Central TA issued for the Rail Central Stage 2 Statutory Consultation promoted larger mitigation schemes at these locations that are required for the Northampton Gateway scheme, due to Rail Central having a greater traffic impact than Northampton

Gateway at these junctions. The CIA concluded that the identified Rail Central schemes could potentially mitigate the cumulative impact at these junctions. However, Rail Central have amended these schemes since the Rail Central Stage 2 Statutory Consultation and therefore, the suitability of the revised schemes to mitigate the cumulative impact of both developments must be reconsidered. This is considered at Section 3 of this Technical Note.

2.18 VISSIM micro-simulation modelling of M1 Junction 15 and 15A was also undertaken for the CIA using the NSTM2 J3 traffic flow scenario. The VISSIM model included the Northampton Gateway SRFI improvement at M1J15 and the Rail Central improvement scheme at M1J15A, as per the Rail Central presentation of 24 May 2017. The VISSIM results showed that overall network performance is improved with both developments and associated mitigation schemes in place when compared to the Reference Case. Nonetheless, the VISSIM modelling showed that there would be some impacts in terms of queueing in the CIA scenario, not present in the Northampton Gateway only modelling, detailed as follows:

- In the morning peak hour the maximum queue length on the M1 northbound diverge at M1J15 was forecast to exceed the storage capacity on the slip road and could potentially impact on the M1 mainline. This is not present in the Reference Case.
- In the morning peak hour the average queue on the M1 southbound diverge at M1J15 would reach back beyond the end of the slip road where it would impact on the M1 mainline flow. This occurs to a greater extent in the Reference Case and so would still represent an improvement.
- Although still an improvement on the Reference Case scenario, the queue lengths on the M1 northbound diverge at M1J15A would extend back to the M1 mainline before the end of the CIA evening peak hour.
- On the A43 approach to M1J15A the average and maximum queue lengths in the evening peak hour on the A43 are shown to increase significantly in the cumulative impact assessment scenario.

2.19 A revised M1J15A improvement scheme to that included in the cumulative impact VISSIM modelling was presented by Rail Central as part of their Stage 2 Statutory Consultation. This revised mitigation scheme reduced the scale of the mitigation proposals at M1J15A. However, based on the assessment work undertaken at that time, the CIA concluded that the revised layout for M1J15A would not materially change the conclusions drawn from the VISSIM modelling, as the alterations to the scheme did not substantially change the proposals for the M1 slip roads.

2.20 Since that time, Rail Central have revised their highway mitigation strategy which now actively encourages drivers to use the A43 corridor, including M1J15A. More detailed assessment of the forecast operation of the revised Rail Central layout for M1J15A is now also available as part of the Rail Central TA. The implications of this are discussed at Section 3 of this Technical Note.

3.0 RAIL CENTRAL HIGHWAY MITIGATION STRATEGY

3.1 So that an understanding of the likely cumulative effect of the final Rail Central highway mitigation strategy submitted for Examination and the Northampton Gateway mitigation strategy can be made, a review of the Rail Central highway mitigation strategy presented in the TA submitted for Examination has been undertaken. This review focuses on the 2031 assessment year, as the CIA is not required for the 2021 DfT 02/2013 Circular scenario.

3.2 The highway mitigation proposals associated with the Northampton Gateway SRFI have not changed since the original CIA and are as described in the Northampton Gateway TA (ES Appendix 12.1).

Evolution of the Rail Central highway mitigation strategy

3.3 The Rail Central DCO was accepted for Examination on 15 November 2018. The application is supported by an ES, with transport considered at Chapter 17. The TA, provided at ES Appendix 17.1, shows that the overarching strategy for the mitigation of the highway impacts of the Rail Central SRFI development has changed since the draft Rail Central TA was put forward at the Stage 2 Statutory Consultation.

3.4 The previous approach detailed in the Stage 2 Statutory Consultation draft TA for Rail Central was concerned with quantifying impacts at junctions across a wide study area and identifying where mitigation was required. This resulted in a study area for detailed assessment of 38 junctions, and proposals to mitigate impacts via physical highway works at 13 junctions.

3.5 However, the Rail Central TA submitted with the DCO application states at paragraph 8.18 that "*the DS3* [with Stage 2 Consultation highway mitigation] *modelling showed an increase in traffic flow using the Ring Road and A45 corridors. This is as a result of the additional capacity provided at junctions along those routes attracting traffic towards them*". Paragraph 8.19 of the Rail Central TA states that it was subsequently agreed with Highways England and NCC that the A45 improvements should be removed so that traffic would not be attracted to this route and would instead use the A43 where the highway improvement strategy should be focused.

3.6 Therefore, the highway mitigation strategy has switched from systematically identifying impacts and proposing appropriate mitigation, to instead promoting the principle that the proposed highway improvements at M1J15A and the western half of the Ring Road would have the positive effect of attracting traffic away from the A45 corridor, and onto the A43 corridor.

3.7 To achieve the mitigation strategy, the highway improvement schemes previously proposed at M1J15 and four A45 junctions have been removed from the proposals and Rail Central are now promoting capacity improvement schemes at the following eight junctions:

- M1 Junction 15A (classified as a Nationally Significant Infrastructure Project)
- A5076/A5123/Upton Way Roundabout
- A5076/Hunsbury Hunsbury Hill Avenue/Hunsbarrow Road/Hunsbury Hill Road Roundabout
- A5076/Towcester Road/Tesco Roundabout
- A43 Tove Roundabout
- A43 Abthorpe Roundabout
- A5076/Telford Way/Walter Tull Way/Duston Mill Lane Roundabout
- A5076/High Street/Duston Mill Roundabout.

High level review of the Rail Central NSTM model outputs

3.8 It is explained in the Rail Central TA submitted with their DCO application that the NSTM model scenarios DS3 (with Stage 2 Consultation highway mitigation) and DS4 (reduced highway mitigation from that included in Stage 2 Consultation) were used to justify this strategy. However, the results of these scenarios are not presented anywhere within the Rail Central TA or its appendices.

3.9 The submitted Rail Central highway mitigation strategy is modelled as scenario DS6, and extracts of 2031 flow difference plots (Figures 44 and 56 in Systra's Strategic Modelling Assessment report (Appendix R of the Rail Central TA)) are provided below at **Figures 1 and 2.** The flow difference plots show the change in traffic flow between the 2031 'do minimum' scenario (2031 traffic with no Rail Central development) and the 2031 DS6 scenario (2031 with Rail Central and all associated Rail Central highway mitigation). Red lines represent an increase in the flow, whilst blue lines represent a reduction in flow. The thickness of the line indicates the scale of the change, the thicker the line, the greater the change.

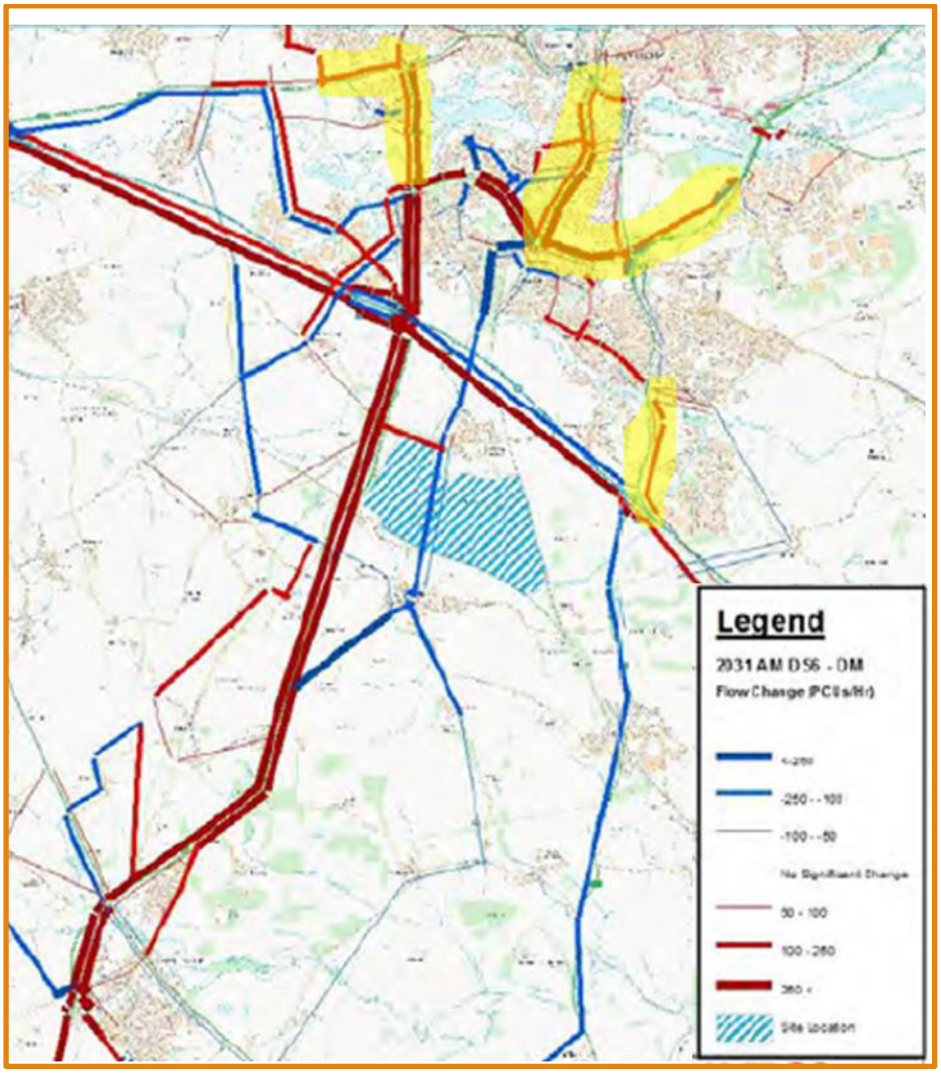

Figure 1: extract of Rail Central 2031 DS6 – DM AM peak flow difference plot

3.10 **Figure 1** shows that in the morning peak hour, traffic increases on the A43 and A5076 Ring Road corridors. This is as intended as part of the revised Rail Central highway mitigation strategy, which is to draw traffic onto these routes. However, as shown highlighted in yellow on **Figure 1**, from the A5076/Towcester Road/Tesco Roundabout, there would be significant traffic increases on Towcester Road north (to/from Northampton Town Centre)

and on the A5076 Mere Way (to/from the A45 Queen Eleanor Interchange). However, impacts at junctions towards the Town Centre on Towcester Road, including the A4500 St Peters Way/A508 Horseshoe Street/A5123 St Peters Way/Towcester Road gyratory, and the A45 Queen Eleanor Interchange have not been considered in the Rail Central TA.

3.11 As highlighted in yellow on **Figure 1,** there would be significant traffic increases north of the A5076/A5123/Upton Way Roundabout on the A5076 Upton Way. The Stage 2 Statutory Consultation draft TA proposed mitigation at the A4500 Weedon Road/A5076 Upton Way/Tollgate Way gyratory. However, impacts at this junction are not now considered in the Rail Central TA, and the improvement scheme is no longer part of the Rail Central highway mitigation strategy.

3.12 **Figure 1** also shows that there continues to be traffic increases on the A45 between the Queen Eleanor Interchange and the Barnes Meadow Interchange, and also to the south of the Wootton Interchange (highlighted yellow).

3.13 **Figure 2** below shows that in the evening peak hour, there would be traffic increases on the A43 and A5076 Ring Road corridors as intended as part of the revised Rail Central highway mitigation strategy to draw traffic onto these routes.

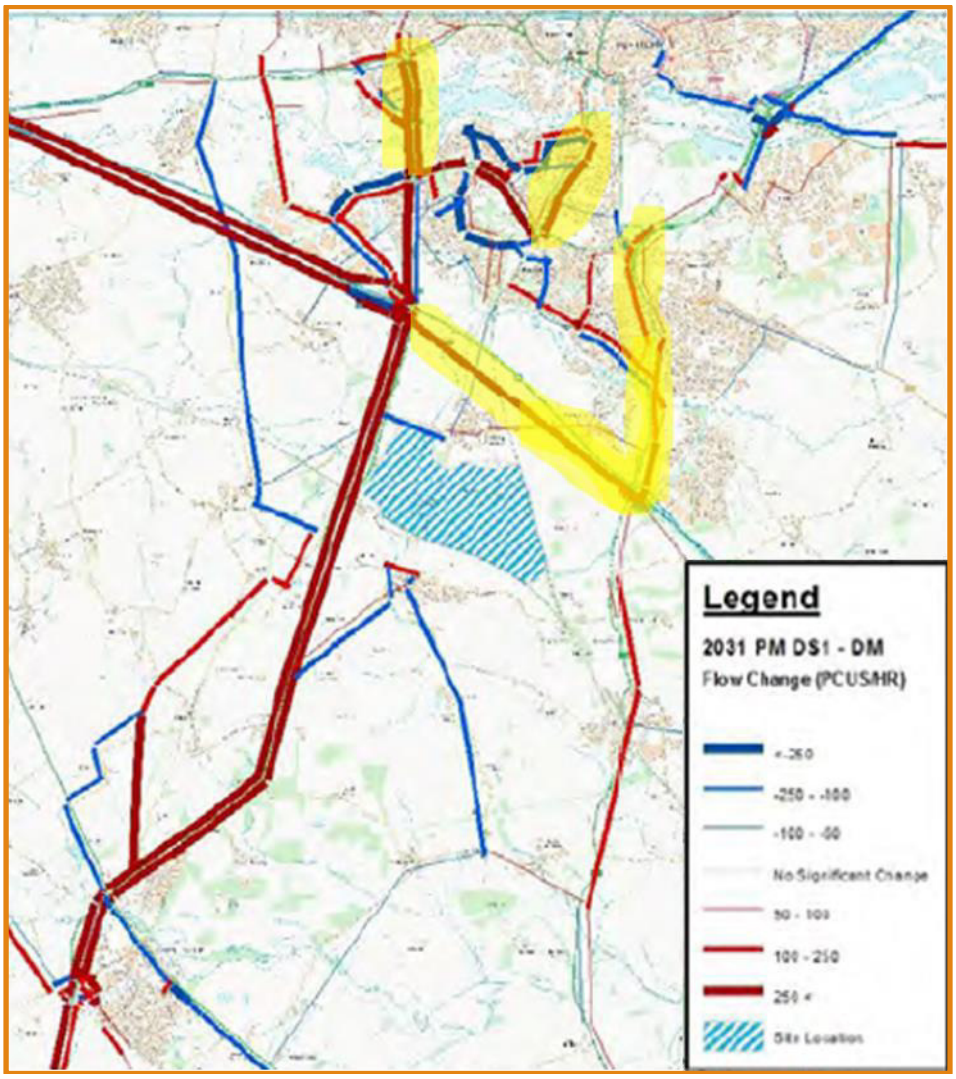

Figure 2: extract of Rail Central 2031 DS6 – DM PM peak flow difference plot

3.14 However, **Figure 2** also shows that southbound on the A5123 towards M1J15A there is a reduction in traffic. Further, there would be material traffic increases on the A45 between M1J15 and the Queen Eleanor Interchange and on the M1 towards M1J15A from the A45

(as highlighted yellow on **Figure 2**). This would suggest that the Rail Central strategy is not delivering as intended in the evening peak hour, as traffic is using an alternative route to reach M1J15A from the north.

3.15 In the evening peak hour, **Figure 2** shows that there are further traffic increases to the north of the A5076/Towcester Road/Tesco Roundabout along Towcester Road and north of the A5076/A5123/Upton Way Roundabout along the A5076 Upton Way. Further, **Figure 2** shows that traffic flows would also increase during the evening peak hour along the A508 through Roade.

3.16 The change in traffic flows between the 2031 'do minimum' and 2031 DS1 (with Rail Central, no mitigation) scenarios are shown at Figures 30 and 31 in Systra's Strategic Modelling Assessment report (Appendix R of the Rail Central TA)). These figures show that without mitigation, the addition of Rail Central development traffic would significantly increase rat-running through the villages to the east and west of the A43 in both peak hours.

Summary

3.17 In the AM peak hour traffic does increase on the A5076 Ring Road and A43 corridors as per the Rail Central strategy, indicating that the proposed junction mitigation schemes included in the DS6 NSTM model are delivering the intended capacity improvements.

3.18 However, in the PM peak hour there is a reduction in southbound traffic flow on the A5123 towards M1J15A and with traffic increases on the A45 between the Queen Eleanor Interchange and M1J15, and on the M1 northbound towards M1J15A from the A45. This would suggest that the Rail Central strategy has not been wholly realised in the evening peak hour, as traffic is using an alternative route to reach M1J15A from the north.

3.19 The Rail Central TA does not assess the impact of the traffic increases on the A5076 Upton Way or Towcester Road (north of the Tesco Roundabout) corridors as a result of the revised Rail Central highway mitigation strategy. The impact of forecast traffic increases at key junctions on these corridors should require consideration, particularly at the A4500 Weedon Road/A5076 Upton Way/Tollgate Way gyratory and the A4500 St Peters Way/A508 Horseshoe Street/A5123 St Peters Way/Towcester Road gyratory.

3.20 Additionally, the absence of an assessment at the A45 Queen Eleanor Interchange is not explained, despite the large increases in traffic that are forecast.

Proposed Rail Central M1J15A improvement scheme

3.21 The delivery of the Rail Central mitigation strategy relies on the ability of the improvement schemes at M1J15A, the A5076 Ring Road and the A43, to deliver significant betterment. Should the performance of the mitigated junctions not deliver the forecast uplift in capacity, the desired reassignment of traffic would be unlikely to occur as traffic would continue to find other routes to avoid congestion.

3.22 Of particular importance to the Rail Central highway mitigation strategy is M1J15A.

3.23 Rail Central's original highway proposals for M1J15A, as presented during their 24 May 2017 Local Liaison Group meeting, showed a significant improvement scheme with large traffic signal controlled T-junctions either side of the M1. This junction was modelled in the NSTM2 J3 scenario for the Northampton Gateway CIA.

3.24 In the Rail Central Transport Working Group minutes of 14 November 2017 (Rail Central TA Appendix B), Rail Central noted in relation to their proposed works at M1J15A that "*following a review of the information published by Roxhill in relation to the Northampton*

Gateway scheme, and previous advice provided by HE and NCC, the scope of works required to mitigate the impact of Rail Central could be significantly reduced in comparison to the previous position".

3.25 Rail Central therefore reduced the scale of the proposed M1J15A scheme and the format was altered to include a small gyratory to the south and a signalised roundabout to the north. The A43 southbound through the southern junction would be free flow. The proposed Rail Central mitigation scheme is provided at **Appendix B**.

3.26 The decision to reduce the scale of the mitigation proposals was taken prior to the Rail Central Stage 2 Statutory Consultation, and prior to the decision to affect positive reassignment of traffic, rather than mitigating specific development impacts. Therefore, it is not clear whether the revised M1J15A scheme has been designed to deliver the wider reassignment of background traffic as intended by the final Rail Central highway mitigation strategy.

M1J15A Rail Central detailed modelling

3.27 The Rail Central TA presents both VISSIM microsimulation modelling and detailed LinSig modelling of their M1J15A mitigation scheme. The VISSIM assessment report at Appendix W of the Rail Central TA (incorrectly referenced in the Rail Central TA) considers the effectiveness of the M1J15A mitigation scheme across the whole of the VISSIM network but does not specifically indicate how M1J15A is operating. The traffic signal control plans are not provided, and the VISSIM report does not provide any queue length data or screenshots to demonstrate that the junction functions in an acceptable manor.

3.28 However, the VISSIM report states at para 6.4.3 that during the 2021 and 2031 PM peak periods, not all demand traffic can enter the network on most entry links, including on the A43 and the Rail Central site access. As shown at Table 12 in the VISSIM assessment report (Appendix W of the Rail Central TA), there would be circa 11,993 unreleased vehicles in the 2031 'do minimum' (2031 traffic with no Rail Central development) evening peak model and 9,621 unreleased vehicles in the 2031 DS6 (2031 with Rail Central and all associated highway mitigation) evening peak model.

3.29 This suggests that there is significant congestion on all routes into the network, and whilst there are fewer unreleased vehicles in the DS6 scenario with the mitigation in place, it is clear that there must still remain significant queueing across the network. As there are unreleased vehicles on the A43, and importantly at the Rail Central access in the 2031 DS6 scenario, it must be concluded that the queueing on the A43 approach to M1J15A is preventing development traffic from exiting the site access.

3.30 The conclusions drawn from the limited VISSIM model outputs provided in the VISSIM report (Appendix W of the Rail Central TA) are supported by the outputs of the Rail Central M1J15A LinSig modelling shown in Table 9.3 of the Rail Central TA (table is reproduced below). It shows the assessment results for the DS6 scenario, i.e. with Rail Central and its associated highway mitigation (referred to in the table as the 'DM plus development'). The LinSig results show that the proposed Rail Central improvement scheme at M1J15A would provide an overall improvement of greater than 5% in the morning peak hour in terms of queueing and delay. It is noted however, that much of the improvement in delay can be attributed to the A43 southbound at the southern gyratory being free-flow.

Peak Period		AM Peak				PM Peak			
Approach		A5123	M1 SB Slips	M1 NB Slips	A43	A5123	M1 SB Slips	M1 NB Slips	A43
2021 DM plus development	Queue (PCU)	41	51	12	24	24	25	11	138
2031 DM plus development		89	53	14	44	33	41	8	177
2021 DM plus development	Traffic Flows (PCU)	6,590 (+1,353)				6,883 (+1,396)			
2031 DM plus development		6,986 (+1,353)				7,110 (+1,396)			
2021 DM plus development	DoS (%)	99.1	108.1	84.4	89.9	91.1	100.0	71.2	122.9
2031 DM plus development		107.7	109.8	89.0	100.8	95.8	105.6	57.1	128.4
2021 DM plus development	Total Delay (PCU hr)	132 (-87%)				310 (-42%)			
2031 DM plus development		241 (-85%)				383 (-36%)			

Key:	Decreased by more than 5%	Decreased by between 1% and 5%	Negligible Change (+/- 1%)	Increased by between 1% and 5%	Increased by more than 5%

3.31 When considering the model in more detail, it is shown that in the evening peak hour, whilst queuing and delay are also forecast to improve when compared to the do minimum scenario, the degree of saturation on the A43 approach is forecast to significantly deteriorate, with a degree of saturation of 128.4% in 2031 with the development and mitigation in place, compared to 88.5% without the development (Table 9.2 of the Rail Central TA). Further, there would be a mean maximum queue (MMQ) of 177 pcus on the A43 approach in the 2031 evening peak hour.

3.32 The stated MMQ results on the A43 in the evening peak hour would equate to a queue length of circa 1.06km in 2031. This MMQ is significant and would reduce the attractiveness for drivers in choosing to use this section of the A43. However, the reported queue lengths are averages of the maximum queue over multiple cycles, and therefore, for oversaturated arms such as the A43, the actual maximum queue could be up to twice as long during some cycles (circa. 2.12km in 2031). The proposed Rail Central site access is located approximately 1.7km south of M1J15A. Hence, during the evening peak hour the maximum queue length could reach beyond the site access junction in 2031.

3.33 Such a queue length would explain why there are unreleased vehicles on the Rail Central site access in the VISSIM modelling (Appendix W of the TA).

3.34 Notwithstanding the above, the Rail Central LinSig model of the proposed M1J15A mitigation scheme (Appendix T of the Rail Central TA) is incorrect and overestimates the capacity of the junction. The capacity of the A43 approach is overestimated as it has been modelled with two left turn lanes from the A43 to the M1 northbound (a full lane and a flared lane), when the proposed scheme has only one flared lane, as confirmed by Vectos at the meeting on 12 December 2018. When this is corrected, the queuing on the A43 increases.

3.35 Further, internal link lengths at both the northern signalised roundabout and the southern gyratory are modelled incorrectly in LinSig, as they have not been measured to reflect the stopline to stopline distance. Therefore, the model underestimates the time required for traffic to leave the junction. In addition, queue limits do not appear to have been specified as instances of internal queues exceeding the storage space are shown in the LinSig results.

Corrected M1J15A LinSig modelling

3.36 To consider how the above issues would affect the reported performance of the junction, ADC have created a revised LinSig model using the outputs provided at Appendix T of the

Rail Central TA. All parameters, including saturation flows, traffic flows, intergreens and stage sequences have been modelled as per the Rail Central model, and only those issues identified above have been amended to correctly reflect the Rail Central proposals.

3.37 The results of the LinSig modelling are provided at **Appendix C** of this Technical Note and summarised in the table below.

2031		AM peak				PM peak			
		A5123	M1 NB Slips	M1 SB Slips	A43	A5123	M1 NB Slips	M1 SB Slips	A43
MMQ (pcu)	Rail Central DS6	89	53	14	44	33	41	8	177
	ADC amended DS6	115	61	19	143	38	31	46	256
DoS (%)	Rail Central DS6	107.1%	109.8%	89.0%	100.8%	95.8%	105.6%	57.1%	128.4%
	ADC amended DS6	112.8%	117.9%	95.9%	115.0%	97.8%	110.6%	109.1%	137.1%
PRC (%)	Rail Central DS6	-22.0%				-42.7%			
	ADC amended DS6	-25.4%				-43.7%			
Total delay (PCUhr)	Rail Central DS6	241				383			
	ADC amended DS6	389.5				541.2			

3.38 The corrected LinSig modelling shows that the Rail Central modelling has over estimated the degree of saturation on all approaches to the junction. Whilst the practical reserve capacity (PRC) is slightly worse in both peak hours for the corrected model, the total delay has significantly increased in both peak hours.

3.39 In the 2031 morning peak hour, the MMQ on the A43 approach is significantly longer in the corrected model at 143 pcus, or circa. 850 metres long. Therefore, at certain points during the morning peak hour the maximum queue could extend up to 1.9km; to the Rail Central site access junction.

3.40 In the 2031 evening peak hour, the MMQ on the A43 approach is also significantly longer in the corrected model, at 256 pcus, or circa. 1.5km long, which would be just 200 metres short of the site access junction and may affect the operation of the northbound merge. However, at certain times during the peak hour the maximum queue length could reach up to 3.0km which would extend beyond the site access junction, preventing traffic from leaving the Rail Central site access. It is considered that this would represent a severe impact on the performance of the A43 at a key node on the strategic road network, and that this adverse impact would not therefore be acceptable to Highways England or Northamptonshire County Council.

3.41 VISSIM and LinSig software packages allow junction performance to be modelled in detail and therefore give a better representation of capacity, delay and queueing than strategic models. The Rail Central VISSIM modelling report (Appendix W of the TA) does not provide queue length analysis and no discussion on individual junction performance is provided. Although Vectos confirmed at the meeting on 12 December 2018 that they were undertaking additional work to provide this information, they confirmed that it would not be available in time to inform this updated CIA.

3.42 However, the LinSig modelling shows that the proposed Rail Central improvements to M1J15A would result in significant queueing on the A43. This would deter vehicles from using this corridor and could prevent vehicles exiting the Rail Central site access. This could lead to increases in rat-running away from the A43 and through local villages. Fundamentally, this raises the question of whether the strategic modelling is overestimating the success of the Rail Central mitigation strategy, when in reality the proposed improvement scheme at M1J15A could not accommodate the forecast increase in traffic.

Proposed Rail Central A5076/Towcester Road/Tesco roundabout improvement scheme

3.43 The Rail Central highway mitigation strategy also aims to encourage drivers to use the A5076 Ring road corridor. A key junction on the Ring Road corridor is the A5076 Mere Way/Towcester Road/Tesco roundabout, located west of the A45 Queen Eleanor Interchange.

3.44 The Rail Central TA presents a mitigation scheme at this junction, which would include provision of traffic signal control at the Towcester Road north approach, lengthening of the flared lane on the A5076 Mere Way westbound approach, widening on the A5076 eastbound approach to provide an additional lane and localised widening on the circulating carriageway. The proposed Rail Central mitigation scheme is provided at **Appendix D**.

3.45 As part of the Rail Central TA, the proposed Rail Central improvement scheme has been modelled in LinSig and the results (presented at Appendix T and summarised at Table 9.6 of the Rail Central TA) show that the proposed junction improvement broadly achieves a nil-detriment impact in the 2031 morning peak hour. However, Table 9.6 shows that the PRC would deteriorate in the 2031 DS6 evening peak scenario by 25% when compared to the Rail Central 2031 'do minimum' scenario.

3.46 Notwithstanding the above, the Rail Central LinSig model of the proposed A5076 Mere Way/Towcester Road/Tesco roundabout mitigation scheme (Appendix U of the Rail Central TA) is incorrect and overestimates the capacity of the junction. The capacity of the Towcester Road approach is overestimated as it has been modelled with two full lanes and a flared lane, when the proposed scheme has only one full lane and two short flared lanes. When this is corrected, the performance of the Towcester Road north approach worsens, which would also lead to a reduction in the green time available to the circulating carriageway at this node.

3.47 Further, internal link lengths at the signalised roundabout are modelled incorrectly in LinSig, as they have not been measured to reflect the stopline to stopline distance. Queue limits do not appear to have been specified as instances of internal queues exceeding the storage space are shown in the LinSig results.

Corrected A5076/Towcester Road/Tesco roundabout LinSig modelling

3.48 To consider how the above issues would affect the reported performance of the junction, ADC have created a revised LinSig model using the outputs provided at Appendix U of the Rail Central TA. Only those issues identified above have been amended to correctly reflect the proposals, with saturation flows and intergreens remaining as per the original Rail Central model. The results of the corrected LinSig modelling are provided at **Appendix E** of this Technical Note and are summarised in the table below.

2031		AM peak					PM peak				
		Towcester Road N	A5076 East	Tesco	Towcester Road S	A5076 West	Towcester Road N	A5076 East	Tesco	Towcester Road S	A5076 West
MMQ (pcu)	Rail Central DS6	72	205	6	3	151	9	72	46	5	17
	ADC amended DS6	205	144	3	4	238	57	118	50	3	183
DoS (%)	Rail Central DS6	122.4%	121.7%	74.0%	58.8%	113.8%	85.8%	104.2%	120.9%	84.3%	90.6%
	ADC amended DS6	143.8%	113.0%	87.3%	75.5%	129.1%	110.2%	110.7%	115.6%	48.3%	131.1%
PRC (%)	Rail Central DS6	-45.6%					-43.5%				
	ADC amended DS6	-59.7%					-49.1%				

3.49 The corrected modelling for the 2031 DS6 scenario shows that the capacity of the proposed improvement scheme has been overestimated in both the 2031 morning and evening peak hours. Comparing the PRC of the corrected 2031 DS6 model with the 2031 'do minimum' results at Table 9.6 of the Rail Central TA shows that the operation of the junction would worsen in both the 2031 morning and evening peak hours.

3.50 In the 2031 morning peak hour, whilst the performance of the A5076 east approach is shown to be 8.7% better than the Rail Central DS6 model, the performance of the A5076 west approach is shown to be 15.3% worse than the Rail Central DS6 model, and therefore, the proposed scheme can be said to merely switch the congestion from one side of the A5076 to the other.

3.51 Further, the corrected model shows that under the Rail Central proposals the Towcester Road north approach would be significantly worse in the 2031 morning peak DS6 scenario than forecast in the Rail Central TA, with a forecast MMQ of 205 pcus, compared with 72 pcus.

3.52 In the 2031 evening peak hour, only on the Tesco and Towcester Road south approaches to the junction has capacity not been overestimated in the 2031 Rail Central DS6 model. The results presented in the Rail Central TA significantly underestimate MMQs on the A5076 west, A5076 east and Towcester Road north approaches.

3.53 Further, in the evening peak hour, both the Rail Central and ADC modelling of the 2031 DS6 scenario shows that the Tesco supermarket access would operate above 100% of its capacity with significant MMQs. This would adversely affect the operation of the supermarket during the evening peak hour.

3.54 The results of the corrected modelling demonstrate that the performance of the proposed highway mitigation scheme has been overestimated. Whilst the mitigated junction is handling more traffic in the 2031 DS6 scenario, it is unlikely that the forecast reassignment towards the A5076 Ring Road could be achieved considering the deterioration in junction performance, especially on the A5076 west and Towcester Road north approaches. Therefore, the revised modelling results raise the question as to whether the Rail Central mitigation strategy to draw traffic onto the A5076 corridor could be achieved.

4.0 UPDATED HIGHWAY CUMULATIVE IMPACT ASSESSMENT

Introduction

4.1 The following assessment considers how the submitted Rail Central mitigation strategy (reviewed at Section 3 of this Technical Note) could alter the conclusions of the CIA work (summarised at Section 2 of this Technical Note).

M1J15A

4.2 The Rail Central proposals at M1J15A have been significantly reduced in scale since the CIA was undertaken prior to the Rail Central Stage 2 Statutory Consultation. However, the submitted Rail Central scheme (**Appendix A**) is more substantial than the proposed mitigation identified for the Northampton Gateway SRFI on its own. Therefore, the updated CIA continues to assume a scenario in which the Rail Central scheme would be implemented should both developments come forward. Nonetheless, for completeness, the ability of the Northampton Gateway mitigation scheme at M1J15A to accommodate the traffic impacts of both developments has also been considered (see paragraphs 4.16 to 4.19). This confirms that the Northampton Gateway mitigation scheme at M1J15A would not have sufficient capacity should both development scheme come forward.

4.3 Section 3 of this Technical Note raises concerns regarding the performance of the submitted Rail Central mitigation scheme at M1J15A. The VISSIM model report (Appendix W of the Rail Central TA) suggests that not all development traffic can exit the Rail Central site access in the evening peak hour, which is likely to be due to significant queueing on the A43 approach to M1J15A, as supported by the LinSig results discussed at paragraphs 3.36 to 3.42 of this Technical Note.

4.4 Further, it has been demonstrated that the capacity of M1J15A has been overestimated in the Rail Central LinSig modelling, and queueing on the A43 approach would be significantly worse than forecast in the Rail Central TA. Therefore, it is doubtful whether the forecast reassignment of traffic onto the A43 corridor could be achieved.

4.5 As stated at paragraph 1.8 of this Technical Note, there has not been sufficient time to re-run the NSTM2 and so an updated NSTM2 flow set is not available for the updated CIA scenario. Further, Vectos confirmed at the meeting of the 12 December 2018 that the updated Rail Central CIA was not yet complete and could not give a timescale for when outputs of this work would be available.

4.6 The CIA that was submitted with the Northampton Gateway DCO application, provided at Technical 12 (ES Appendix 12.2), showed that in the CIA NSTM2 J3 scenario a relatively small amount of traffic associated with the Northampton Gateway development would be anticipated to route through M1J15A. Whilst this volume of traffic would not be significant; the performance of the junction would deteriorate.

4.7 To consider this in more detail, the ADC corrected M1J15A LinSig model (see paragraph 3.36 of this Technical Note) has been used in a sensitivity test using the 2031 NSTM2 J3 scenario traffic flows from the original CIA.

4.8 It is acknowledged that the 2031 NSTM2 J3 scenario traffic flows do not allow for the revised Rail Central mitigation strategy, which seeks to draw traffic onto the A43 and A5076 corridors and may therefore underestimate traffic using the A43 corridor. However, the J3 scenario traffic flow group was derived using the larger Rail Central proposed scheme at M1J15A which would provide increased capacity compared to the submitted scheme. It is therefore unlikely, given the reduced scale of the proposed improvements, that more traffic associated with Northampton Gateway SRFI would route through M1J15A than assessed

in the J3 scenario. Hence, in the absence of other data, it is considered that the NSTM2 J3 scenario should provide a robust indication of the cumulative traffic flows at the junction.

4.9 The full LinSig results are provided at **Appendix C** and summarised in the table below.

M1J15A Modelling Results		AM peak				PM peak			
		A5123	M1 NB Slips	M1 SB Slips	A43	A5123	M1 NB Slips	M1 SB Slips	A43
MMQ (pcu)	2031 D1 (reference case)	8	148	11	26	2	301	17	23
	2031 DS6 (Rail Central only)	115	61	19	143	38	31	46	256
	2031 J3 (CIA)	201	74	20	197	12	118	14	311
DoS (%)	2031 D1 (reference case)	88.0%	156.0%	93.0%	99.0%	66.0%	203.0%	97.0%	98.0%
	2031 DS6 (Rail Central only)	112.8%	117.9%	95.9%	115.0%	97.8%	110.6%	109.1%	137.1%
	2031 J3 (CIA)	127.1%	126.2%	97.9%	120.0%	71.8%	127.5%	88.2%	137.0%
PRC (%)	2031 D1 (reference case)	N/A				N/A			
	2031 DS6 (Rail Central only)	-25.4%				-43.7%			
	2031 J3 (CIA)	-41.2%				-65.7%			

4.10 The results of the 2031 D1 Reference Case Arcady modelling (Table 10.5 in the Northampton Gateway TA, ES Appendix 12.1) are also provided in the table to provide context to the LinSig results.

4.11 The table shows that in the morning peak hour, the performance of the A5123 and the A43 would worsen in both the 2031 DS6 Rail Central only and 2031 J3 cumulative scenarios when compared to the 2031 D1 reference case, with long queues on the A5123 and A43 approaches to the junction. However, both the 2031 DS6 Rail Central only and 2031 J3 cumulative scenarios show significantly improved queueing on the M1 northbound offslip, compared to the 2031 D1 Reference Case. There would only be a modest deterioration in the performance of the M1 southbound offslip.

4.12 When compared to the Arcady modelling results for the 2031 D1 Reference Case in the evening peak hour, the table shows that the performance of the M1 northbound offslip approach would also significantly improve in both the 2031 DS6 Rail Central only and 2021 J3 cumulative scenario. However, whilst the MMQ on the M1 northbound offslip would improve in the 2031 J3 cumulative scenario compared to the 2031 D1 Reference Case, at 118 pcus compared to 301 pcus, or circa 708 metres, it would still reach back to the M1 mainline (circa. 650 metres from the stopline) during the evening peak hour and could therefore cause some flow disruption to the M1. The performance of the A5123 and M1 southbound offslip approaches would remain largely unchanged.

4.13 The A43 approach would operate significantly worse in both the 2031 DS6 and 2031 J3 scenarios when compared to the 2031 D1 Reference Case. The queue is forecast to increase from 23 pcus to 311 pcus, or 1.87km, in the 2031 J3 scenario. This is a MMQ and hence there would be periods where the queue would extend up to twice this distance. The forecast queuing on the A43 represents an increase from that assessed in the original CIA, which considered the larger Rail Central improvement scheme at M1J15A. The forecast level of performance for the A43 approach to M1J15A represents a severe impact in comparison to the Reference Case, and therefore it is considered that this adverse impact would be unacceptable to Highways England and Northamptonshire County Council.

4.14 In the morning peak hour, the LinSig results indicate that the practical reserve capacity (PRC) of the junction would deteriorate by 15.8% (41.2% - 25.4% = 15.8%) in the 2031 J3 cumulative scenario when compared to the 2031 DS6 scenario for Rail Central only, with the degree of saturation increasing on all approaches to the junction.

4.15 In the 2031 evening peak hour, the LinSig results indicate that the PRC would deteriorate by 22.0% (65.7% - 43.7% = 22.0%) in the 2031 J3 cumulative scenario when compared to the 2031 DS6 scenario for Rail Central only.

Northampton Gateway proposed M1J15A scheme

4.16 For completeness, the ability of the Northampton Gateway mitigation scheme at M1J15A to accommodate the traffic flows of the 2031 J3 cumulative scenario has been considered. The results of this assessment are provided at **Appendix F** and summarised in the table below.

M1J15A Modelling Results		AM peak				PM peak			
		A5123	M1 NB Slips	M1 SB Slips	A43	A5123	M1 NB Slips	M1 SB Slips	A43
MMQ (pcu)	2031 D1 (reference case)	8	148	11	26	2	301	17	23
	2031 J3 (CIA)	296	124	2	126	1	142	1	271
DoS (%)	2031 D1 (reference case)	88.0%	156.0%	93.0%	99.0%	66.0%	203.0%	97.0%	98.0%
	2031 J3 (CIA)	148.9%	127.5%	65.7%	111.0%	73.2%	124.3%	61.5%	133.2%
PRC (%)	2031 D1 (reference case)	N/A				N/A			
	2031 J3 (CIA)	-65.7%				-68.0%			

4.17 The results in the table show that in the 2031 J3 scenario, the Northampton Gateway M1J15A mitigation scheme would improve the performance of the M1 northbound offslip approach in both peak hours when compared to the 2031 D1 reference case. However, in the J3 scenario there would be significant increases in queueing on the A5123 and A43 approaches in the morning peak hour, and on the A43 approach in the evening peak hour.

4.18 The results shown at **Appendix F** show significant queueing on the internal southbound approach to the southern roundabout, which would block the exit from the northern roundabout and impact on the M1 southbound offslip and A5123 approaches to the junction.

4.19 Therefore, since the Northampton Gateway mitigation scheme at M1J15A has not been designed to accommodate the traffic flows associated with the Rail Central development, it is clear that it would not have sufficient capacity should both developments come forward.

Summary of M1J15A assessment

4.20 It has been demonstrated that the submitted Rail Central mitigation scheme at M1J15A does not adequately accommodate the forecast traffic demand on the A43 in the 2031 DS6 assessment scenario for Rail Central only.

4.21 In the event that both proposed SRFI developments should be granted planning consent, the modelling undertaken as part of this updated CIA demonstrates that in the morning peak hour the performance of the junction would deteriorate further, with significantly increased queueing on the A5123 and A43 approaches when compared to the reference case.

4.22 In the evening peak hour, the modelling undertaken as part of this updated CIA demonstrates significant queueing on the A43 approach when compared to the reference case. Further, in the updated CIA scenario, some of the benefit that is provided by the mitigation scheme to the M1 northbound offslip is eroded, with queueing reaching back to the mainline M1.

4.23 Given that the proposed Rail Central M1J15A highway works do not adequately accommodate the forecast traffic increases associated with the Rail Central development, and that the operation of the junction has been shown to deteriorate further with both developments in place, it is likely that drivers would seek to avoid the congestion on the A5123 and A43 in the morning peak hour and on the A43 in the evening peak hour, reassigning to the A45 and M1J15, or rat-running on local roads through neighbouring villages.

A5076 Ring Road corridor

4.24 As noted at paragraph 2.14 of this Technical Note, the TA for the Northampton Gateway SRFI shows that traffic increases on the A5076 corridor are relatively modest when compared to the 2031 D1 reference case, though there is some reassignment of background traffic onto the A5076 Ring Road corridor.

4.25 The CIA showed that when compared to the Northampton Gateway SRFI, the Rail Central SRFI would significantly increase traffic flows along the A5123 and A5076 corridors. Therefore, due to interactions between traffic generated by both SRFI developments and reassigning background traffic, the CIA indicated that traffic increases on these routes would be more significant, especially along the A5076 Ring Road.

4.26 The revised Rail Central mitigation strategy purposefully encourages more traffic to reassign onto the A5076 Ring Road corridor and proposes mitigation at the following junctions in order to achieve that strategy:

- A5075 Towcester Road/A5076/Tesco roundabout;
- A5076/A5123/Upton Way roundabout;
- A5076/Hunsbury Hunsbury Hill Avenue/Hunsbarrow Road/Hunsbury Hill Road roundabout.

A5076/Towcester Road/Tesco roundabout

4.27 Section 3 of this Technical Note raises concerns regarding the performance of the current Rail Central mitigation scheme at Towcester Road/A5076/A5123/Tesco roundabout (shown at **Appendix D**), a key junction for delivering a highway mitigation strategy for the A5076 corridor.

4.28 Further, it has been demonstrated in Section 3 that the capacity of the junction has been overestimated in the Rail Central modelling. Whilst the mitigated junction is handling more traffic in the 2031 DS6 scenario, considering the deterioration in junction performance it is unlikely that the forecast reassignment towards the A5076 Ring Road could be achieved, especially on the A5076 west and Towcester Road north approaches.

4.29 To consider the implications of this analysis on the CIA, the corrected Towcester Road/A5076/A5123/Tesco roundabout model has been used in a sensitivity test using the NSTM2 J3 traffic flows from the CIA. These traffic flows do not allow for the revised Rail Central mitigation strategy which seeks to draw traffic onto the A43 and A5076 corridors.

4.30 The results are provided at **Appendix E** and summarised in the table below.

Towcester Road/A5076/A5123/Tesco modelling results		AM peak					PM peak				
		Towcester Road N	A5076 East	Tesco	Towcester Road S	A5076 West	Towcester Road N	A5076 East	Tesco	Towcester Road S	A5076 West
MMQ (pcu)	2031 D1 (reference case)	48	83	5	126	31	227	63.7	7	10	126
	2031 DS6 (Rail Central only)	205	144	3	4	238	57	118	50	3	183
	2031 J3 (CIA)	203	131	6	87.3	153	239	52	8	14	111
DoS (%)	2031 D1 (reference case)	110.4%	109.4%	70.5%	118.9%	99.2%	133.2%	106.3%	80.9%	90.4%	131.7%
	2031 DS6 (Rail Central only)	143.8%	113.0%	87.3%	75.5%	129.1%	110.2%	110.7%	115.6%	48.3%	131.1%
	2031 J3 (CIA)	141.6%	114.7%	68.3%	109.6%	124.8%	149.7%	103.8%	84.4%	91.4%	117.9%
PRC (%)	2031 D1 (reference case)	-32.3%					-48.0%				
	2031 DS6 (Rail Central only)	-59.7%					-49.1%				
	2031 J3 (CIA)	-57.3%					-66.3%				

4.31 In the morning peak hour, the results of the 2031 DS6 and 2031 J3 model scenarios are very similar, with only a 2.4% difference in PRC (59.7% - 57.3% = 2.4%). However, when compared to the 2031 D1 reference case scenario, it is clear that the junction would operate significantly worse in both the 2031 DS6 Rail Central only and 2031 J3 cumulative scenarios, with significant residual impact.

4.32 In the evening peak hour, the results show that the PRC of the junction would be 17.2% worse in the 2031 J3 scenario when compared to the 2031 DS6 scenario (66.3% - 49.1% = 17.2%), with significant increase in congestion on the Towcester Road north approach. When compared to the 2031 D1 reference case scenario, the junction would not mitigate the cumulative impact of the two SRFI developments.

North of the A5076 Ring Road, including Northampton Town Centre

4.33 **Figures 1 and 2** in Section 2 of this Technical Note show that in the 2031 DS6 scenario for Rail Central alone, there would be significant traffic increases from the Towcester Road/A5076/A5123/Tesco roundabout on Towcester Road North (to/from Northampton Town Centre) and on the A5076 Mere Way (to/from the A45 Queen Eleanor Interchange).

4.34 **Figures 1 and 2** also show significant traffic increases north of the A5076/A5123/Upton Way Roundabout on the A5076 Upton Way towards the A4500 Weedon Road/A5076 Upton Way/Tollgate Way gyratory.

4.35 Table 2 in Technical Note 12 (ES Appendix 12.2) showed that in the 2031 J3 scenario there would be a material impact at the A4500 Weedon Road/A5076 Upton Way/Tollgate Way gyratory when compared to the 2031 D1 reference case.

4.36 A mitigation scheme was proposed at A4500 Weedon Road/A5076 Upton Way/Tollgate Way gyratory for the Rail Central Stage 2 Statutory Consultation and Technical Note 12 (ES Appendix 12.2) concluded that the identified scheme would likely mitigate the cumulative impact. However, this improvement scheme is no longer promoted in the Rail Central DCO and therefore, given that traffic flows would be likely to increase further from the 2031 J3 scenario due to the revised Rail Central mitigation strategy, a cumulative impact would remain at this location.

4.37 Table 2 in Technical Note 12 (ES Appendix 12.2) shows that whilst the impact of the 2031 J3 cumulative scenario was not significant at the A4500 St Peters Way/A508 Horseshoe Street/A5123 St Peters Way/Towcester Road gyratory when compared to the 2031 D1 reference case, the junction is operating over capacity and would therefore be sensitive to any further increases in traffic flow. Given the traffic flows at this junction increase in the 2031 DS6 Rail Central flow (**Figures 1 and 2**), it is likely that the traffic increases in a revised cumulative scenario could be more significant than suggested in the 2031 J3 scenario and therefore there may be a material impact at this junction in the cumulative scenario.

Summary of A5076 Corridor, including Northampton Town Centre assessment

4.38 It has been demonstrated that the proposed Rail Central mitigation scheme at A5076/Towcester Road/Tesco roundabout does not adequately accommodate the forecast traffic demand in the 2031 DS6 assessment scenario for Rail Central only.

4.39 In the event that both proposed SRFI developments should be granted planning consent, it is likely that the cumulative traffic impact of both developments would mean that performance of the junction would deteriorate further, particularly in the morning peak hour. It is therefore unlikely that the Rail Central mitigation strategy would prevent traffic increases on the A45 as traffic would seek to avoid the congestion on the A5076 and instead route to the A45 or rat-run through residential areas.

4.40 Beyond the A5076 corridor, the CIA demonstrated that there would be a material impact at the A4500 Weedon Road/A5076 Upton Way/Tollgate Way gyratory. A mitigation scheme was proposed at A4500 Weedon Road/A5076 Upton Way/Tollgate Way gyratory for the Rail Central Stage 2 Statutory Consultation and the CIA concluded that the identified

scheme would likely mitigate the cumulative impact. This improvement scheme is no longer promoted by Rail Central and therefore a cumulative impact would remain at this location.

4.41 The CIA did not show a material impact at the A4500 St Peters Way/A508 Horseshoe Street/A5123 St Peters Way/Towcester Road gyratory when compared to the 2031 D1 reference case. However, the CIA indicated that the junction would operate over capacity and therefore, given the forecast 2031 DS6 Rail Central flow increases at this junction due to the revised Rail Central highway mitigation strategy, it is likely that there may be a material cumulative impact at this junction.

Interaction south of the M1

4.42 The original CIA demonstrated that there would be little interaction between the A508 and A43 corridors south of the M1. Paragraph 6.8 of Technical 12 (ES Appendix 12.2) concludes that as a result of the Northampton Gateway mitigation strategy for the A508 corridor, there would be comparable reductions in traffic flows through the neighbouring villages in the cumulative scenario as for the scenario without Rail Central.

4.43 The revised Rail Central mitigation strategy south of the M1 has changed and is now designed to encourage more vehicles to use the A43 corridor.

4.44 **Figures 1 and 2** at Section 2 of this Technical Note show that the Rail Central mitigation strategy significantly increases flows on the A43 corridor, with some traffic increases on local roads to the west of the A43.

4.45 However, Section 3 of this Technical Note shows that the capacity of the M1J15A and the A5076/Towcester Road/Tesco roundabout has been overestimated in the Rail Central modelling. Therefore, instead of traffic being drawn to the A43 and A5076 corridors, traffic may seek to route via the A45 corridor and M1J15, or rat-run on load roads through neighbouring villages.

M1J15

4.46 Detailed LinSig modelling results of the CIA assessment provided at Table 2 of Technical Note 12 (Appendix 12.2 of the ES), show that the proposed Northampton Gateway M1J15 major upgrade scheme would improve performance by 75.2% in the morning peak hour and by 51.1% in the evening peak hour with both developments in place when compared to the 2031 D1 reference case. Therefore, whilst the Rail Central mitigation proposals at M1J15A and at the A5076/Towcester Road/Tesco roundabout have been shown to overestimate the junction's capacity, MJ15 has significant headroom to accommodate reassigning traffic.

4.47 However, the VISSIM modelling undertaken in the original CIA showed that in the morning peak hour, the maximum queue length on the M1 northbound diverge at M1J15 exceeded the storage capacity on the slip road. This is not present in the reference case or the Northampton Gateway only scenario. Therefore, traffic reassigning away from M1J15A could further impact on this issue.

4.48 The original CIA VISSIM modelling also showed that in the morning peak hour the average queue on the M1 southbound diverge at M1J15 would reach back beyond the end of the slip road where it would impact on the M1 mainline flow. Whilst this was shown to occur to a greater extent in the Reference Case, any further reassignment to M1J15 from M1J15A could further impact on this issue, and erode the benefits realised in the Northampton Gateway only scenario.

A45 Corridor

4.49 Table 2 of the Technical Note 12 (ES Appendix 12.2) confirms that there would be a material impacts at the A45 Wootton Interchange and at the A45 Queen Eleanor Interchange in the 2031 J3 cumulative scenario. **Figures 1 and 2** of this Technical Note show that in the 2031 DS6 scenario with just Rail Central there would be a large increase in traffic on the A5076 Mere Way arm of the junction in the morning peak hour, and rat-running traffic through the residential areas west of the Wootton Interchange in both the morning and evening peak hours.

4.50 As discussed at paragraphs 4.19 to 4.22 of Technical Note 12, NCC are proposing a comprehensive improvement scheme at the A45 Queen Eleanor Interchange which would address congestion at the junction and also draw traffic away from the A45 Wootton Interchange. It has been agreed with NCC and Highways England that a financial contribution will be secured as part of the Northampton Gateway SRFI development towards the A45 Queen Eleanor Interchange improvement, equivalent to the cost of implementing the identified Northampton Gateway improvement scheme as detailed in the Northampton Gateway TA (ES Appendix 12.1).

4.51 The Rail Central Stage 2 Statutory Consultation removed their previously proposed improvement scheme at the A45 Queen Eleanor Interchange, as discussed at paragraph 2.6 of this Technical Note. The Rail Central TA does not include an assessment of the likely impacts at either the A45 Queen Eleanor Interchange or the A45 Wootton Interchange.

4.52 Technical Note 12 (ES Appendix 12.2) concluded that it would be appropriate that Rail Central should also provide a financial contribution towards the comprehensive NCC improvement scheme at the A45 Queen Eleanor Interchange. Considering the increases in traffic flows on the A5076 Mere Way and to the west of the Wootton Interchange in the 2031 DS6 scenario (**Figures 1 and 2**), and the material impacts reported at Table 2 of Technical Note 12 (ES Appendix 12.2), this conclusion is maintained.

4.53 The detailed modelling for the Northampton Gateway SRFI (Technical Note 10 provided at ES Appendix 12.1) demonstrated that the Northampton Gateway development would not result in an impact at the A45 Brackmills Interchange, the A45 Barnes Meadow Interchange, or the A45 Lumbertubs Interchange.

4.54 The detailed modelling for the CIA (ES Appendix 12.2) noted there would be impacts at the A45 Barnes Meadow Interchange and the A45 Lumbertubs Interchange with both developments in place. However, at that time it was considered that the proposed mitigation put forward at these junctions as part of the Rail Central Stage 2 Consultation highway mitigation stategy could potentially mitigate the cumulative impact.

4.55 The submitted Rail Central highway mitigation strategy no longer promotes improvements at these junctions. Whilst the Rail Central strategy is to encourage traffic away from the A45, the 2031 DS6 flow difference plots provided at **Figures 1 and 2** at Section 2**,** show that there would be traffic increases on A45. Further, the capacity of the M1J15A and the A5076/Towcester Road/Tesco roundabout have been shown to be overestimated, which could lead to further traffic increases on the A45 from that shown in the Rail Central TA.

4.56 Therefore, since it is likely that traffic flows would increase further in the cumulative scenario, particularly since the Northampton Gateway proposals at M1J15 would attract vehicles to the A45 corridor, the cumulative impacts at these junctions due to the Rail Central scheme could be unacceptable without mitigation.

5.0 PUBLIC TRANSPORT AND PUBLIC RIGHTS OF WAY

Public Transport Strategy

5.1 The public transport strategy for the Northampton Gateway SRFI is set out in detail in the TA (ES Appendix 12.1). The public transport strategy and cost plan has been agreed with the NCC.

5.2 The strategy proposes a new, developer funder, bus service which would run from Northampton Town Centre and access into the heart of the development. It is anticipated that as the development is built-out and employee numbers grow, the bus service would become commercially viable. Further, new bus stops would be provided at the site access roundabout providing access to the existing bus services on the A508 corridor.

5.3 The proposed public transport strategy for the Rail Central SRFI is reliant on a bus interchange accessed off Northampton Road which will enable existing and new bus services running along this road to drop off employees at the site.

5.4 Therefore, it is clear that there would not be any interaction between the public transport strategies for the two SRFI developments.

Public Rights of Way (PRoW)

5.5 The walking and cycling strategy for the proposed Northampton Gateway SRFI development are described within TA (ES Appendix 12.1), as are the proposed changes to the PRoW for non-motorised users (pedestrian, cyclists and equestrians). The walking and cycling strategy and PRoW diversions have been agreed with the NCC and Highways England.

5.6 Within the Northampton Gateway SRFI site, public footpaths KX17 and KX13 that cross the main site would be diverted and extended to form a loop within the landscape bunding. To the south of Zone A4 a public footpath would complete the new loop arrangement linking with the existing public footpath and bridge over the West Coast Mainline Northampton Loop railway.

5.7 The Rail Central proposal for the diverted PRoW KX13 includes a footpath bridge over the West Coast Mainline Northampton Loop railway line in the vicinity of the proposed rail spur, at the southern end of the Northampton Gateway scheme. The diverted PROW is then shown following alongside the railway line before crossing back over again to the north.

5.8 Therefore, the respective PRoW strategies overlap, as shown on BWB drawing NGW-BWB-GEN-XX-SK-C-S2-P1-SK87, a copy of which is provided at **Appendix G**. The location of the Rail Central proposed crossing for diverted PRoW KX13 is incompatible with the required earthworks for the Northampton Gateway scheme at the southern rail spur. However, it is considered that this could be addressed by an amendment to the Rail Central scheme, to move the location of the proposed Rail Central KX13 crossing south. The amended crossing location is shown at Insert B at BWB drawing NGW-BWB-GEN-XX-SK-C-S2-P1-SK87.

5.9 Elsewhere there are no other conflicts between the walking and cycling strategies proposed by the two schemes. However, the Rail Central DCO submission provides no details of the likely impacts on existing PRoW KX2/LA13 that crosses the A43 to the south of M1J15A, and how this route will be accommodated and/or amended as a result of the highway mitigation works that are proposed by Rail Central at M1J15A. The proposed Northampton Gateway highway mitigation scheme for this junction includes the diversion and improvement of the PRoW crossing.

6.0 DISCUSSION AND CONCLUSIONS

Updated CIA – traffic impact

6.1 Paragraph 1.5 of this Technical Note summarises the agreed scope of the CIA that was submitted with the Northampton Gateway DCO application, including the strategic and detailed modelling that was undertaken to complete that analysis. That work is detailed at Technical Note 12 (ES Appendix 12.2).

6.2 Section 2 of this Technical Note provides a summary of the main conclusions of the CIA assessment submitted with the Northampton Gateway DCO application, which were that:

- There would be little interaction between the A508 and A43 corridors south of the M1, and therefore the benefits afforded to the A508 corridor by the Northampton Gateway scheme would remain largely as detailed in the Northampton Gateway TA;
- Detailed junction modelling demonstrated that at junctions where cumulative impacts were identified, mitigation provided by either the Northampton Gateway SRFI or the emerging Rail Central highway mitigation strategy (Stage 2 Statutory Consultation) was likely to be sufficient to mitigate the cumulative impact;
- The CIA VISSIM microsimulation modelling showed that overall highway network performance would be improved with both developments and the highway mitigation schemes assessed at that time in place, when compared to the 'Reference Case' (i.e. the future scenario with neither SRFI nor their associated mitigation measures delivered, where just committed developments and infrastructure are in place).
- However, there would be some impacts in terms of queueing in the CIA scenario, not present in the Northampton Gateway only scenario, as follows:
  - In the morning peak hour the maximum queue length on the M1 northbound diverge at M1J15 was forecast to exceed the storage capacity on the slip road and could potentially impact on the M1 mainline;
  - In the morning peak hour the average queue on the M1 southbound diverge at M1J15 would reach back beyond the end of the slip road where it would impact on the M1 mainline flow;
  - Although still an improvement on the Reference Case scenario, the queue lengths on the M1 northbound diverge at M1J15A would extend back to the M1 mainline before the end of the CIA evening peak hour;
  - On the A43 approach to M1J15A the average and maximum queue lengths in the evening peak hour on the A43 are shown to increase significantly in the cumulative impact assessment scenario.

6.3 The submitted Rail Central highway mitigation strategy has been amended since the detailed modelling work included in the CIA and has been amended again since their Stage 2 Statutory Consultation. Therefore, the Examining Authority at ExQ1.9.1 have requested that an updated CIA be undertaken for Deadline 4.

6.4 There has not been sufficient time to revise the strategic modelling or the detailed VISSIM microsimulation modelling ahead of Deadline 4. Therefore, a methodology for providing an updated CIA, as set out at paragraph 1.10 of this Technical Note, has been agreed by both NCC and Highways England, based upon a review of the submitted Rail Central TA and detailed modelling at specific locations.

6.5 Section 3 of this Technical Note provides a review of the submitted Rail Central highway mitigation strategy and Section 4 considers how the revised strategy may alter the conclusions of the CIA, summarised above at paragraph 6.2.

Beneficial impacts in the cumulative scenario

6.6 At M1J15, the detailed LinSig modelling results of the original CIA assessment (Table 2 of Technical Note 12 at Appendix 12.2 of the ES), show that the proposed Northampton

Gateway M1J15 major upgrade scheme would significantly improve the performance when compared to the 2031 D1 Reference Case, although queuing on the M1 northbound and southbound diverge slips would worsen as compared to the forecast operation of the junction with only the Northampton Gateway scheme.

6.7 Based on the updated CIA work, it is considered that the revised Rail Central highway mitigation strategy would not materially impact that conclusion and the overall improvement in performance at M1J15 would not be significantly eroded in the cumulative scenario. Therefore, there would continue to be a net benefit to the highway network due to this scheme in the updated CIA scenario.

6.8 The Northampton Gateway development delivers a substantial suite of improvements to the A508 corridor, including the Roade Bypass. The CIA provided at Technical 12 demonstrates that there would be little interaction between the A508 and A43 corridors in the cumulative scenario examined in that work. It is not considered that the revised Rail Central highway mitigation strategy would materially impact that conclusion. Therefore, the benefits to the A508, afforded by the Northampton Gateway A508 corridor improvements, would remain in the updated CIA scenario.

6.9 The VISSIM modelling included in the Northampton Gateway TA of the Northampton Gateway improvement scheme at M1J15A, demonstrated significant improvement in the performance of both M1 diverge slips, which in the Reference Case were shown to experience queuing back to the M1 mainline, resulting in flow breakdown on the M1. The VISSIM modelling included in the original CIA showed that some of the benefit to the M1 northbound diverge would be eroded, with queueing reaching back to the mainline M1 in the CIA scenario.

6.10 Whilst it has not been possible to run the VISSIM model for the revised Rail Central mitigation strategy, the LinSig modelling provided at the table at paragraph 4.9 of this Technical Note indicates that, whilst the queue on the M1 northbound diverge at M1J15A would reach the mainline in the 2031 evening peak hour, it would still represent an improvement on the Reference Case position without the SRFI schemes. It is therefore concluded that this benefit would remain in the updated CIA scenario, albeit a reduced benefit than that likely with Northampton Gateway alone.

Adverse impacts in the cumulative scenario

6.11 The revised Rail Central highway mitigation strategy seeks to attract traffic onto the A43 and A5076 Ring Road corridors. To achieve this, improvement schemes are proposed at M1J15A and junctions on the western section of the A5076 Ring Road corridor, including the A5076/Towcester Road/ Mere Way/Tesco roundabout.

6.12 However, it has been demonstrated at Section 3 of this Technical Note that the submitted Rail Central mitigation schemes at M1J15A and the A5076/Towcester Road/Tesco roundabout do not adequately accommodate the forecast traffic demand in the 2031 DS6 assessment scenario for Rail Central only. Based on the assessment included in Section 4 of this Technical Note, which uses the 2031 J3 cumulative scenario traffic flow set from the CIA, it is reasonable to conclude that the performance of these junctions would deteriorate further due to the combined traffic impacts of both SRFI developments, with the revised Rail Central highway mitigation strategy.

6.13 Technical Note 12 (ES Appendix 12.2) concluded that the CIA assessment undertaken at that time (which included a larger highway mitigation scheme at M1J15A) showed significant increases in queueing on the A43 approach to M1J15A in comparison to the Reference Case. However, in the updated CIA scenario (with the reduced Rail Central highway mitigation at M1J15A), there would be significantly increased queueing on the

A5123 approach in the morning peak hour and further significant increases in queueing on the A43 approach in both peak hours. Particularly in the evening peak hour when the MMQ would reach 311 pcus, or 1.87km.

6.14 Therefore, given that queuing on the A43 and A5123 approaches to M1J15A is forecast to significantly deteriorate in the updated CIA scenario, coupled with a revised Rail Central highway mitigation strategy that requires and encourages traffic to use the A43 corridor, it is considered that the forecast adverse cumulative impacts on the A43 and A5123 approaches to M1J15A will be unacceptable to Highways England and Northamptonshire County Council, as the impact on the A43 would be severe.

6.15 Due to the adverse impacts described above, there are likely to be further residual impacts on the wider highway network. These impacts cannot be expressly quantified at this time, as to do so would require additional modelling using the NSTM2. However, the following discussion indicates where these impacts are likely to occur, based on the updated CIA work undertaken in this Technical Note:

Increased 'rat-running' traffic in villages

- Systra's Strategic Modelling Assessment report (Rail Central TA Appendix R)) shows that without the improvement scheme at M1J15A there would be significant rat-running through villages to the east and west of the A43 in both the 2031 morning and evening peak hours in the Rail Central only scenario. This rat running is shown to be removed in the strategic modelling undertaken to support the Rail Central TA. However, it has been shown that in the updated CIA scenario, there would be significant queuing on A5123 approach in the morning peak hour and the A43 approach in both peak hours. Therefore, it is considered that in the cumulative scenario, drivers would be likely to avoid the congestion on the A5123 and A43 in the morning peak hour and on the A43 in the evening peak hour, potentially reassigning to the A45 and M1J15, or rat-running through neighbouring villages.

Reduced performance on key routes and junction in Northampton

- The CIA demonstrated that there would be a material impact at the A4500 Weedon Road/A5076 Upton Way/Tollgate Way gyratory and concluded that this impact could be mitigated by a proposal highway mitigation scheme identified by Rail Central at the time of their Stage 2 Statutory Consultation. However, this improvement scheme is no longer being promoted by Rail Central. Nevertheless, the submitted Rail Central TA, shows significant traffic increases towards Northampton Town Centre along the Towcester Road and A5076 Upton Way corridors (2031 DS6 scenario). Considering the additional traffic drawn to the A5076 Upton Way corridor by the Rail Central highway mitigation strategy, it is highly likely that an unacceptable cumulative impact would remain at this location in the updated CIA scenario.
- Whilst the CIA did not show a material impact at the A4500 St Peters Way/A508 Horseshoe Street/A5123 St Peters Way/Towcester Road gyratory when compared to the 2031 D1 Reference Case, the junction was shown to operate significantly over capacity. The Rail Central TA shows traffic increases at this junction due to the revised Rail Central highway mitigation strategy (2031 DS6 scenario). It is therefore considered that there may be a material cumulative impact at this junction that would require mitigation in the updated CIA scenario.

6.16 In conclusion, when considered across the network, the combined highway mitigation proposed by both Northampton Gateway and Rail Central would result in an improvement in performance at M1J15, the A508 and on the diverge slip roads at M1J15A when compared with the Reference Case (i.e. compared to the likely transport conditions without either scheme of their highway mitigation).

6.17 Some parts of the highway network will see limited if any cumulative impacts, with limited interaction between the two development proposals on the A508 corridor, and the A43 corridor. This means that even with both SRFIs in place, many benefits expected from the Northampton Gateway proposals would remain (such as to Roade and other parts of the A508 corridor).

6.18 However, due predominantly to the impacts of the Rail Central development, in combination there are other areas on the network where there would be unacceptable adverse impacts. Most notably at M1J15A on the A5123 and A43 approaches, and at the A5076/Towcester Road/Tesco junction in Northampton. There may also be potential cumulative impacts on the network towards Northampton Town Centre, along the Towcester Road corridor, and on the A5076 Upton Way corridor.

Updated CIA - Public Transport Strategy and Public Rights of Way (PRoW)

6.19 There would not be any interaction between the public transport strategies for the two SRFI developments and therefore there would not be an adverse impact in the updated CIA scenario.

6.20 Within the Northampton Gateway SRFI site, public footpaths KX17 and KX13 that cross the main site would be diverted and extended to form a loop within the landscape bunding. To the south, a public footpath would complete the new loop arrangement linking with the existing public footpath and bridge over the West Coast Mainline Northampton Loop railway. The Rail Central proposal also includes a footpath over the railway line as part of their proposed diversion of PRoW KX13, with the footpath then tracking alongside the railway line before crossing the railway again to the north. Therefore, the respective PRoW strategies for the two schemes overlap.

6.21 The location of the Rail Central proposed crossing for diverted PRoW KX13 is incompatible with the required earthworks for the Northampton Gateway scheme at the southern rail spur. However, it is considered that this could be addressed by an amendment to the Rail Central scheme, to move the location of the proposed Rail Central KX13 crossing south.

6.22 Elsewhere there are no other conflicts between the walking and cycling strategies proposed by the two schemes. However, the Rail Central DCO submission provides no details of the likely impacts on existing PRoW KX2/LA13 that crosses the A43 to the south of M1J15A, and how this route will be accommodated and/or amended as a result of the highway mitigation works that are proposed by Rail Central at M1J15A. The proposed Northampton Gateway highway mitigation scheme for this junction includes the diversion and improvement of the PRoW crossing.

APPENIDX A

TRANSPORT WORKING GROUP CORRESPONDENCE

Mark Higgins

From: Seldon, Martin <Martin.Seldon@highwaysengland.co.uk>
Sent: 12 December 2018 16:31
To: Sim-Jones, Rob; Stuart Dunhill; 'Aoife O'Toole'
Cc: Mark Higgins; Simon Hilditch; Ian Rigby; Draper, Martin; Hussain, Kazi
Subject: RE: Northampton Gateway - Transport Working Group mtg - ExA requirement to update cumulative impact assessment with Rail Central

Hi Stuart

I can confirm that your suggested approach to updating the CIA was appropriate from a Highways England perspective.

Kind regards

Martin Seldon, Assistant Spatial Planning & Economic Development Manager
Highways England | The Cube | 199 Wharfside Street | Birmingham | B1 1RN
Tel: +44 (0) 300 4703345 | **Mobile**: + [redacted]
Web: http://highwaysengland.co.uk
GTN: 0300 470 3345

From: Sim-Jones, Rob [mailto:RSim-Jones@kierwsp.co.uk]
Sent: 11 December 2018 13:32
To: Stuart Dunhill; Seldon, Martin; 'Aoife O'Toole'
Cc: Mark Higgins; Simon Hilditch; Ian Rigby; Draper, Martin; Hussain, Kazi
Subject: RE: Northampton Gateway - Transport Working Group mtg - ExA requirement to update cumulative impact assessment with Rail Central

Good afternoon Stuart,

Thank you for your e-mail. I can confirm that your suggested approach to updating the CIA was appropriate from a LHA perspective.

Kind regards,

Rob

Rob Sim-Jones
Principal Engineer – (Principal Lead) Development Management
Northamptonshire Highways
One Angel Square
Angel Street
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NN1 1ED
DDI: +44(0)1604 364338
Web: www.kierwsp.co.uk;

From: Stuart Dunhill [mailto:Stuart.Dunhill@ADCinfrastructure.com]
Sent: 10 December 2018 12:27
To: 'Martin Seldon'; Sim-Jones, Rob; 'Aoife O'Toole'
Cc: Mark Higgins; Simon Hilditch; Ian Rigby; Draper, Martin; 'Kazi Hussain'
Subject: RE: Northampton Gateway - Transport Working Group mtg - ExA requirement to update cumulative impact assessment with Rail Central

Rob, Martin and Aoife.

Thank you for meeting last Friday.

At the meeting we discussed in more detail our proposed approach (set out below) for updating the cumulative impact assessment (CIA) of the Northampton Gateway + Rail Central schemes.

At the meeting you confirmed that our proposed approach to updating the CIA was sensible and appropriate, given that there is not sufficient time to undertake further strategic or micro-simulation modelling, and also in light of the outcome of our initial assessment of the Rail Central proposals.

I should be grateful if you could respond to this email to confirm the above and hence your agreement to our methodology to update the CIA.

Kind regards

Stuart Dunhill BEng(Hons) PhD CEng MICE
Director – ADC Infrastructure Limited

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Winners of the Insiders East Midlands Property Dinner **Client Advisor of the Year** *Award 2018*

From: Stuart Dunhill
Sent: 29 November 2018 16:27
To: 'Martin Seldon' <martin.seldon@highwaysengland.co.uk>; 'Kazi Hussain' <kazi.hussain@highwaysengland.co.uk>; 'Aoife O'Toole' <aoife.otoole@aecom.com>; 'Sim-Jones, Rob' <RSim-Jones@kierwsp.co.uk>; MDraper@kierwsp.co.uk
Cc: Mark Higgins - ADC Infrastructure (Mark.Higgins@ADCinfrastructure.com) <Mark.Higgins@ADCinfrastructure.com>; 'Simon Hilditch' <Simon.Hilditch@bwbconsulting.com>; 'Ian Rigby' <Ian.Rigby@segro.com>
Subject: Northampton Gateway - Transport Working Group mtg - ExA requirement to update cumulative impact assessment with Rail Central

Martin/Kazi/Aoife,

I trust that you are all well.

As you may be aware, as part of the examination of Northampton Gateway, the Examining Authority requires that we (the Applicant) update our assessment of the cumulative impact of the Northampton Gateway + Rail Central schemes. We only have until 8 January 2019 to complete this work and therefore there is not sufficient time to undertake further strategic or microsimulation modelling. We have therefore set out the following proposed approach to the Examining Authority:

- undertake a review of the Rail Central transport mitigation strategy and the Rail Central highway mitigation proposals;
- based on an understanding of the Rail Central proposals and assessments submitted to date, comment on any interaction between the respective mitigation strategies and identify where they may be incompatible;
- undertake junction modelling at the identified locations to provide quantitative data to inform a qualitative assessment of the likely residual impacts; and
- for Deadline 4, provide an updated CIA, explaining the significance of the cumulative effects and how this significance has been determined.

Our review of the recently submitted Rail Central DCO application suggests that the highway works that they now propose at M1 Junction 15A may not be sufficient to accommodate the traffic impact of the Rail Central proposals alone and therefore would not be sufficient to accommodate the cumulative impact of the combined development.

We would therefore like to reconvene a meeting of the Transport Working Group for us to agree the approach for the updated cumulative impact assessment. I have spoke with Rob Sim-Jones this afternoon regarding this, and he agrees that this would be helpful. We are however limited on potential dates and **we have agreed that we will meet NCC on the 7 December (time and venue tbc).**

Whilst I realise that the cumulative assessment is not a requirement of the 02/2013 DfT Circular, given the responsibly for the junction falls to Highways England, it would be most helpful to have your input also. Hence are you available to attend a meeting on the 7th December? We could meet in Birmingham, if that helps. Or we could meet at Segro's (Roxhill's) offices in Rugby.

If you can let me know your availability and preference of venue, and I will then confirm arrangements.

Kind regards

Stuart Dunhill BEng(Hons) PhD CEng MICE
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Winners of the Insiders East Midlands Property Dinner **Client Advisor of the Year** *Award 2018*

APPENIDX B

RAIL CENTRAL M1 J15A PROPOSED IMPROVEMENT SCHEME

N

M1

A5123

Proposed widening of existing roundabout approach

Proposed signalisation of roundabout

Proposed traffic signal junction

Proposed link road

Proposed structure over Grand Union Canal -
refer to structure drawings RC-ALG-PLN-2.31.1 & RC-ALG-PLN-2.31.2

SEE INSET A

Proposed ghost island merge

A43

M1

0 50 100 150 200m

INSET A - SCALE 1:1250

LEGEND

Reproduced from Ordnance Survey Superplan Data with the permission of The Controller of Her Majesty's Stationery Office. Crown Copyright - Licence No. AL100034021.

Based on MK Surveys' topographical survey drawing reference 25444 dated May 2018.

- Red Line Boundary
- New Carriageway
- New Verge

Notes.

1. For information on structure designs please refer to drawings RC-ALG-PLN-2.31.1 and RC-ALG-PLN-2.31.2
2. For information on drainage designs please refer to drawings RC-ALG-APP_6.1.13.2.14 and RC-ALG-APP_6.1.13.2.15

REV	DATE	DETAILS OF ISSUE/REVISION	DRW	REV
P1	16/08/18	First Issue	CJH	AJC

Gazeley
a GLP company

ASHFIELD LAND

Rail Central
Northamptonshire

THE RAIL CENTRAL RAIL FREIGHT INTERCHANGE AND HIGHWAY ORDER 201[x]

DRAWING TITLE
JUNCTION 15A
GENERAL ARRANGEMENT

SCALE	1:2500	DRAWN	CJH
PAGE SIZE	A1	REVIEWED	AJC
REGULATION	6(2)	DOCUMENT	LAYOUT

DRAWING STATUS
PLANNING

DRAWING No	REVISION
RC-ALG-PLN-2.28.0	P1

APPENIDX C

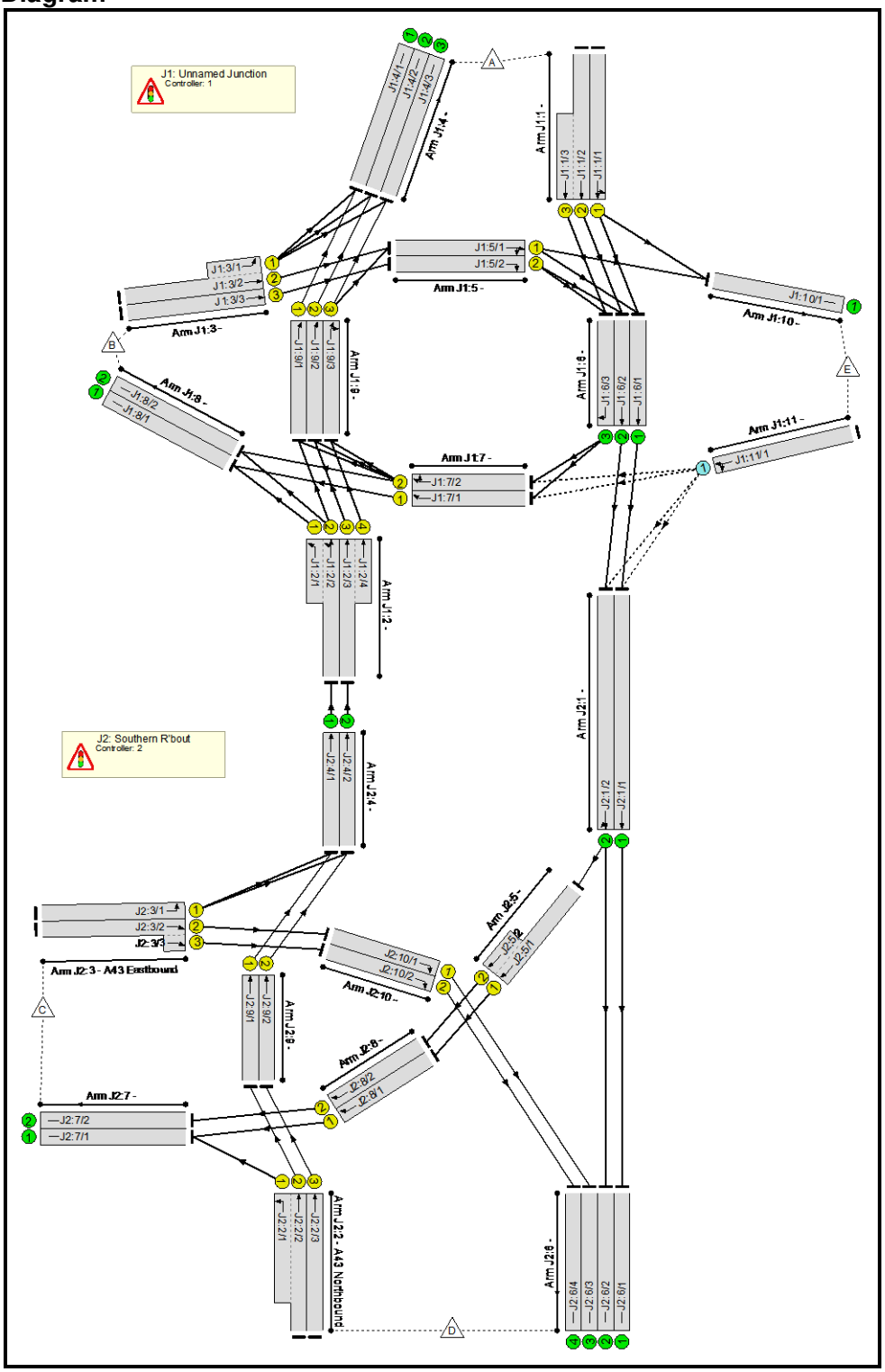
M1 J15A LINGSIG MODELLING RESULTS

Full Input Data And Results

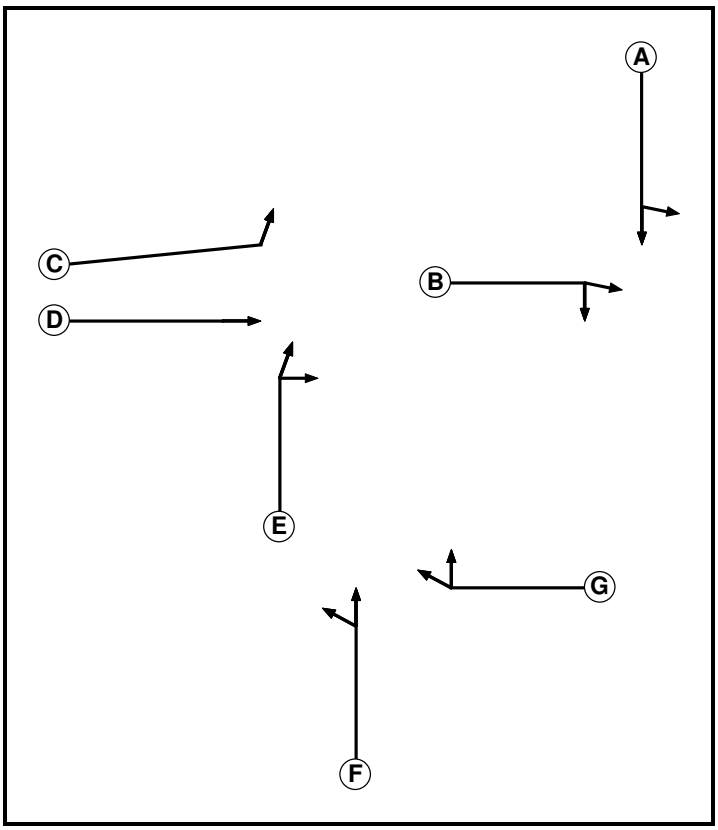
User and Project Details

Project:	**Northampton Gateway**
Title:	**Rail Central M1J15A CIA**
File name:	190107 M1J15A RC Mitigation.lsg3x
Author:	Mark Higgins
Company:	ADC Infrastructure
Address:	Nottingham
Notes:	Model corrections as per Technical Note 13

Network Layout Diagram



C1
Phase Diagram



Phase Input Data

Phase Name	Phase Type	Stage Stream	Assoc. Phase	Street Min	Cont Min
A	Traffic	1		7	7
B	Traffic	1		7	7
C	Traffic	2		7	7
D	Traffic	2		7	7
E	Traffic	2		7	7
F	Traffic	3		7	7
G	Traffic	3		7	7

Phase Intergreens Matrix

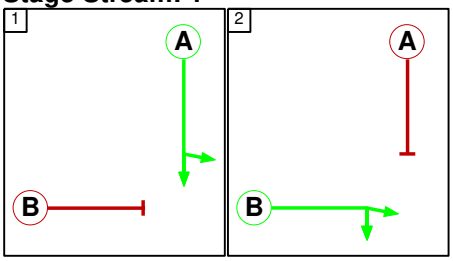
		Starting Phase						
		A	B	C	D	E	F	G
Terminating Phase	A		6	-	-	-	-	-
	B	7		-	-	-	-	-
	C	-	-		-	5	-	-
	D	-	-	-		5	-	-
	E	-	-	7	5		-	-
	F	-	-	-	-	-		6
	G	-	-	-	-	-	5	

Phases in Stage

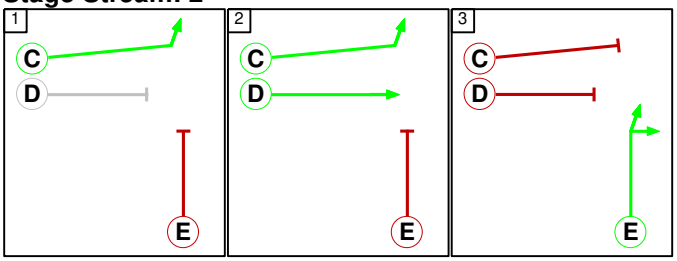
Stream	Stage No.	Phases in Stage
1	1	A
1	2	B
2	1	C
2	2	C D
2	3	E
3	1	F
3	2	G

Stage Diagram

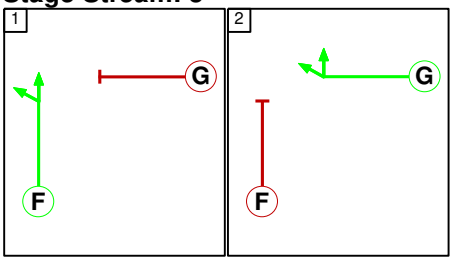
Stage Stream: 1



Stage Stream: 2



Stage Stream: 3



Prohibited Stage Change

Stage Stream: 1

From Stage \ To Stage	1	2
1		6
2	7	

Stage Stream: 2

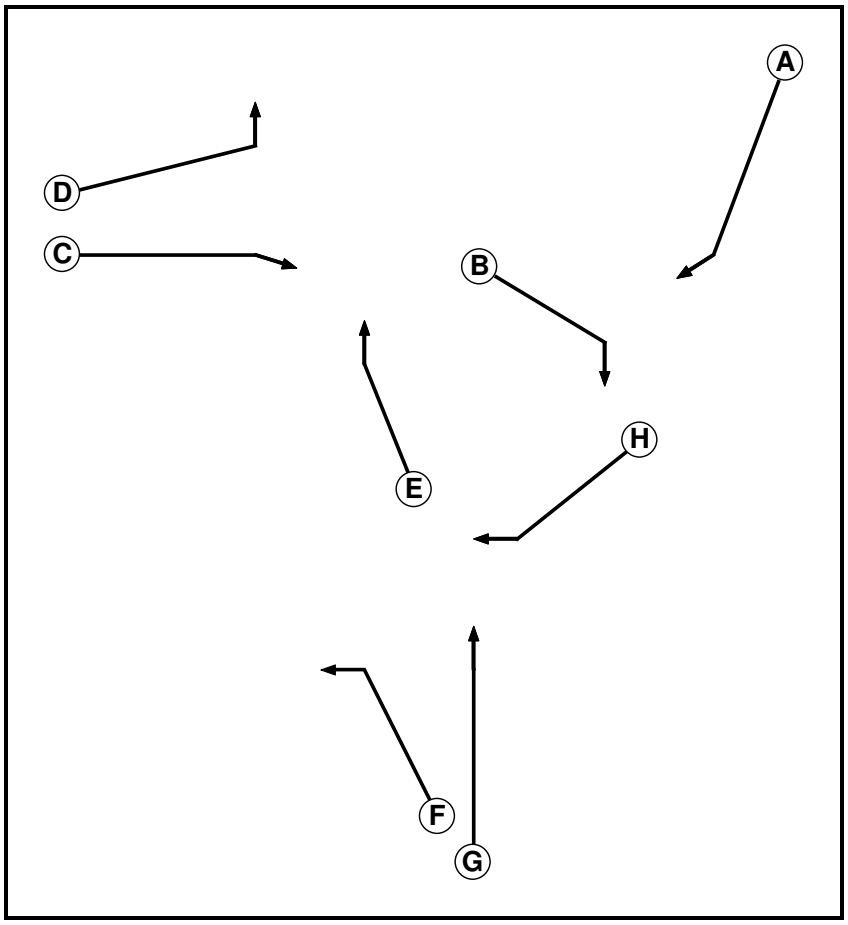
From Stage \ To Stage	1	2	3
1		2	5
2	0		5
3	7	7	

Stage Stream: 3

From Stage \ To Stage	1	2
1		6
2	5	

C2

Phase Diagram



Phase Input Data

Phase Name	Phase Type	Stage Stream	Assoc. Phase	Street Min	Cont Min
A	Traffic	1		7	7
B	Traffic	1		7	7
C	Traffic	2		7	7
D	Traffic	2		7	7
E	Traffic	2		7	7
F	Traffic	3		7	7
G	Traffic	3		7	7
H	Traffic	3		7	7

Phase Intergreens Matrix

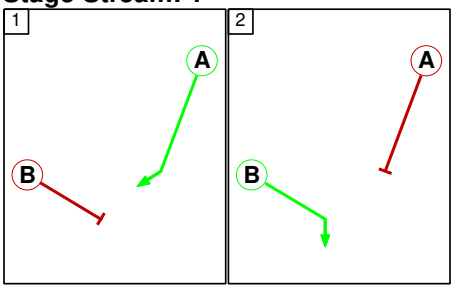
		Starting Phase							
		A	B	C	D	E	F	G	H
Terminating Phase	A		7	-	-	-	-	-	-
	B	6		-	-	-	-	-	-
	C	-	-		-	5	-	-	-
	D	-	-	-		5	-	-	-
	E	-	-	8	5		-	-	-
	F	-	-	-	-	-		-	5
	G	-	-	-	-	-	-		6
	H	-	-	-	-	-	8	5	

Phases in Stage

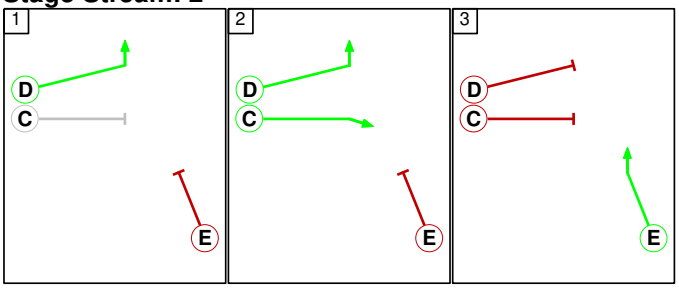
Stream	Stage No.	Phases in Stage
1	1	A
1	2	B
2	1	D
2	2	C D
2	3	E
3	1	F
3	2	F G
3	3	H

Stage Diagram

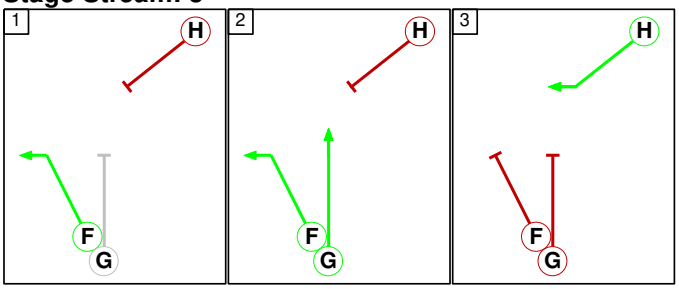
Stage Stream: 1



Stage Stream: 2



Stage Stream: 3



Prohibited Stage Change

Stage Stream: 1

	To Stage		
From Stage		1	2
	1		7
	2	6	

Stage Stream: 2

	To Stage			
From Stage		1	2	3
	1		2	5
	2	0		5
	3	5	8	

Stage Stream: 3

	To Stage			
From Stage		1	2	3
	1		2	5
	2	0		6
	3	8	8	

Give-Way Lane Input Data

Junction: J1: Unnamed Junction											
Lane	**Movement**	**Max Flow when Giving Way (PCU/Hr)**	**Min Flow when Giving Way (PCU/Hr)**	**Opposing Lane**	**Opp. Lane Coeff.**	**Opp. Mvmnts.**	**Right Turn Storage (PCU)**	**Non-Blocking Storage (PCU)**	**RTF**	**Right Turn Move up (s)**	**Max Turns in Intergreen (PCU)**
J1:11/1	J1:7/1 (Ahead)	1000	0	J1:6/1	0.33	All	-	-	-	-	-
				J1:6/2	0.33	All					
				J1:6/3	0.33	All					
	J1:7/2 (Ahead)	1000	0	J1:6/1	0.33	All					
				J1:6/2	0.33	All					
				J1:6/3	0.33	All					
	J2:1/1 (Left)	1000	0	J1:6/1	0.33	All					
				J1:6/2	0.33	All					
				J1:6/3	0.33	All					
	J2:1/2 (Left)	1000	0	J1:6/1	0.33	All					
				J1:6/2	0.33	All					
				J1:6/3	0.33	All					

Junction: J2: Southern R'bout
There are no Opposed Lanes in this Junction

Lane Input Data

Junction: J1: Unnamed Junction												
Lane	**Lane Type**	**Phases**	**Start Disp.**	**End Disp.**	**Physical Length (PCU)**	**Sat Flow Type**	**Def User Saturation Flow (PCU/Hr)**	**Lane Width (m)**	**Gradient**	**Nearside Lane**	**Turns**	**Turning Radius (m)**
J1:1/1	U	A	2	3	60.0	User	1800	-	-	-	-	-
J1:1/2	U	A	2	3	60.0	User	1800	-	-	-	-	-
J1:1/3	U	A	2	3	8.0	User	1800	-	-	-	-	-
J1:2/1	U	F	2	3	6.0	User	1900	-	-	-	-	-
J1:2/2	U	F	2	3	24.3	User	1900	-	-	-	-	-
J1:2/3	U	F	2	3	24.3	User	1900	-	-	-	-	-
J1:2/4	U	F	2	3	6.0	User	1800	-	-	-	-	-
J1:3/1	U	C	2	3	5.0	User	1800	-	-	-	-	-
J1:3/2	U	D	2	3	60.0	User	1800	-	-	-	-	-
J1:3/3	U	D	2	3	60.0	User	1800	-	-	-	-	-
J1:4/1	U		2	3	3.0	Inf	-	-	-	-	-	-
J1:4/2	U		2	3	3.0	Inf	-	-	-	-	-	-
J1:4/3	U		2	3	3.0	Inf	-	-	-	-	-	-
J1:5/1	U	B	2	3	8.7	User	1900	-	-	-	-	-
J1:5/2	U	B	2	3	8.7	User	1900	-	-	-	-	-
J1:6/1	U		2	3	16.5	Inf	-	-	-	-	-	-
J1:6/2	U		2	3	16.5	Inf	-	-	-	-	-	-
J1:6/3	U		2	3	60.0	Inf	-	-	-	-	-	-
J1:7/1	U	G	2	3	4.3	User	1900	-	-	-	-	-
J1:7/2	U	G	2	3	4.3	User	1800	-	-	-	-	-
J1:8/1	U		2	3	3.0	Inf	-	-	-	-	-	-
J1:8/2	U		2	3	3.0	Inf	-	-	-	-	-	-
J1:9/1	U	E	2	3	12.2	User	1900	-	-	-	-	-
J1:9/2	U	E	2	3	12.2	User	1900	-	-	-	-	-
J1:9/3	U	E	2	3	12.2	User	1900	-	-	-	-	-
J1:10/1	U		2	3	60.0	Inf	-	-	-	-	-	-
J1:11/1	O		2	3	60.0	Inf	-	-	-	-	-	-

Junction: J2: Southern R'bout												
Lane	Lane Type	Phases	Start Disp.	End Disp.	Physical Length (PCU)	Sat Flow Type	Def User Saturation Flow (PCU/Hr)	Lane Width (m)	Gradient	Nearside Lane	Turns	Turning Radius (m)
J2:1/1	U		2	3	24.3	Inf	-	-	-	-	-	-
J2:1/2	U		2	3	24.3	Inf	-	-	-	-	-	-
J2:2/1 (A43 Northbound)	U	F	2	3	15.0	User	1800	-	-	-	-	-
J2:2/2 (A43 Northbound)	U	G	2	3	60.0	User	1800	-	-	-	-	-
J2:2/3 (A43 Northbound)	U	G	2	3	60.0	User	1800	-	-	-	-	-
J2:3/1 (A43 Eastbound)	U	D	2	3	60.0	User	1800	-	-	-	-	-
J2:3/2 (A43 Eastbound)	U	C	2	3	60.0	User	1800	-	-	-	-	-
J2:3/3 (A43 Eastbound)	U	C	2	3	2.0	User	1800	-	-	-	-	-
J2:4/1	U		2	3	3.0	Inf	-	-	-	-	-	-
J2:4/2	U		2	3	3.0	Inf	-	-	-	-	-	-
J2:5/1	U	A	2	3	7.0	User	1800	-	-	-	-	-
J2:5/2	U	A	2	3	4.0	User	1800	-	-	-	-	-
J2:6/1	U		2	3	3.0	Inf	-	-	-	-	-	-
J2:6/2	U		2	3	3.0	Inf	-	-	-	-	-	-
J2:6/3	U		2	3	60.0	Inf	-	-	-	-	-	-
J2:6/4	U		2	3	60.0	Inf	-	-	-	-	-	-
J2:7/1	U		2	3	3.0	Inf	-	-	-	-	-	-
J2:7/2	U		2	3	3.0	Inf	-	-	-	-	-	-
J2:8/1	U	H	2	3	5.0	User	1900	-	-	-	-	-
J2:8/2	U	H	2	3	5.0	User	1900	-	-	-	-	-
J2:9/1	U	E	2	3	5.0	User	1900	-	-	-	-	-
J2:9/2	U	E	2	3	5.0	User	1900	-	-	-	-	-
J2:10/1	U	B	2	3	5.0	User	1900	-	-	-	-	-
J2:10/2	U	B	2	3	5.0	User	1900	-	-	-	-	-

Traffic Flow Groups

Flow Group	Start Time	End Time	Duration	Formula
1: '2031 RC AM Peak'	08:00	09:00	01:00	
2: '2031 RC PM Peak'	17:00	18:00	01:00	
3: '2031 J3 AM Peak'	08:00	09:00	01:00	
4: '2031 J3 PM Peak'	17:00	18:00	01:00	

Scenario 1: '2031 DS6 AM' (FG1: '2031 RC AM Peak', Plan 1: 'Network Control Plan 1')

Traffic Flows, Desired

Desired Flow :

		Destination					
		A	B	C	D	E	Tot.
Origin	A	0	291	156	1987	60	2494
	B	310	0	40	740	14	1104
	C	140	40	0	566	6	752
	D	1547	502	565	0	7	2621
	E	10	2	2	1	0	15
	Tot.	2007	835	763	3294	87	6986

Traffic Lane Flows

Lane	Scenario 1: 2031 DS6 AM
Junction: J1: Unnamed Junction	
J1:1/1	1194
J1:1/2 (with short)	1300(In) 1009(Out)
J1:1/3 (short)	291
J1:2/1 (short)	406
J1:2/2 (with short)	1097(In) 691(Out)
J1:2/3 (with short)	1145(In) 579(Out)
J1:2/4 (short)	566
J1:3/1 (short)	310
J1:3/2 (with short)	653(In) 343(Out)
J1:3/3	451
J1:4/1	666
J1:4/2	683
J1:4/3	658
J1:5/1	356
J1:5/2	451
J1:6/1	1463
J1:6/2	1460
J1:6/3	291
J1:7/1	169
J1:7/2	134
J1:8/1	575
J1:8/2	260
J1:9/1	562
J1:9/2	580
J1:9/3	568
J1:10/1	87
J1:11/1	15
Junction: J2: Southern R'bout	
J2:1/1	1463
J2:1/2	1463
J2:2/1 (short)	565
J2:2/2 (with short)	1515(In) 950(Out)
J2:2/3	1106
J2:3/1	186
J2:3/2 (with short)	566(In) 283(Out)

J2:3/3 (short)	283
J2:4/1	1097
J2:4/2	1145
J2:5/1 (with short)	198(In) 99(Out)
J2:5/2 (short)	99
J2:6/1	1463
J2:6/2	1265
J2:6/3	283
J2:6/4	283
J2:7/1	664
J2:7/2	99
J2:8/1	99
J2:8/2	99
J2:9/1	950
J2:9/2	1106
J2:10/1	283
J2:10/2	283

Lane Saturation Flows

Junction: J1: Unnamed Junction								
Lane	**Lane Width (m)**	**Gradient**	**Nearside Lane**	**Allowed Turns**	**Turning Radius (m)**	**Turning Prop.**	**Sat Flow (PCU/Hr)**	**Flared Sat Flow (PCU/Hr)**
J1:1/1	This lane uses a directly entered Saturation Flow						1800	1800
J1:1/2	This lane uses a directly entered Saturation Flow						1800	1800
J1:1/3	This lane uses a directly entered Saturation Flow						1800	1800
J1:2/1	This lane uses a directly entered Saturation Flow						1900	1900
J1:2/2	This lane uses a directly entered Saturation Flow						1900	1900
J1:2/3	This lane uses a directly entered Saturation Flow						1900	1900
J1:2/4	This lane uses a directly entered Saturation Flow						1800	1800
J1:3/1	This lane uses a directly entered Saturation Flow						1800	1800
J1:3/2	This lane uses a directly entered Saturation Flow						1800	1800
J1:3/3	This lane uses a directly entered Saturation Flow						1800	1800
J1:4/1	Infinite Saturation Flow						Inf	Inf
J1:4/2	Infinite Saturation Flow						Inf	Inf
J1:4/3	Infinite Saturation Flow						Inf	Inf
J1:5/1	This lane uses a directly entered Saturation Flow						1900	1900
J1:5/2	This lane uses a directly entered Saturation Flow						1900	1900
J1:6/1	Infinite Saturation Flow						Inf	Inf
J1:6/2	Infinite Saturation Flow						Inf	Inf
J1:6/3	Infinite Saturation Flow						Inf	Inf
J1:7/1	This lane uses a directly entered Saturation Flow						1900	1900
J1:7/2	This lane uses a directly entered Saturation Flow						1800	1800
J1:8/1	Infinite Saturation Flow						Inf	Inf
J1:8/2	Infinite Saturation Flow						Inf	Inf
J1:9/1	This lane uses a directly entered Saturation Flow						1900	1900
J1:9/2	This lane uses a directly entered Saturation Flow						1900	1900
J1:9/3	This lane uses a directly entered Saturation Flow						1900	1900
J1:10/1	Infinite Saturation Flow						Inf	Inf
J1:11/1	Infinite Saturation Flow						Inf	Inf

Junction: J2: Southern R'bout								
Lane	**Lane Width (m)**	**Gradient**	**Nearside Lane**	**Allowed Turns**	**Turning Radius (m)**	**Turning Prop.**	**Sat Flow (PCU/Hr)**	**Flared Sat Flow (PCU/Hr)**
J2:1/1	Infinite Saturation Flow						Inf	Inf
J2:1/2	Infinite Saturation Flow						Inf	Inf
J2:2/1 (A43 Northbound Lane 1)	This lane uses a directly entered Saturation Flow						1800	1800
J2:2/2 (A43 Northbound Lane 2)	This lane uses a directly entered Saturation Flow						1800	1800
J2:2/3 (A43 Northbound Lane 3)	This lane uses a directly entered Saturation Flow						1800	1800
J2:3/1 (A43 Eastbound Lane 1)	This lane uses a directly entered Saturation Flow						1800	1800
J2:3/2 (A43 Eastbound Lane 2)	This lane uses a directly entered Saturation Flow						1800	1800
J2:3/3 (A43 Eastbound Lane 3)	This lane uses a directly entered Saturation Flow						1800	1800
J2:4/1	Infinite Saturation Flow						Inf	Inf
J2:4/2	Infinite Saturation Flow						Inf	Inf
J2:5/1	This lane uses a directly entered Saturation Flow						1800	1800
J2:5/2	This lane uses a directly entered Saturation Flow						1800	1800
J2:6/1	Infinite Saturation Flow						Inf	Inf
J2:6/2	Infinite Saturation Flow						Inf	Inf
J2:6/3	Infinite Saturation Flow						Inf	Inf
J2:6/4	Infinite Saturation Flow						Inf	Inf
J2:7/1	Infinite Saturation Flow						Inf	Inf
J2:7/2	Infinite Saturation Flow						Inf	Inf
J2:8/1	This lane uses a directly entered Saturation Flow						1900	1900
J2:8/2	This lane uses a directly entered Saturation Flow						1900	1900
J2:9/1	This lane uses a directly entered Saturation Flow						1900	1900
J2:9/2	This lane uses a directly entered Saturation Flow						1900	1900
J2:10/1	This lane uses a directly entered Saturation Flow						1900	1900
J2:10/2	This lane uses a directly entered Saturation Flow						1900	1900

Scenario 2: '2031 DS6 PM' (FG2: '2031 RC PM Peak', Plan 1: 'Network Control Plan 1')

Traffic Flows, Desired

Desired Flow :

		Destination					
		A	B	C	D	E	Tot.
Origin	A	0	297	264	1704	8	2273
	B	374	0	132	529	1	1036
	C	302	51	0	283	1	637
	D	1952	473	661	0	1	3087
	E	41	16	14	6	0	77
	Tot.	2669	837	1071	2522	11	7110

Traffic Lane Flows

Lane	Scenario 2: 2031 DS6 PM
Junction: J1: Unnamed Junction	
J1:1/1	1074
J1:1/2 (with short)	1199(In) 902(Out)
J1:1/3 (short)	297
J1:2/1 (short)	289
J1:2/2 (with short)	1292(In) 1003(Out)
J1:2/3 (with short)	1488(In) 732(Out)
J1:2/4 (short)	756
J1:3/1 (short)	374
J1:3/2 (with short)	628(In) 254(Out)
J1:3/3	408
J1:4/1	892
J1:4/2	881
J1:4/3	896
J1:5/1	256
J1:5/2	408
J1:6/1	1319
J1:6/2	1310
J1:6/3	297
J1:7/1	185
J1:7/2	169
J1:8/1	474
J1:8/2	363
J1:9/1	768
J1:9/2	756
J1:9/3	773
J1:10/1	11
J1:11/1	77
Junction: J2: Southern R'bout	
J2:1/1	1322
J2:1/2	1327
J2:2/1 (short)	661
J2:2/2 (with short)	1778(In) 1117(Out)
J2:2/3	1309
J2:3/1	354
J2:3/2 (with short)	283(In) 142(Out)

J2:3/3 (short)	141
J2:4/1	1292
J2:4/2	1488
J2:5/1 (with short)	410(In) 205(Out)
J2:5/2 (short)	205
J2:6/1	1322
J2:6/2	917
J2:6/3	142
J2:6/4	141
J2:7/1	866
J2:7/2	205
J2:8/1	205
J2:8/2	205
J2:9/1	1117
J2:9/2	1309
J2:10/1	142
J2:10/2	141

Lane Saturation Flows

Junction: J1: Unnamed Junction								
Lane	**Lane Width (m)**	**Gradient**	**Nearside Lane**	**Allowed Turns**	**Turning Radius (m)**	**Turning Prop.**	**Sat Flow (PCU/Hr)**	**Flared Sat Flow (PCU/Hr)**
J1:1/1	This lane uses a directly entered Saturation Flow						1800	1800
J1:1/2	This lane uses a directly entered Saturation Flow						1800	1800
J1:1/3	This lane uses a directly entered Saturation Flow						1800	1800
J1:2/1	This lane uses a directly entered Saturation Flow						1900	1900
J1:2/2	This lane uses a directly entered Saturation Flow						1900	1900
J1:2/3	This lane uses a directly entered Saturation Flow						1900	1900
J1:2/4	This lane uses a directly entered Saturation Flow						1800	1800
J1:3/1	This lane uses a directly entered Saturation Flow						1800	1800
J1:3/2	This lane uses a directly entered Saturation Flow						1800	1800
J1:3/3	This lane uses a directly entered Saturation Flow						1800	1800
J1:4/1	Infinite Saturation Flow						Inf	Inf
J1:4/2	Infinite Saturation Flow						Inf	Inf
J1:4/3	Infinite Saturation Flow						Inf	Inf
J1:5/1	This lane uses a directly entered Saturation Flow						1900	1900
J1:5/2	This lane uses a directly entered Saturation Flow						1900	1900
J1:6/1	Infinite Saturation Flow						Inf	Inf
J1:6/2	Infinite Saturation Flow						Inf	Inf
J1:6/3	Infinite Saturation Flow						Inf	Inf
J1:7/1	This lane uses a directly entered Saturation Flow						1900	1900
J1:7/2	This lane uses a directly entered Saturation Flow						1800	1800
J1:8/1	Infinite Saturation Flow						Inf	Inf
J1:8/2	Infinite Saturation Flow						Inf	Inf
J1:9/1	This lane uses a directly entered Saturation Flow						1900	1900
J1:9/2	This lane uses a directly entered Saturation Flow						1900	1900
J1:9/3	This lane uses a directly entered Saturation Flow						1900	1900
J1:10/1	Infinite Saturation Flow						Inf	Inf
J1:11/1	Infinite Saturation Flow						Inf	Inf

Junction: J2: Southern R'bout								
Lane	**Lane Width (m)**	**Gradient**	**Nearside Lane**	**Allowed Turns**	**Turning Radius (m)**	**Turning Prop.**	**Sat Flow (PCU/Hr)**	**Flared Sat Flow (PCU/Hr)**
J2:1/1	Infinite Saturation Flow						Inf	Inf
J2:1/2	Infinite Saturation Flow						Inf	Inf
J2:2/1 (A43 Northbound Lane 1)	This lane uses a directly entered Saturation Flow						1800	1800
J2:2/2 (A43 Northbound Lane 2)	This lane uses a directly entered Saturation Flow						1800	1800
J2:2/3 (A43 Northbound Lane 3)	This lane uses a directly entered Saturation Flow						1800	1800
J2:3/1 (A43 Eastbound Lane 1)	This lane uses a directly entered Saturation Flow						1800	1800
J2:3/2 (A43 Eastbound Lane 2)	This lane uses a directly entered Saturation Flow						1800	1800
J2:3/3 (A43 Eastbound Lane 3)	This lane uses a directly entered Saturation Flow						1800	1800
J2:4/1	Infinite Saturation Flow						Inf	Inf
J2:4/2	Infinite Saturation Flow						Inf	Inf
J2:5/1	This lane uses a directly entered Saturation Flow						1800	1800
J2:5/2	This lane uses a directly entered Saturation Flow						1800	1800
J2:6/1	Infinite Saturation Flow						Inf	Inf
J2:6/2	Infinite Saturation Flow						Inf	Inf
J2:6/3	Infinite Saturation Flow						Inf	Inf
J2:6/4	Infinite Saturation Flow						Inf	Inf
J2:7/1	Infinite Saturation Flow						Inf	Inf
J2:7/2	Infinite Saturation Flow						Inf	Inf
J2:8/1	This lane uses a directly entered Saturation Flow						1900	1900
J2:8/2	This lane uses a directly entered Saturation Flow						1900	1900
J2:9/1	This lane uses a directly entered Saturation Flow						1900	1900
J2:9/2	This lane uses a directly entered Saturation Flow						1900	1900
J2:10/1	This lane uses a directly entered Saturation Flow						1900	1900
J2:10/2	This lane uses a directly entered Saturation Flow						1900	1900

Scenario 3: '2031 J3 AM ' (FG3: '2031 J3 AM Peak', Plan 1: 'Network Control Plan 1')

Traffic Flows, Desired

Desired Flow :

	Destination						
		A	B	C	D	E	Tot.
Origin	A	0	188	315	2241	60	2804
	B	140	0	16	791	14	961
	C	424	100	0	452	6	982
	D	1284	803	820	0	7	2914
	E	10	2	2	1	0	15
	Tot.	1858	1093	1153	3485	87	7676

Traffic Lane Flows

Lane	Scenario 3: 2031 J3 AM
Junction: J1: Unnamed Junction	
J1:1/1	1370
J1:1/2 (with short)	1434(In) 1246(Out)
J1:1/3 (short)	188
J1:2/1 (short)	353
J1:2/2 (with short)	1254(In) 901(Out)
J1:2/3 (with short)	1370(In) 683(Out)
J1:2/4 (short)	687
J1:3/1 (short)	140
J1:3/2 (with short)	522(In) 382(Out)
J1:3/3	439
J1:4/1	407
J1:4/2	730
J1:4/3	721
J1:5/1	395
J1:5/2	439
J1:6/1	1678
J1:6/2	1685
J1:6/3	188
J1:7/1	114
J1:7/2	86
J1:8/1	467
J1:8/2	626
J1:9/1	361
J1:9/2	683
J1:9/3	687
J1:10/1	87
J1:11/1	15
Junction: J2: Southern R'bout	
J2:1/1	1678
J2:1/2	1688
J2:2/1 (short)	820
J2:2/2 (with short)	1772(In) 952(Out)
J2:2/3	1142
J2:3/1	530
J2:3/2 (with short)	452(In) 226(Out)

J2:3/3 (short)	226
J2:4/1	1254
J2:4/2	1370
J2:5/1 (with short)	333(In) 167(Out)
J2:5/2 (short)	166
J2:6/1	1678
J2:6/2	1355
J2:6/3	226
J2:6/4	226
J2:7/1	987
J2:7/2	166
J2:8/1	167
J2:8/2	166
J2:9/1	952
J2:9/2	1142
J2:10/1	226
J2:10/2	226

Lane Saturation Flows

Junction: J1: Unnamed Junction								
Lane	**Lane Width (m)**	**Gradient**	**Nearside Lane**	**Allowed Turns**	**Turning Radius (m)**	**Turning Prop.**	**Sat Flow (PCU/Hr)**	**Flared Sat Flow (PCU/Hr)**
J1:1/1	This lane uses a directly entered Saturation Flow						1800	1800
J1:1/2	This lane uses a directly entered Saturation Flow						1800	1800
J1:1/3	This lane uses a directly entered Saturation Flow						1800	1800
J1:2/1	This lane uses a directly entered Saturation Flow						1900	1900
J1:2/2	This lane uses a directly entered Saturation Flow						1900	1900
J1:2/3	This lane uses a directly entered Saturation Flow						1900	1900
J1:2/4	This lane uses a directly entered Saturation Flow						1800	1800
J1:3/1	This lane uses a directly entered Saturation Flow						1800	1800
J1:3/2	This lane uses a directly entered Saturation Flow						1800	1800
J1:3/3	This lane uses a directly entered Saturation Flow						1800	1800
J1:4/1	Infinite Saturation Flow						Inf	Inf
J1:4/2	Infinite Saturation Flow						Inf	Inf
J1:4/3	Infinite Saturation Flow						Inf	Inf
J1:5/1	This lane uses a directly entered Saturation Flow						1900	1900
J1:5/2	This lane uses a directly entered Saturation Flow						1900	1900
J1:6/1	Infinite Saturation Flow						Inf	Inf
J1:6/2	Infinite Saturation Flow						Inf	Inf
J1:6/3	Infinite Saturation Flow						Inf	Inf
J1:7/1	This lane uses a directly entered Saturation Flow						1900	1900
J1:7/2	This lane uses a directly entered Saturation Flow						1800	1800
J1:8/1	Infinite Saturation Flow						Inf	Inf
J1:8/2	Infinite Saturation Flow						Inf	Inf
J1:9/1	This lane uses a directly entered Saturation Flow						1900	1900
J1:9/2	This lane uses a directly entered Saturation Flow						1900	1900
J1:9/3	This lane uses a directly entered Saturation Flow						1900	1900
J1:10/1	Infinite Saturation Flow						Inf	Inf
J1:11/1	Infinite Saturation Flow						Inf	Inf

Junction: J2: Southern R'bout								
Lane	**Lane Width (m)**	**Gradient**	**Nearside Lane**	**Allowed Turns**	**Turning Radius (m)**	**Turning Prop.**	**Sat Flow (PCU/Hr)**	**Flared Sat Flow (PCU/Hr)**
J2:1/1	Infinite Saturation Flow						Inf	Inf
J2:1/2	Infinite Saturation Flow						Inf	Inf
J2:2/1 (A43 Northbound Lane 1)	This lane uses a directly entered Saturation Flow						1800	1800
J2:2/2 (A43 Northbound Lane 2)	This lane uses a directly entered Saturation Flow						1800	1800
J2:2/3 (A43 Northbound Lane 3)	This lane uses a directly entered Saturation Flow						1800	1800
J2:3/1 (A43 Eastbound Lane 1)	This lane uses a directly entered Saturation Flow						1800	1800
J2:3/2 (A43 Eastbound Lane 2)	This lane uses a directly entered Saturation Flow						1800	1800
J2:3/3 (A43 Eastbound Lane 3)	This lane uses a directly entered Saturation Flow						1800	1800
J2:4/1	Infinite Saturation Flow						Inf	Inf
J2:4/2	Infinite Saturation Flow						Inf	Inf
J2:5/1	This lane uses a directly entered Saturation Flow						1800	1800
J2:5/2	This lane uses a directly entered Saturation Flow						1800	1800
J2:6/1	Infinite Saturation Flow						Inf	Inf
J2:6/2	Infinite Saturation Flow						Inf	Inf
J2:6/3	Infinite Saturation Flow						Inf	Inf
J2:6/4	Infinite Saturation Flow						Inf	Inf
J2:7/1	Infinite Saturation Flow						Inf	Inf
J2:7/2	Infinite Saturation Flow						Inf	Inf
J2:8/1	This lane uses a directly entered Saturation Flow						1900	1900
J2:8/2	This lane uses a directly entered Saturation Flow						1900	1900
J2:9/1	This lane uses a directly entered Saturation Flow						1900	1900
J2:9/2	This lane uses a directly entered Saturation Flow						1900	1900
J2:10/1	This lane uses a directly entered Saturation Flow						1900	1900
J2:10/2	This lane uses a directly entered Saturation Flow						1900	1900

Scenario 4: '2031 J3 PM' (FG4: '2031 J3 PM Peak', Plan 1: 'Network Control Plan 1')

Traffic Flows, Desired

Desired Flow :

		Destination					
		A	B	C	D	E	Tot.
Origin	A	0	252	176	1147	8	1583
	B	387	0	6	522	1	916
	C	508	307	0	391	1	1207
	D	1519	681	908	0	1	3109
	E	41	16	14	6	0	77
	Tot.	2455	1256	1104	2066	11	6892

Traffic Lane Flows

Lane	Scenario 4: 2031 J3 PM
Junction: J1: Unnamed Junction	
J1:1/1	701
J1:1/2 (with short)	882(In) 630(Out)
J1:1/3 (short)	252
J1:2/1 (short)	541
J1:2/2 (with short)	1636(In) 1095(Out)
J1:2/3 (with short)	1381(In) 691(Out)
J1:2/4 (short)	690
J1:3/1 (short)	387
J1:3/2 (with short)	519(In) 132(Out)
J1:3/3	397
J1:4/1	810
J1:4/2	824
J1:4/3	821
J1:5/1	134
J1:5/2	397
J1:6/1	824
J1:6/2	1027
J1:6/3	252
J1:7/1	162
J1:7/2	147
J1:8/1	703
J1:8/2	553
J1:9/1	681
J1:9/2	695
J1:9/3	694
J1:10/1	11
J1:11/1	77
Junction: J2: Southern R'bout	
J2:1/1	827
J2:1/2	1044
J2:2/1 (short)	908
J2:2/2 (with short)	1886(In) 978(Out)
J2:2/3	1223
J2:3/1	816
J2:3/2 (with short)	391(In) 196(Out)

J2:3/3 (short)	195
J2:4/1	1636
J2:4/2	1381
J2:5/1 (with short)	196(In) 98(Out)
J2:5/2 (short)	98
J2:6/1	827
J2:6/2	848
J2:6/3	196
J2:6/4	195
J2:7/1	1006
J2:7/2	98
J2:8/1	98
J2:8/2	98
J2:9/1	978
J2:9/2	1223
J2:10/1	196
J2:10/2	195

Lane Saturation Flows

Junction: J1: Unnamed Junction								
Lane	**Lane Width (m)**	**Gradient**	**Nearside Lane**	**Allowed Turns**	**Turning Radius (m)**	**Turning Prop.**	**Sat Flow (PCU/Hr)**	**Flared Sat Flow (PCU/Hr)**
J1:1/1	This lane uses a directly entered Saturation Flow						1800	1800
J1:1/2	This lane uses a directly entered Saturation Flow						1800	1800
J1:1/3	This lane uses a directly entered Saturation Flow						1800	1800
J1:2/1	This lane uses a directly entered Saturation Flow						1900	1900
J1:2/2	This lane uses a directly entered Saturation Flow						1900	1900
J1:2/3	This lane uses a directly entered Saturation Flow						1900	1900
J1:2/4	This lane uses a directly entered Saturation Flow						1800	1800
J1:3/1	This lane uses a directly entered Saturation Flow						1800	1800
J1:3/2	This lane uses a directly entered Saturation Flow						1800	1800
J1:3/3	This lane uses a directly entered Saturation Flow						1800	1800
J1:4/1	Infinite Saturation Flow						Inf	Inf
J1:4/2	Infinite Saturation Flow						Inf	Inf
J1:4/3	Infinite Saturation Flow						Inf	Inf
J1:5/1	This lane uses a directly entered Saturation Flow						1900	1900
J1:5/2	This lane uses a directly entered Saturation Flow						1900	1900
J1:6/1	Infinite Saturation Flow						Inf	Inf
J1:6/2	Infinite Saturation Flow						Inf	Inf
J1:6/3	Infinite Saturation Flow						Inf	Inf
J1:7/1	This lane uses a directly entered Saturation Flow						1900	1900
J1:7/2	This lane uses a directly entered Saturation Flow						1800	1800
J1:8/1	Infinite Saturation Flow						Inf	Inf
J1:8/2	Infinite Saturation Flow						Inf	Inf
J1:9/1	This lane uses a directly entered Saturation Flow						1900	1900
J1:9/2	This lane uses a directly entered Saturation Flow						1900	1900
J1:9/3	This lane uses a directly entered Saturation Flow						1900	1900
J1:10/1	Infinite Saturation Flow						Inf	Inf
J1:11/1	Infinite Saturation Flow						Inf	Inf

Junction: J2: Southern R'bout								
Lane	**Lane Width (m)**	**Gradient**	**Nearside Lane**	**Allowed Turns**	**Turning Radius (m)**	**Turning Prop.**	**Sat Flow (PCU/Hr)**	**Flared Sat Flow (PCU/Hr)**
J2:1/1	Infinite Saturation Flow						Inf	Inf
J2:1/2	Infinite Saturation Flow						Inf	Inf
J2:2/1 (A43 Northbound Lane 1)	This lane uses a directly entered Saturation Flow						1800	1800
J2:2/2 (A43 Northbound Lane 2)	This lane uses a directly entered Saturation Flow						1800	1800
J2:2/3 (A43 Northbound Lane 3)	This lane uses a directly entered Saturation Flow						1800	1800
J2:3/1 (A43 Eastbound Lane 1)	This lane uses a directly entered Saturation Flow						1800	1800
J2:3/2 (A43 Eastbound Lane 2)	This lane uses a directly entered Saturation Flow						1800	1800
J2:3/3 (A43 Eastbound Lane 3)	This lane uses a directly entered Saturation Flow						1800	1800
J2:4/1	Infinite Saturation Flow						Inf	Inf
J2:4/2	Infinite Saturation Flow						Inf	Inf
J2:5/1	This lane uses a directly entered Saturation Flow						1800	1800
J2:5/2	This lane uses a directly entered Saturation Flow						1800	1800
J2:6/1	Infinite Saturation Flow						Inf	Inf
J2:6/2	Infinite Saturation Flow						Inf	Inf
J2:6/3	Infinite Saturation Flow						Inf	Inf
J2:6/4	Infinite Saturation Flow						Inf	Inf
J2:7/1	Infinite Saturation Flow						Inf	Inf
J2:7/2	Infinite Saturation Flow						Inf	Inf
J2:8/1	This lane uses a directly entered Saturation Flow						1900	1900
J2:8/2	This lane uses a directly entered Saturation Flow						1900	1900
J2:9/1	This lane uses a directly entered Saturation Flow						1900	1900
J2:9/2	This lane uses a directly entered Saturation Flow						1900	1900
J2:10/1	This lane uses a directly entered Saturation Flow						1900	1900
J2:10/2	This lane uses a directly entered Saturation Flow						1900	1900

Scenario 1: '2031 DS6 AM' (FG1: '2031 RC AM Peak', Plan 1: 'Network Control Plan 1')
C1

Stage Timings

Stage Stream: 1

Stage	1	2
Duration	52	25
Change Point	2	61

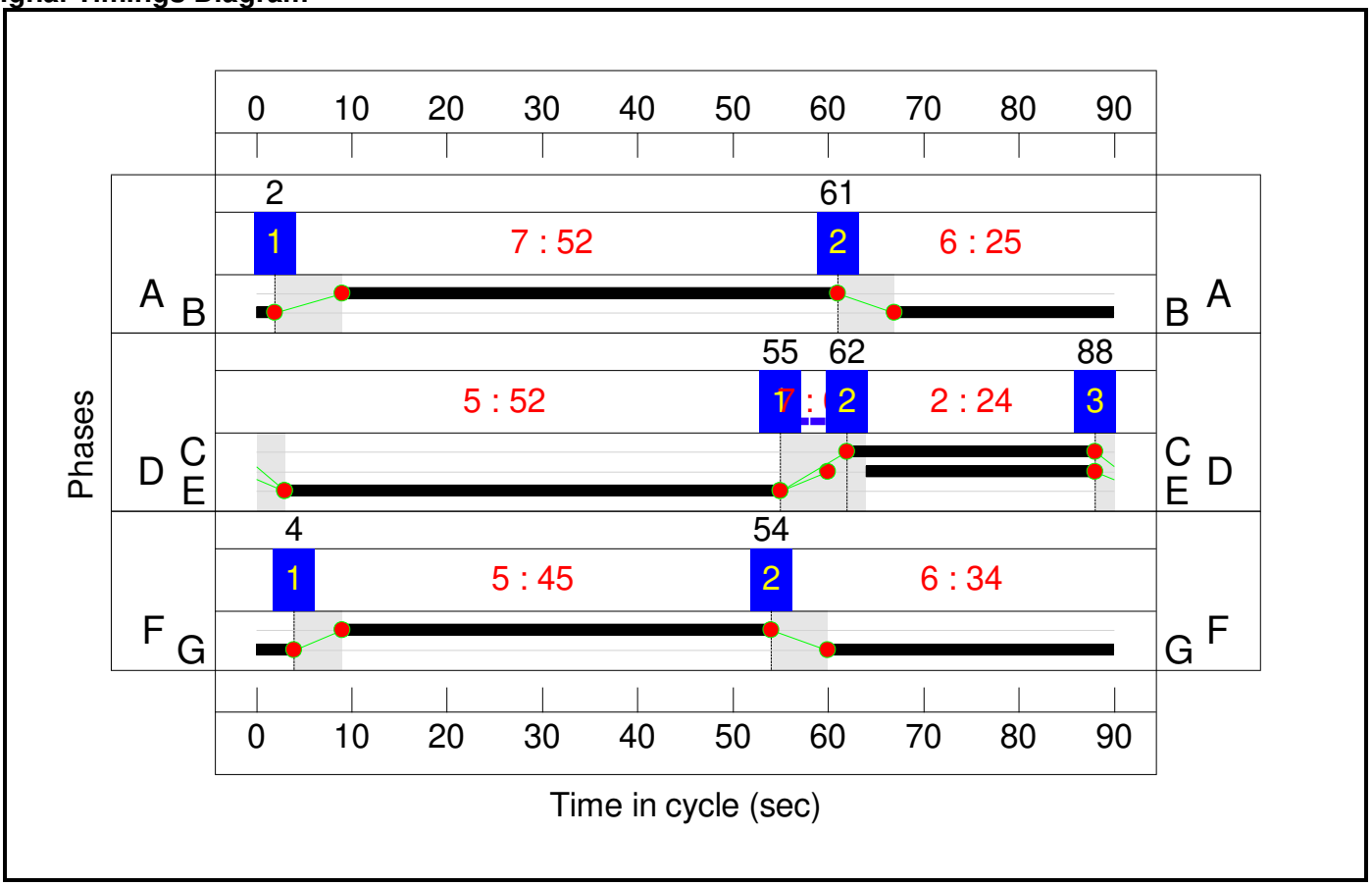
Stage Stream: 2

Stage	1	2	3
Duration	0	24	52
Change Point	55	62	88

Stage Stream: 3

Stage	1	2
Duration	45	34
Change Point	4	54

Signal Timings Diagram



C2

Stage Timings

Stage Stream: 1

Stage	1	2
Duration	14	63
Change Point	63	83

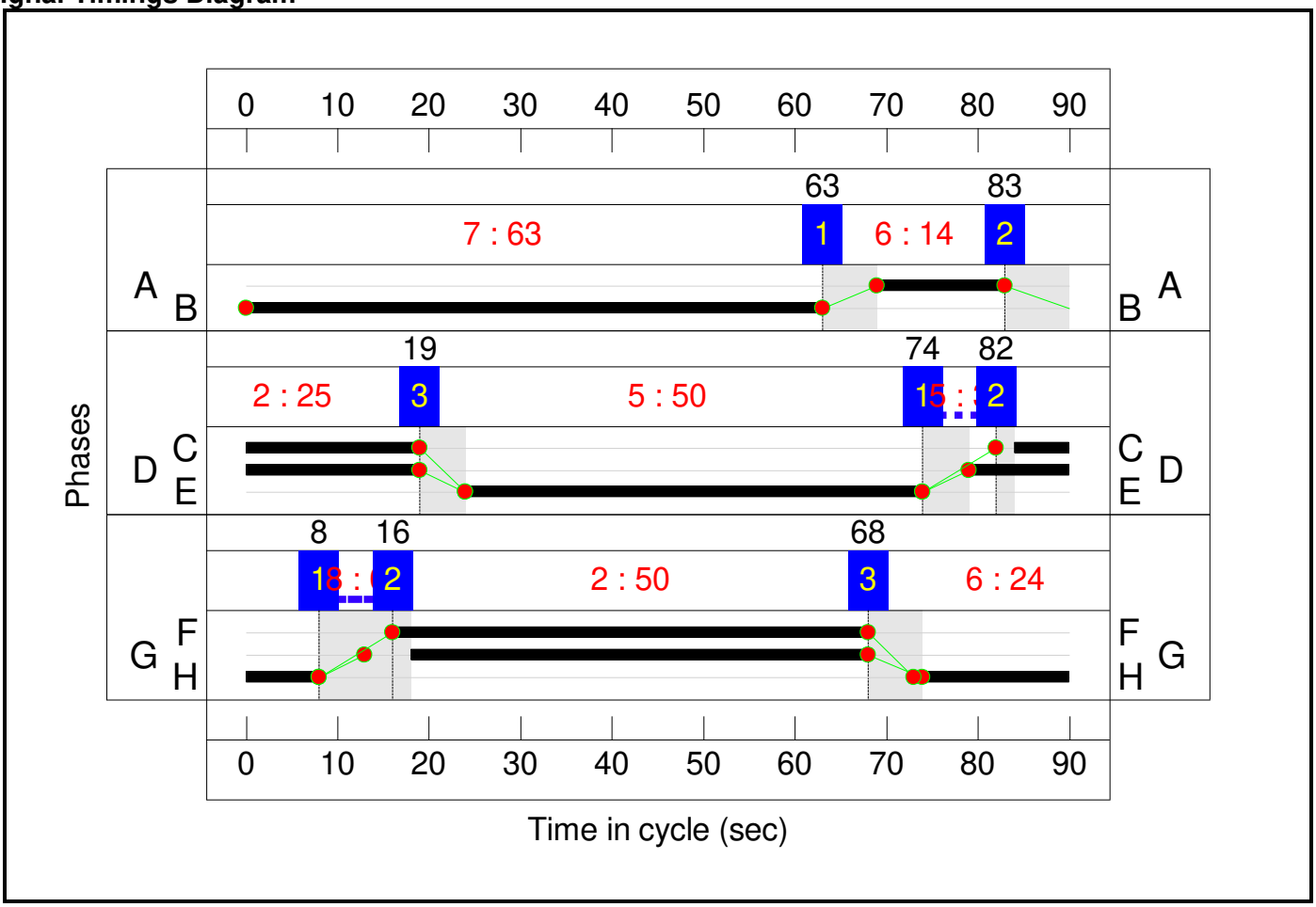
Stage Stream: 2

Stage	1	2	3
Duration	3	25	50
Change Point	74	82	19

Stage Stream: 3

Stage	1	2	3
Duration	0	50	24
Change Point	8	16	68

Signal Timings Diagram



Network Results

Item	Lane Description	Lane Type	Controller Stream	Position In Filtered Route	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)
J1: Unnamed	**-**	**-**	**N/A**	**-**	**-**		**-**	**-**	**-**	**-**	**-**	**-**	**112.8%**
1/1	Ahead Left	U	1:1	N/A	C1:A		1	52	-	1194	1800	1060	112.6%
1/2+1/3	Ahead	U	1:1	N/A	C1:A		1	52	-	1300	1800:1800	894+258	112.8 : 112.8%
2/2+2/1	Left Ahead	U	1:3	N/A	C1:F		1	45	-	1097	1900:1900	705+414	90.7 : 89.4%
2/3+2/4	Ahead	U	1:3	N/A	C1:F		1	45	-	1145	1900:1800	599+585	89.5 : 89.4%
3/2+3/1	Left Ahead	U	1:2	N/A	C1:D C1:C		1	24:26	-	653	1800:1800	358+323	95.9 : 95.9%
3/3	Ahead	U	1:2	N/A	C1:D		1	24	-	451	1800	500	90.2%
5/1	Right Ahead	U	1:1	N/A	C1:B		1	25	-	356	1900	549	64.8%
5/2	Right	U	1:1	N/A	C1:B		1	25	-	451	1900	549	82.2%
7/1	Ahead	U	1:3	N/A	C1:G		1	34	-	169	1900	739	20.3%
7/2	Ahead Right	U	1:3	N/A	C1:G		1	34	-	134	1800	700	17.2%
9/1	Ahead	U	1:2	N/A	C1:E		1	52	-	562	1900	1119	46.6%
9/2	Ahead	U	1:2	N/A	C1:E		1	52	-	580	1900	1119	48.0%
9/3	Ahead Right	U	1:2	N/A	C1:E		1	52	-	568	1900	1119	46.9%
11/1	Ahead Left	O	N/A	N/A	-		-	-	-	15	Inf	158	9.5%
J2: Southern	**-**	**-**	**N/A**	**-**	**-**		**-**	**-**	**-**	**-**	**-**	**-**	**110.0%**
2/2+2/1	A43 Northbound Left Ahead	U	2:3	N/A	C2:G C2:F		1	50:52	-	1515	1800:1800	863+513	110.0 : 110.0%
2/3	A43 Northbound Ahead	U	2:3	N/A	C2:G		1	50	-	1106	1800	1020	108.4%
3/1	A43 Eastbound Left	U	2:2	N/A	C2:D		1	30	-	186	1800	620	30.0%
3/2+3/3	A43 Eastbound Ahead	U	2:2	N/A	C2:C		1	25	-	566	1800:1800	300+300	94.3 : 94.3%
5/1+5/2	Ahead	U	2:1	N/A	C2:A		1	14	-	198	1800:1800	230+230	39.2 : 39.2%
8/1	Ahead	U	2:3	N/A	C2:H		1	24	-	99	1900	528	17.1%
8/2	Ahead	U	2:3	N/A	C2:H		1	24	-	99	1900	528	17.1%
9/1	Ahead	U	2:2	N/A	C2:E		1	50	-	950	1900	1077	80.2%
9/2	Ahead	U	2:2	N/A	C2:E		1	50	-	1106	1900	1077	94.7%
10/1	Right	U	2:1	N/A	C2:B		1	63	-	283	1900	1351	20.9%
10/2	Right	U	2:1	N/A	C2:B		1	63	-	283	1900	1351	20.9%

Item	Arriving (pcu)	Leaving (pcu)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Uniform Delay (pcuHr)	Rand + Oversat Delay (pcuHr)	Storage Area Uniform Delay (pcuHr)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)	Max. Back of Uniform Queue (pcu)	Rand + Oversat Queue (pcu)	Mean Max Queue (pcu)
J1: Unnamed	**-**	**-**	**15**	**0**	**0**	**47.0**	**173.8**	**0.0**	**220.7**	**-**	**-**	**-**	**-**
1/1	1194	1060	-	-	-	11.5	71.2	-	82.7	249.2	33.2	71.2	104.4
1/2+1/3	1300	1152	-	-	-	11.9	78.0	-	89.9	249.1	36.8	78.0	114.8
2/2+2/1	1010	1010	-	-	-	5.3	4.3	-	9.6	34.3	10.4	4.3	14.7
2/3+2/4	1059	1059	-	-	-	6.7	4.0	-	10.6	36.2	19.2	4.0	23.2
3/2+3/1	653	653	-	-	-	5.3	7.6	-	12.9	71.2	11.3	7.6	18.9
3/3	451	451	-	-	-	3.9	4.0	-	7.9	62.9	10.8	4.0	14.7
5/1	355	355	-	-	-	0.1	0.9	-	1.0	10.3	0.3	0.9	1.2
5/2	451	451	-	-	-	0.0	2.2	-	2.2	17.6	0.0	2.2	2.2
7/1	150	150	-	-	-	0.3	0.1	-	0.4	10.8	1.9	0.1	2.0
7/2	120	120	-	-	-	0.3	0.1	-	0.4	11.2	1.4	0.1	1.5
9/1	521	521	-	-	-	0.5	0.4	-	1.0	6.7	1.4	0.4	1.8
9/2	537	537	-	-	-	0.5	0.5	-	1.0	6.5	1.3	0.5	1.8
9/3	525	525	-	-	-	0.5	0.4	-	1.0	6.6	1.3	0.4	1.8
11/1	15	15	15	0	0	0.1	0.1	-	0.1	29.7	0.2	0.1	0.3
J2: Southern	**-**	**-**	**0**	**0**	**0**	**29.6**	**139.2**	**0.0**	**168.7**	**-**	**-**	**-**	**-**
2/2+2/1	1515	1377	-	-	-	11.5	74.2	-	85.7	203.7	38.7	74.2	112.9
2/3	1106	1020	-	-	-	9.2	48.7	-	57.9	188.4	29.8	48.7	78.5
3/1	186	186	-	-	-	1.1	0.2	-	1.3	25.7	3.4	0.2	3.6
3/2+3/3	566	566	-	-	-	4.7	6.1	-	10.8	68.7	11.7	6.1	17.8
5/1+5/2	180	180	-	-	-	1.3	0.3	-	1.7	33.1	1.9	0.3	2.2
8/1	90	90	-	-	-	0.1	0.1	-	0.2	6.6	2.0	0.1	2.1
8/2	90	90	-	-	-	0.1	0.1	-	0.2	6.6	2.0	0.1	2.1
9/1	863	863	-	-	-	0.6	2.0	-	2.5	10.6	16.6	2.0	18.6
9/2	1020	1020	-	-	-	0.8	7.2	-	7.9	28.0	25.5	7.2	32.7
10/1	283	283	-	-	-	0.1	0.1	-	0.3	3.3	3.8	0.1	3.9
10/2	283	283	-	-	-	0.1	0.1	-	0.3	3.3	3.8	0.1	3.9

C1	Stream: 1	PRC for Signalled Lanes (%):	-25.4	Total Delay for Signalled Lanes (pcuHr):	175.83	Cycle Time (s):	90
C1	Stream: 2	PRC for Signalled Lanes (%):	-6.6	Total Delay for Signalled Lanes (pcuHr):	23.69	Cycle Time (s):	90
C1	Stream: 3	PRC for Signalled Lanes (%):	-0.8	Total Delay for Signalled Lanes (pcuHr):	21.09	Cycle Time (s):	90
C2	Stream: 1	PRC for Signalled Lanes (%):	129.6	Total Delay for Signalled Lanes (pcuHr):	2.17	Cycle Time (s):	90
C2	Stream: 2	PRC for Signalled Lanes (%):	-5.3	Total Delay for Signalled Lanes (pcuHr):	22.61	Cycle Time (s):	90
C2	Stream: 3	PRC for Signalled Lanes (%):	-22.3	Total Delay for Signalled Lanes (pcuHr):	143.96	Cycle Time (s):	90
		PRC Over All Lanes (%):	-25.4	Total Delay Over All Lanes(pcuHr):	389.47		

Scenario 2: '2031 DS6 PM' (FG2: '2031 RC PM Peak', Plan 1: 'Network Control Plan 1')
C1

Stage Timings

Stage Stream: 1

Stage	1	2
Duration	55	22
Change Point	38	10

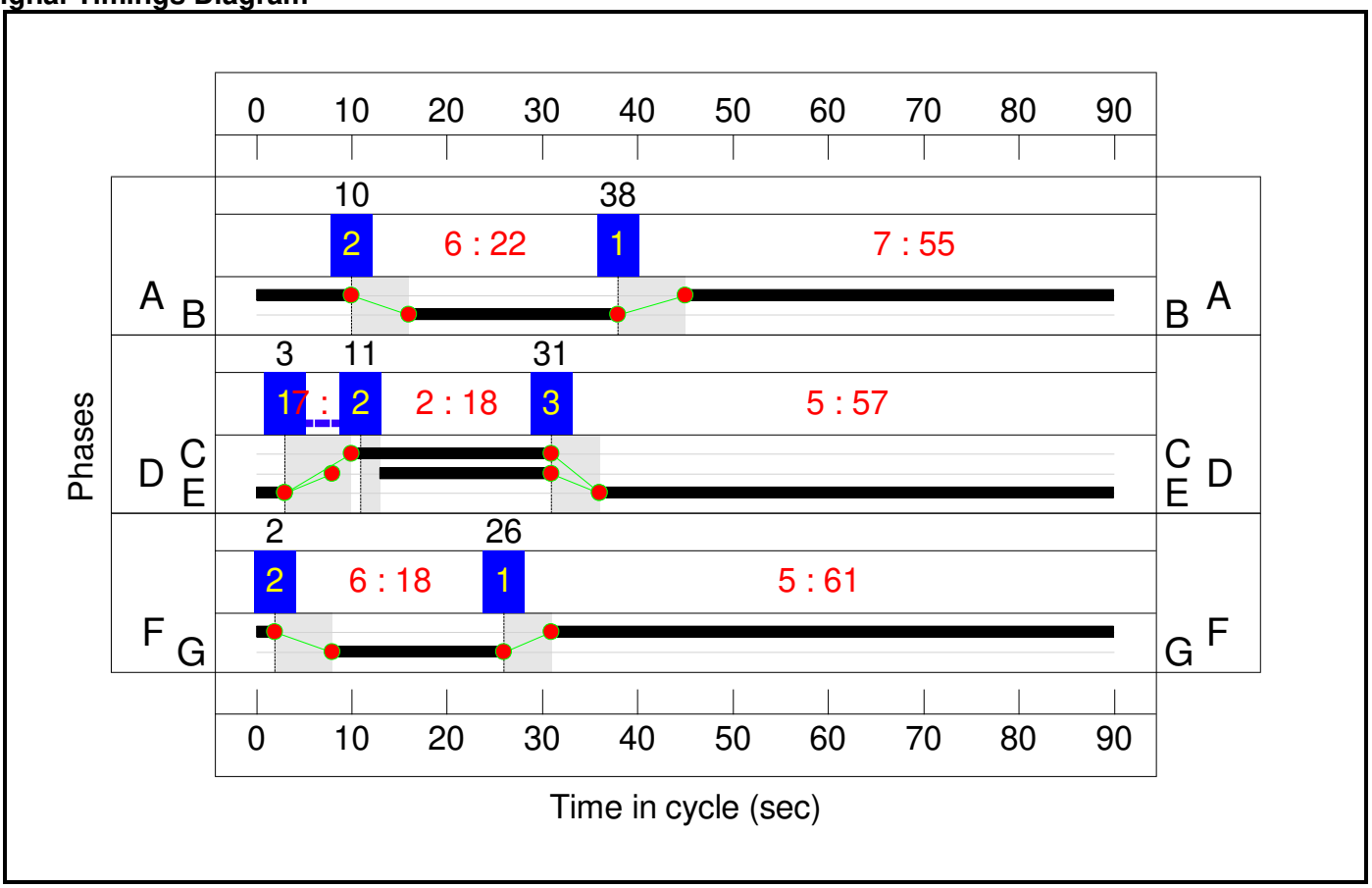
Stage Stream: 2

Stage	1	2	3
Duration	1	18	57
Change Point	3	11	31

Stage Stream: 3

Stage	1	2
Duration	61	18
Change Point	26	2

Signal Timings Diagram



C2

Stage Timings

Stage Stream: 1

Stage	1	2
Duration	19	58
Change Point	62	87

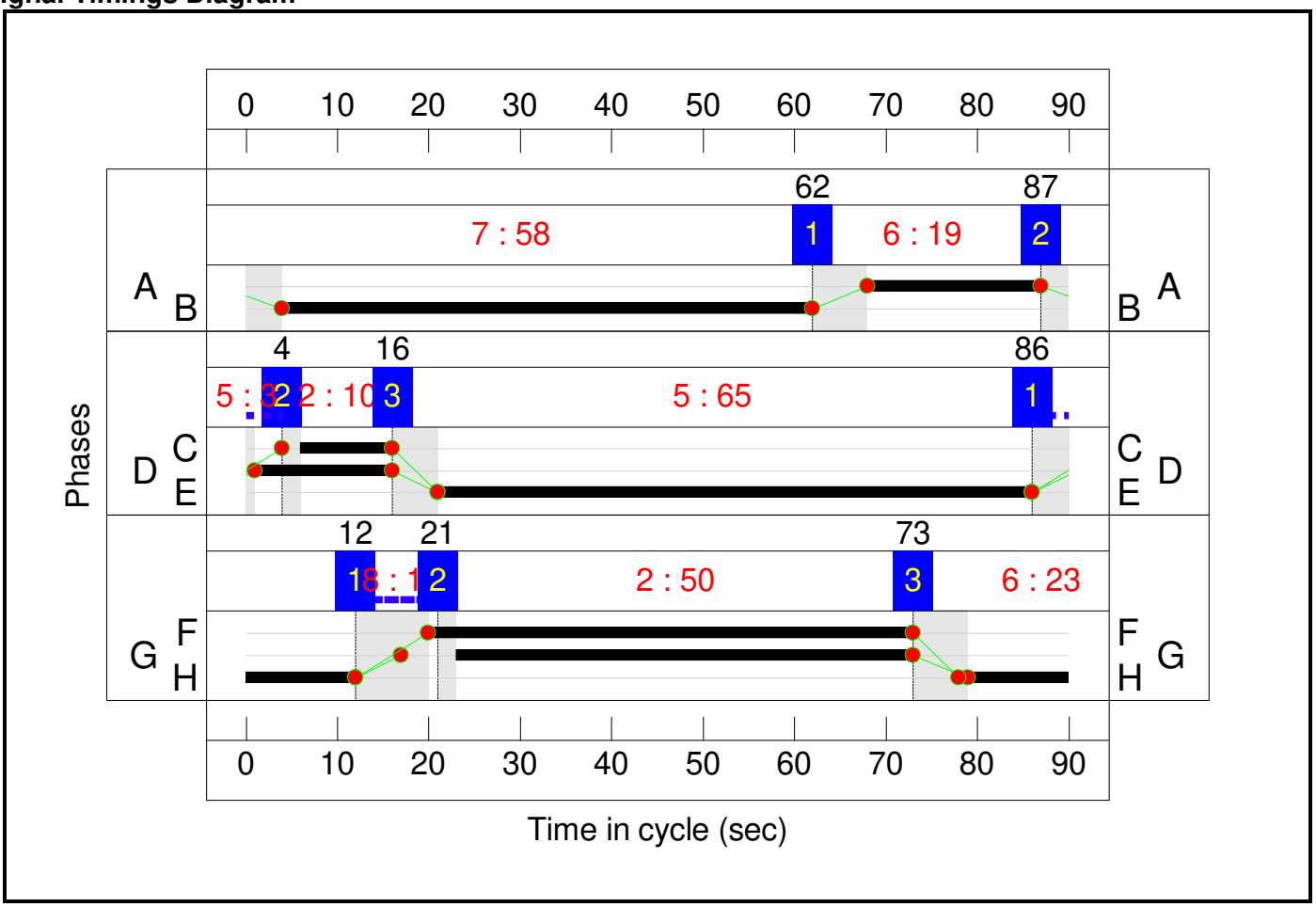
Stage Stream: 2

Stage	1	2	3
Duration	3	10	65
Change Point	86	4	16

Stage Stream: 3

Stage	1	2	3
Duration	1	50	23
Change Point	12	21	73

Signal Timings Diagram



Network Results

Item	Lane Description	Lane Type	Controller Stream	Position In Filtered Route	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)
J1: Unnamed	**-**	**-**	**N/A**	**-**	**-**		**-**	**-**	**-**	**-**	**-**	**-**	**109.1%**
1/1	Ahead Left	U	1:1	N/A	C1:A		1	55	-	1074	1800	1120	95.9%
1/2+1/3	Ahead	U	1:1	N/A	C1:A		1	55	-	1199	1800:1800	922+304	97.8 : 97.8%
2/2+2/1	Left Ahead	U	1:3	N/A	C1:F		1	61	-	1292	1900:1900	1076+310	73.7 : 74.1%
2/3+2/4	Ahead	U	1:3	N/A	C1:F		1	61	-	1488	1900:1800	737+762	78.9 : 78.8%
3/2+3/1	Left Ahead	U	1:2	N/A	C1:D C1:C		1	18:21	-	628	1800:1800	233+343	109.1 : 109.1%
3/3	Ahead	U	1:2	N/A	C1:D		1	18	-	408	1800	380	107.4%
5/1	Right Ahead	U	1:1	N/A	C1:B		1	22	-	256	1900	486	48.3%
5/2	Right	U	1:1	N/A	C1:B		1	22	-	408	1900	486	78.3%
7/1	Ahead	U	1:3	N/A	C1:G		1	18	-	185	1900	401	46.1%
7/2	Ahead Right	U	1:3	N/A	C1:G		1	18	-	169	1800	380	44.5%
9/1	Ahead	U	1:2	N/A	C1:E		1	57	-	768	1900	1224	49.8%
9/2	Ahead	U	1:2	N/A	C1:E		1	57	-	756	1900	1224	49.5%
9/3	Ahead Right	U	1:2	N/A	C1:E		1	57	-	773	1900	1224	50.4%
11/1	Ahead Left	O	N/A	N/A	-		-	-	-	77	Inf	179	43.0%
J2: Southern	**-**	**-**	**N/A**	**-**	**-**		**-**	**-**	**-**	**-**	**-**	**-**	**129.3%**
2/2+2/1	A43 Northbound Left Ahead	U	2:3	N/A	C2:G C2:F		1	50:53	-	1778	1800:1800	864+511	129.3 : 129.3%
2/3	A43 Northbound Ahead	U	2:3	N/A	C2:G		1	50	-	1309	1800	1020	128.3%
3/1	A43 Eastbound Left	U	2:2	N/A	C2:D		1	15	-	354	1800	320	110.6%
3/2+3/3	A43 Eastbound Ahead	U	2:2	N/A	C2:C		1	10	-	283	1800:1800	150+149	94.5 : 94.5%
5/1+5/2	Ahead	U	2:1	N/A	C2:A		1	19	-	410	1800:1800	280+280	71.6 : 71.6%
8/1	Ahead	U	2:3	N/A	C2:H		1	23	-	205	1900	507	39.6%
8/2	Ahead	U	2:3	N/A	C2:H		1	23	-	205	1900	507	39.6%
9/1	Ahead	U	2:2	N/A	C2:E		1	65	-	1117	1900	1393	62.0%
9/2	Ahead	U	2:2	N/A	C2:E		1	65	-	1309	1900	1393	73.2%
10/1	Right	U	2:1	N/A	C2:B		1	58	-	142	1900	1246	11.4%
10/2	Right	U	2:1	N/A	C2:B		1	58	-	141	1900	1246	11.3%

Item	Arriving (pcu)	Leaving (pcu)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Uniform Delay (pcuHr)	Rand + Oversat Delay (pcuHr)	Storage Area Uniform Delay (pcuHr)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)	Max. Back of Uniform Queue (pcu)	Rand + Oversat Queue (pcu)	Mean Max Queue (pcu)
J1: North	**-**	**-**	**77**	**0**	**0**	**26.8**	**79.0**	**0.0**	**105.8**	**-**	**-**	**-**	**-**
1/1	1074	1074	-	-	-	4.8	8.5	-	13.3	44.5	25.1	8.5	33.6
1/2+1/3	1199	1199	-	-	-	4.7	11.9	-	16.7	50.0	26.0	11.9	37.9
2/2+2/1	1022	1022	-	-	-	0.6	1.4	-	2.0	7.0	3.3	1.4	4.7
2/3+2/4	1182	1182	-	-	-	0.6	1.8	-	2.4	7.4	2.1	1.8	3.9
3/2+3/1	628	576	-	-	-	8.0	31.1	-	39.2	224.5	14.5	31.1	45.6
3/3	408	380	-	-	-	5.2	19.3	-	24.5	216.4	10.9	19.3	30.2
5/1	235	235	-	-	-	0.0	0.5	-	0.5	7.5	0.0	0.5	0.5
5/2	380	380	-	-	-	0.0	1.7	-	1.7	16.5	0.0	1.7	1.7
7/1	185	185	-	-	-	1.2	0.4	-	1.6	31.9	3.6	0.4	4.0
7/2	169	169	-	-	-	1.1	0.4	-	1.5	31.3	2.7	0.4	3.1
9/1	610	610	-	-	-	0.0	0.5	-	0.5	2.9	0.0	0.5	0.5
9/2	606	606	-	-	-	0.1	0.5	-	0.6	3.4	2.7	0.5	3.1
9/3	617	617	-	-	-	0.1	0.5	-	0.6	3.3	0.4	0.5	0.9
11/1	77	77	77	0	0	0.4	0.4	-	0.8	37.1	1.3	0.4	1.7
J2: South	**-**	**-**	**0**	**0**	**0**	**54.3**	**381.0**	**0.0**	**435.4**	**-**	**-**	**-**	**-**
2/2+2/1	1778	1375	-	-	-	22.2	203.7	-	225.9	457.4	52.6	203.7	256.2
2/3	1309	1020	-	-	-	19.7	146.7	-	166.4	457.6	42.1	146.7	188.8
3/1	354	320	-	-	-	5.2	21.2	-	26.4	268.7	9.7	21.2	30.9
3/2+3/3	283	283	-	-	-	3.0	5.3	-	8.3	105.0	5.0	5.3	10.3
5/1+5/2	401	401	-	-	-	3.3	1.2	-	4.5	40.8	4.7	1.2	6.0
8/1	200	200	-	-	-	0.4	0.3	-	0.8	13.9	4.9	0.3	5.2
8/2	200	200	-	-	-	0.4	0.3	-	0.8	13.9	4.9	0.3	5.2
9/1	864	864	-	-	-	0.0	0.8	-	0.8	3.4	0.0	0.8	0.8
9/2	1020	1020	-	-	-	0.0	1.4	-	1.4	4.8	0.0	1.4	1.4
10/1	142	142	-	-	-	0.0	0.1	-	0.1	1.6	0.0	0.1	0.1
10/2	141	141	-	-	-	0.0	0.1	-	0.1	1.6	0.0	0.1	0.1

C1	Stream: 1	PRC for Signalled Lanes (%):	-8.7	Total Delay for Signalled Lanes (pcuHr):	32.16	Cycle Time (s):	90
C1	Stream: 2	PRC for Signalled Lanes (%):	-21.2	Total Delay for Signalled Lanes (pcuHr):	65.33	Cycle Time (s):	90
C1	Stream: 3	PRC for Signalled Lanes (%):	14.1	Total Delay for Signalled Lanes (pcuHr):	7.51	Cycle Time (s):	90
C2	Stream: 1	PRC for Signalled Lanes (%):	25.7	Total Delay for Signalled Lanes (pcuHr):	4.67	Cycle Time (s):	90
C2	Stream: 2	PRC for Signalled Lanes (%):	-22.9	Total Delay for Signalled Lanes (pcuHr):	36.84	Cycle Time (s):	90
C2	Stream: 3	PRC for Signalled Lanes (%):	-43.7	Total Delay for Signalled Lanes (pcuHr):	393.84	Cycle Time (s):	90
		PRC Over All Lanes (%):	-43.7	Total Delay Over All Lanes(pcuHr):	541.15		

Scenario 3: '2031 J3 AM ' (FG3: '2031 J3 AM Peak', Plan 1: 'Network Control Plan 1')
C1

Stage Timings

Stage Stream: 1

Stage	1	2
Duration	53	24
Change Point	0	60

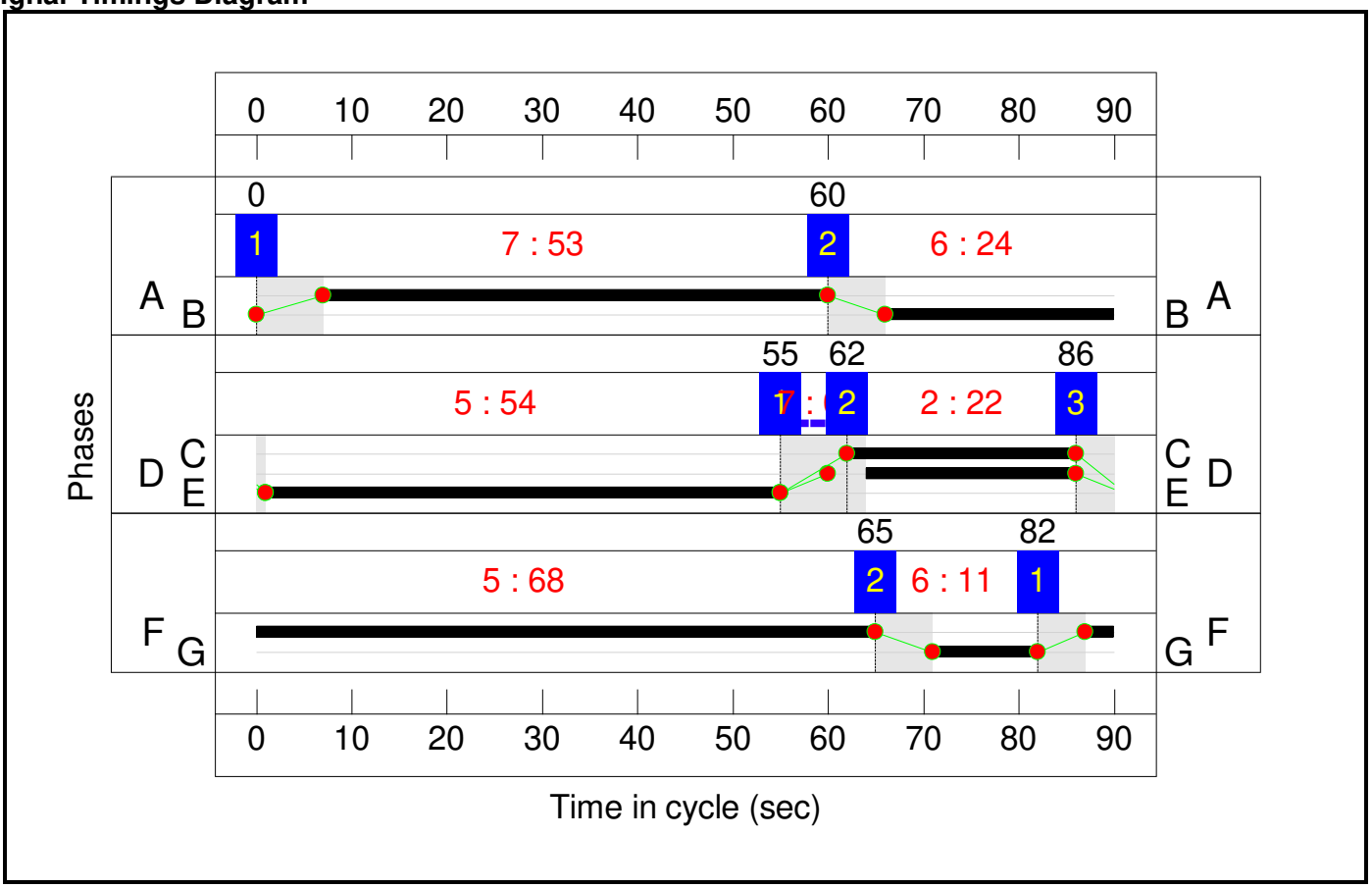
Stage Stream: 2

Stage	1	2	3
Duration	0	22	54
Change Point	55	62	86

Stage Stream: 3

Stage	1	2
Duration	68	11
Change Point	82	65

Signal Timings Diagram



C2

Stage Timings

Stage Stream: 1

Stage	1	2
Duration	51	26
Change Point	85	52

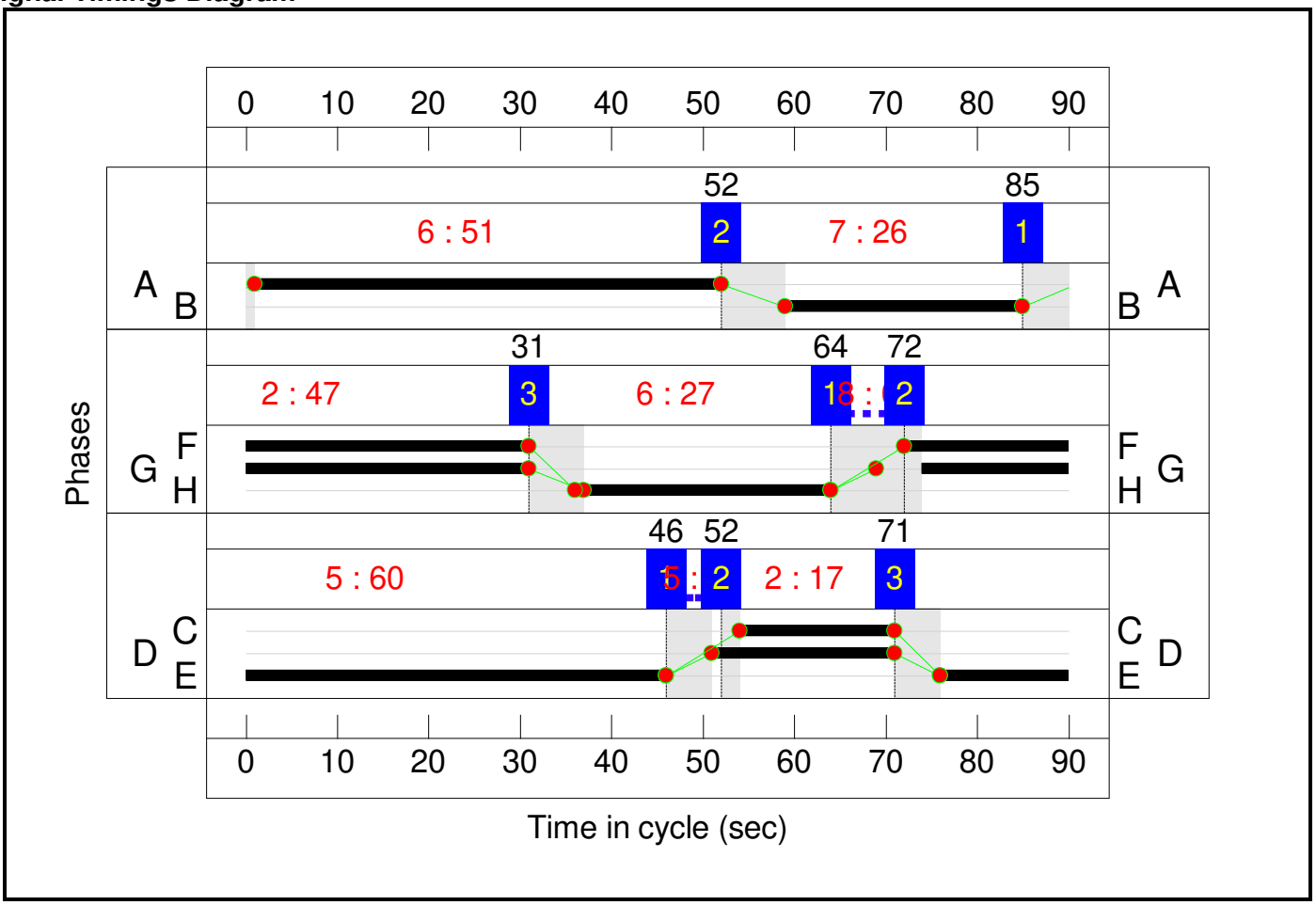
Stage Stream: 2

Stage	1	2	3
Duration	1	17	60
Change Point	46	52	71

Stage Stream: 3

Stage	1	2	3
Duration	0	47	27
Change Point	64	72	31

Signal Timings Diagram



Network Results

Item	Lane Description	Lane Type	Controller Stream	Position In Filtered Route	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)
J1: north	**-**	**-**	**N/A**	**-**	**-**		**-**	**-**	**-**	**-**	**-**	**-**	**127.1%**
1/1	Ahead Left	U	1:1	N/A	C1:A		1	53	-	1370	1800	1080	126.9%
1/2+1/3	Ahead	U	1:1	N/A	C1:A		1	53	-	1434	1800:1800	980+148	127.1 : 127.1%
2/2+2/1	Left Ahead	U	1:3	N/A	C1:F		1	68	-	1254	1900:1900	1120+439	66.3 : 66.2%
2/3+2/4	Ahead	U	1:3	N/A	C1:F		1	68	-	1370	1900:1800	822+827	69.1 : 69.2%
3/2+3/1	Left Ahead	U	1:2	N/A	C1:D C1:C		1	22:24	-	522	1800:1800	390+143	97.9 : 97.9%
3/3	Ahead	U	1:2	N/A	C1:D		1	22	-	439	1800	460	95.4%
5/1	Right Ahead	U	1:1	N/A	C1:B		1	24	-	395	1900	528	74.4%
5/2	Right	U	1:1	N/A	C1:B		1	24	-	439	1900	528	83.2%
7/1	Ahead	U	1:3	N/A	C1:G		1	11	-	114	1900	253	35.4%
7/2	Ahead Right	U	1:3	N/A	C1:G		1	11	-	86	1800	240	29.3%
9/1	Ahead	U	1:2	N/A	C1:E		1	54	-	361	1900	1161	25.3%
9/2	Ahead	U	1:2	N/A	C1:E		1	54	-	683	1900	1161	49.0%
9/3	Ahead Right	U	1:2	N/A	C1:E		1	54	-	687	1900	1161	49.3%
11/1	Ahead Left	O	N/A	N/A	-		-	-	-	15	Inf	148	10.2%
J2: south	**-**	**-**	**N/A**	**-**	**-**		**-**	**-**	**-**	**-**	**-**	**-**	**126.2%**
2/2+2/1	A43 Northbound Left Ahead	U	2:3	N/A	C2:G C2:F		1	47:49	-	1772	1800:1800	793+683	120.0 : 120.0%
2/3	A43 Northbound Ahead	U	2:3	N/A	C2:G		1	47	-	1142	1800	960	119.0%
3/1	A43 Eastbound Left	U	2:2	N/A	C2:D		1	20	-	530	1800	420	126.2%
3/2+3/3	A43 Eastbound Ahead	U	2:2	N/A	C2:C		1	17	-	452	1800:1800	220+220	102.7 : 102.7%
5/1+5/2	Ahead	U	2:1	N/A	C2:A		1	51	-	333	1800:1800	601+598	22.2 : 22.2%
8/1	Ahead	U	2:3	N/A	C2:H		1	27	-	167	1900	591	22.6%
8/2	Ahead	U	2:3	N/A	C2:H		1	27	-	166	1900	591	22.4%
9/1	Ahead	U	2:2	N/A	C2:E		1	60	-	952	1900	1288	61.6%
9/2	Ahead	U	2:2	N/A	C2:E		1	60	-	1142	1900	1288	74.5%
10/1	Right	U	2:1	N/A	C2:B		1	26	-	226	1900	570	38.6%
10/2	Right	U	2:1	N/A	C2:B		1	26	-	226	1900	570	38.6%

Item	Arriving (pcu)	Leaving (pcu)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Uniform Delay (pcuHr)	Rand + Oversat Delay (pcuHr)	Storage Area Uniform Delay (pcuHr)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)	Max. Back of Uniform Queue (pcu)	Rand + Oversat Queue (pcu)	Mean Max Queue (pcu)
J1: north	**-**	**-**	**15**	**0**	**0**	**50.0**	**325.4**	**0.0**	**375.4**	**-**	**-**	**-**	**-**
1/1	1370	1080	-	-	-	18.5	147.3	-	165.8	435.7	41.5	147.3	188.8
1/2+1/3	1434	1128	-	-	-	19.1	155.2	-	174.3	437.5	45.5	155.2	200.6
2/2+2/1	1033	1033	-	-	-	1.4	1.0	-	2.4	8.3	19.3	1.0	20.3
2/3+2/4	1141	1141	-	-	-	0.6	1.1	-	1.8	5.6	3.6	1.1	4.7
3/2+3/1	522	522	-	-	-	4.6	8.9	-	13.5	93.3	11.1	8.9	20.0
3/3	439	439	-	-	-	4.0	6.5	-	10.5	86.0	10.7	6.5	17.2
5/1	393	393	-	-	-	0.1	1.4	-	1.6	14.3	0.3	1.4	1.7
5/2	439	439	-	-	-	0.0	2.3	-	2.3	19.3	0.0	2.3	2.3
7/1	90	90	-	-	-	0.6	0.3	-	0.9	36.5	1.9	0.3	2.2
7/2	70	70	-	-	-	0.5	0.2	-	0.7	34.7	1.5	0.2	1.7
9/1	294	294	-	-	-	0.2	0.2	-	0.4	4.8	1.0	0.2	1.2
9/2	569	569	-	-	-	0.1	0.5	-	0.6	3.7	0.4	0.5	0.9
9/3	572	572	-	-	-	0.1	0.5	-	0.6	3.7	0.4	0.5	0.9
11/1	15	15	15	0	0	0.1	0.1	-	0.1	32.8	0.2	0.1	0.3
J2: south	**-**	**-**	**0**	**0**	**0**	**54.1**	**319.2**	**0.0**	**373.3**	**-**	**-**	**-**	**-**
2/2+2/1	1772	1477	-	-	-	22.4	150.5	-	173.0	351.4	46.6	150.5	197.1
2/3	1142	960	-	-	-	15.3	94.0	-	109.3	344.6	33.1	94.0	127.1
3/1	530	420	-	-	-	9.0	57.3	-	66.4	450.8	16.4	57.3	73.7
3/2+3/3	452	440	-	-	-	4.7	14.0	-	18.8	149.7	9.7	14.0	23.8
5/1+5/2	266	266	-	-	-	0.9	0.1	-	1.1	14.4	1.8	0.1	1.9
8/1	133	133	-	-	-	0.7	0.1	-	0.9	23.9	2.5	0.1	2.6
8/2	133	133	-	-	-	0.7	0.1	-	0.9	23.9	2.5	0.1	2.6
9/1	793	793	-	-	-	0.0	0.8	-	0.8	3.6	0.0	0.8	0.8
9/2	960	960	-	-	-	0.0	1.5	-	1.5	5.4	0.0	1.5	1.5
10/1	220	220	-	-	-	0.1	0.3	-	0.4	6.5	3.3	0.3	3.6
10/2	220	220	-	-	-	0.1	0.3	-	0.4	6.5	3.3	0.3	3.6

C1	Stream: 1	PRC for Signalled Lanes (%):	-41.2	Total Delay for Signalled Lanes (pcuHr):	343.99	Cycle Time (s):	90
C1	Stream: 2	PRC for Signalled Lanes (%):	-8.8	Total Delay for Signalled Lanes (pcuHr):	25.58	Cycle Time (s):	90
C1	Stream: 3	PRC for Signalled Lanes (%):	30.1	Total Delay for Signalled Lanes (pcuHr):	5.73	Cycle Time (s):	90
C2	Stream: 1	PRC for Signalled Lanes (%):	133.2	Total Delay for Signalled Lanes (pcuHr):	1.86	Cycle Time (s):	90
C2	Stream: 2	PRC for Signalled Lanes (%):	-40.2	Total Delay for Signalled Lanes (pcuHr):	87.41	Cycle Time (s):	90
C2	Stream: 3	PRC for Signalled Lanes (%):	-33.3	Total Delay for Signalled Lanes (pcuHr):	284.06	Cycle Time (s):	90
		PRC Over All Lanes (%):	-41.2	Total Delay Over All Lanes(pcuHr):	748.77		

Scenario 4: '2031 J3 PM' (FG4: '2031 J3 PM Peak', Plan 1: 'Network Control Plan 1')
C1

Stage Timings

Stage Stream: 1

Stage	1	2
Duration	54	23
Change Point	1	62

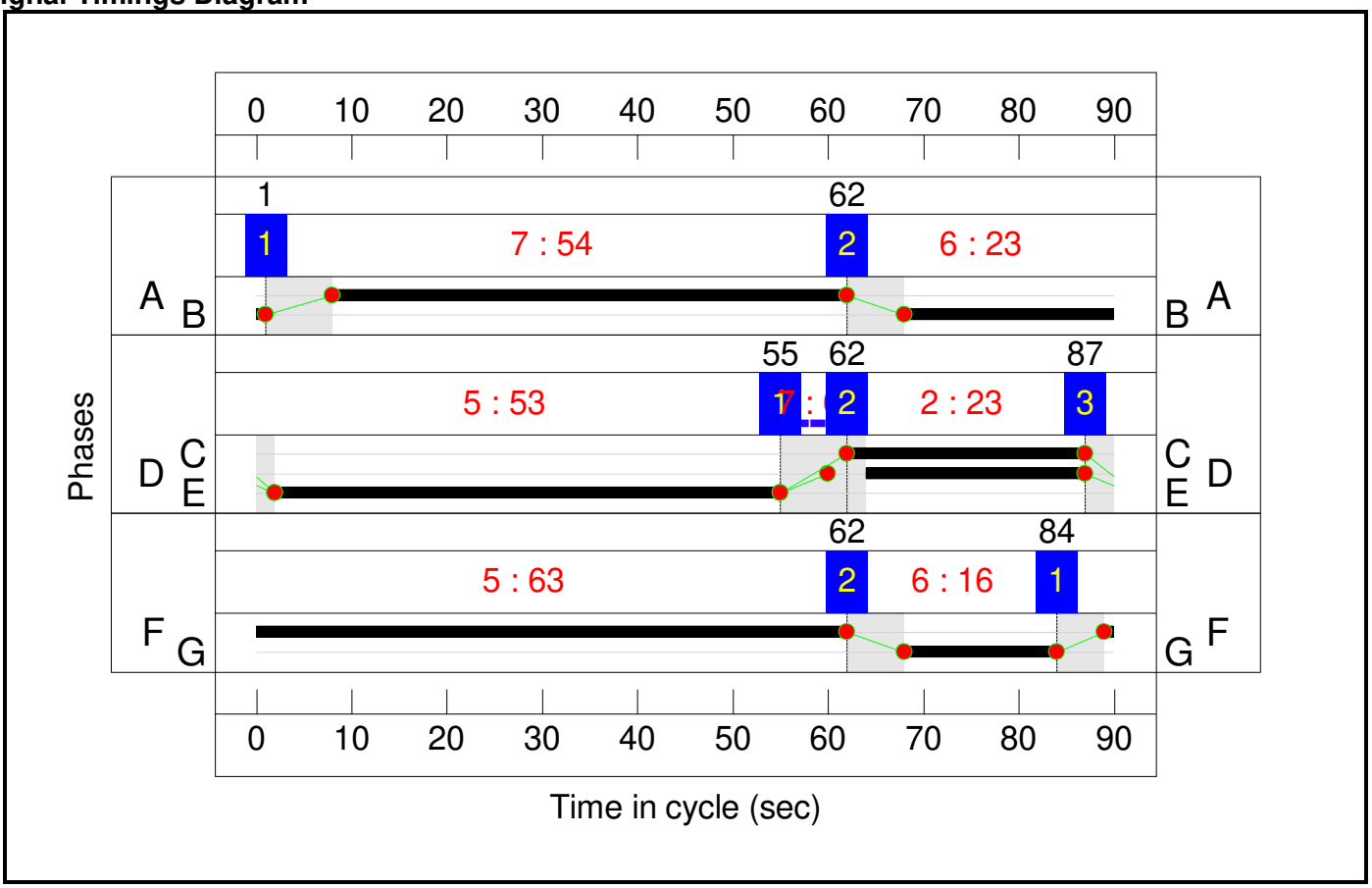
Stage Stream: 2

Stage	1	2	3
Duration	0	23	53
Change Point	55	62	87

Stage Stream: 3

Stage	1	2
Duration	63	16
Change Point	84	62

Signal Timings Diagram



C2

Stage Timings

Stage Stream: 1

Stage	1	2
Duration	13	64
Change Point	67	86

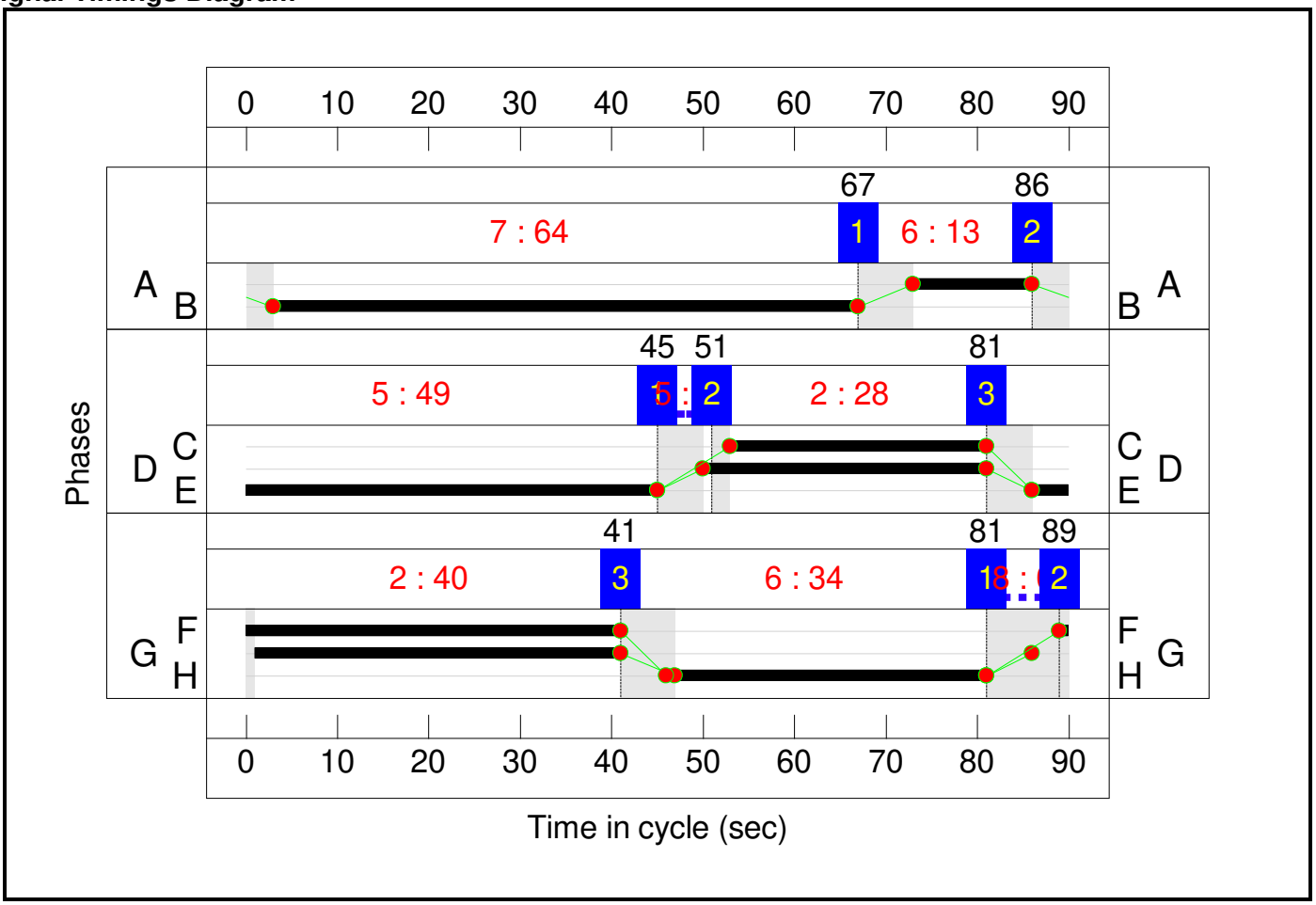
Stage Stream: 2

Stage	1	2	3
Duration	1	28	49
Change Point	45	51	81

Stage Stream: 3

Stage	1	2	3
Duration	0	40	34
Change Point	81	89	41

Signal Timings Diagram



Network Results

Item	Lane Description	Lane Type	Controller Stream	Position In Filtered Route	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)
J1: north	**-**	**-**	**N/A**	**-**	**-**		**-**	**-**	**-**	**-**	**-**	**-**	**88.2%**
1/1	Ahead Left	U	1:1	N/A	C1:A		1	54	-	701	1800	1100	63.7%
1/2+1/3	Ahead	U	1:1	N/A	C1:A		1	54	-	882	1800:1800	877+351	71.8 : 71.8%
2/2+2/1	Left Ahead	U	1:3	N/A	C1:F		1	63	-	1636	1900:1900	989+489	83.4 : 83.0%
2/3+2/4	Ahead	U	1:3	N/A	C1:F		1	63	-	1381	1900:1800	775+774	61.0 : 60.9%
3/2+3/1	Left Ahead	U	1:2	N/A	C1:D C1:C		1	23:25	-	519	1800:1800	150+439	88.2 : 88.2%
3/3	Ahead	U	1:2	N/A	C1:D		1	23	-	397	1800	480	82.7%
5/1	Right Ahead	U	1:1	N/A	C1:B		1	23	-	134	1900	507	26.3%
5/2	Right	U	1:1	N/A	C1:B		1	23	-	397	1900	507	78.4%
7/1	Ahead	U	1:3	N/A	C1:G		1	16	-	162	1900	359	45.1%
7/2	Ahead Right	U	1:3	N/A	C1:G		1	16	-	147	1800	340	43.2%
9/1	Ahead	U	1:2	N/A	C1:E		1	53	-	681	1900	1140	46.1%
9/2	Ahead	U	1:2	N/A	C1:E		1	53	-	695	1900	1140	41.8%
9/3	Ahead Right	U	1:2	N/A	C1:E		1	53	-	694	1900	1140	41.7%
11/1	Ahead Left	O	N/A	N/A	-		-	-	-	77	Inf	361	21.3%
J2: south	**-**	**-**	**N/A**	**-**	**-**		**-**	**-**	**-**	**-**	**-**	**-**	**149.1%**
2/2+2/1	A43 Northbound Left Ahead	U	2:3	N/A	C2:G C2:F		1	40:42	-	1886	1800:1800	714+663	137.0 : 137.0%
2/3	A43 Northbound Ahead	U	2:3	N/A	C2:G		1	40	-	1223	1800	820	149.1%
3/1	A43 Eastbound Left	U	2:2	N/A	C2:D		1	31	-	816	1800	640	127.5%
3/2+3/3	A43 Eastbound Ahead	U	2:2	N/A	C2:C		1	28	-	391	1800:1800	331+329	59.3 : 59.3%
5/1+5/2	Ahead	U	2:1	N/A	C2:A		1	13	-	196	1800:1800	220+220	44.5 : 44.5%
8/1	Ahead	U	2:3	N/A	C2:H		1	34	-	98	1900	739	13.3%
8/2	Ahead	U	2:3	N/A	C2:H		1	34	-	98	1900	739	13.3%
9/1	Ahead	U	2:2	N/A	C2:E		1	49	-	978	1900	1056	67.6%
9/2	Ahead	U	2:2	N/A	C2:E		1	49	-	1223	1900	1056	77.7%
10/1	Right	U	2:1	N/A	C2:B		1	64	-	196	1900	1372	14.3%
10/2	Right	U	2:1	N/A	C2:B		1	64	-	195	1900	1372	14.2%

Item	Arriving (pcu)	Leaving (pcu)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Uniform Delay (pcuHr)	Rand + Oversat Delay (pcuHr)	Storage Area Uniform Delay (pcuHr)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)	Max. Back of Uniform Queue (pcu)	Rand + Oversat Queue (pcu)	Mean Max Queue (pcu)
J1: north	**-**	**-**	**77**	**0**	**0**	**19.2**	**15.0**	**0.0**	**34.2**	**-**	**-**	**-**	**-**
1/1	701	701	-	-	-	2.2	0.9	-	3.0	15.6	11.1	0.9	12.0
1/2+1/3	882	882	-	-	-	2.4	1.3	-	3.7	15.0	10.7	1.3	12.0
2/2+2/1	1230	1230	-	-	-	2.8	2.4	-	5.2	15.3	25.0	2.4	27.5
2/3+2/4	944	944	-	-	-	0.4	0.8	-	1.2	4.5	1.4	0.8	2.2
3/2+3/1	519	519	-	-	-	4.2	3.4	-	7.6	53.0	10.5	3.4	14.0
3/3	397	397	-	-	-	3.4	2.3	-	5.7	51.6	9.3	2.3	11.5
5/1	133	133	-	-	-	0.0	0.2	-	0.2	5.3	0.5	0.2	0.7
5/2	397	397	-	-	-	0.0	1.8	-	1.8	15.9	0.0	1.8	1.8
7/1	162	162	-	-	-	1.1	0.4	-	1.5	33.3	3.6	0.4	4.0
7/2	147	147	-	-	-	1.0	0.4	-	1.4	34.7	3.2	0.4	3.6
9/1	525	525	-	-	-	0.4	0.4	-	0.8	5.8	1.6	0.4	2.1
9/2	477	477	-	-	-	0.5	0.4	-	0.9	6.7	1.4	0.4	1.8
9/3	475	475	-	-	-	0.5	0.4	-	0.9	6.7	1.4	0.4	1.8
11/1	77	77	77	0	0	0.1	0.1	-	0.2	10.8	0.6	0.1	0.8
J2: south	**-**	**-**	**0**	**0**	**0**	**79.9**	**553.8**	**0.0**	**633.7**	**-**	**-**	**-**	**-**
2/2+2/1	1886	1377	-	-	-	34.4	256.3	-	290.7	554.9	54.5	256.3	310.8
2/3	1223	820	-	-	-	25.9	203.0	-	228.9	673.8	40.6	203.0	243.7
3/1	816	640	-	-	-	15.1	90.3	-	105.4	464.9	27.8	90.3	118.1
3/2+3/3	391	391	-	-	-	2.6	0.7	-	3.3	30.6	5.8	0.7	6.6
5/1+5/2	196	196	-	-	-	1.4	0.4	-	1.8	33.3	2.2	0.4	2.6
8/1	98	98	-	-	-	0.1	0.1	-	0.2	6.2	0.2	0.1	0.2
8/2	98	98	-	-	-	0.1	0.1	-	0.2	6.2	0.2	0.1	0.2
9/1	714	714	-	-	-	0.0	1.0	-	1.0	5.2	0.0	1.0	1.0
9/2	820	820	-	-	-	0.0	1.7	-	1.7	7.5	0.0	1.7	1.7
10/1	196	196	-	-	-	0.2	0.1	-	0.3	4.7	0.9	0.1	1.0
10/2	195	195	-	-	-	0.2	0.1	-	0.3	4.7	0.9	0.1	0.9

C1	Stream: 1	PRC for Signalled Lanes (%):	14.9	Total Delay for Signalled Lanes (pcuHr):	8.68	Cycle Time (s):	90
C1	Stream: 2	PRC for Signalled Lanes (%):	2.0	Total Delay for Signalled Lanes (pcuHr):	15.95	Cycle Time (s):	90
C1	Stream: 3	PRC for Signalled Lanes (%):	8.0	Total Delay for Signalled Lanes (pcuHr):	9.34	Cycle Time (s):	90
C2	Stream: 1	PRC for Signalled Lanes (%):	102.0	Total Delay for Signalled Lanes (pcuHr):	2.32	Cycle Time (s):	90
C2	Stream: 2	PRC for Signalled Lanes (%):	-41.7	Total Delay for Signalled Lanes (pcuHr):	111.45	Cycle Time (s):	90
C2	Stream: 3	PRC for Signalled Lanes (%):	-65.7	Total Delay for Signalled Lanes (pcuHr):	519.95	Cycle Time (s):	90
		PRC Over All Lanes (%):	-65.7	Total Delay Over All Lanes(pcuHr):	667.93		

APPENIDX D

RAIL CENTRAL A5076/TOWCESTER ROAD/TESCO PROPOSED IMPROVEMENT SCHEME

A5076, Danes Camp Way

A5123, Towcester Road

Carriageway widening to allow for two approach lanes

Vehicle restraint barrier re-aligned

Entry signalised and yellow box hatch removed

Third entry lane added

Exit widened to three lanes

Towcester Road

Exit widened to two lanes

Additional circulatory lane added

Tesco Store Access

Third lane extended

A5076, Mere Way

0 25 50 100m

LEGEND

NOTES:

1. All details to be checked on-site by the Overseeing Organisation prior to the commencement of the Works.
2. All dimensions in metres unless otherwise stated. DO NOT SCALE from this drawing.
3. All levels in metres above ordnance datum unless otherwise stated.
4. Refer to Specification for Highway Works for further information. If there is any ambiguity between the Specification and the Drawings, the Contractor shall immediately inform the Engineer.
5. Traffic Management to be in accordance with Chapter 8 of the Traffic Signs Manual and relevant Code of Practice.
6. All road signs and line markings to be in accordance with the 'Traffic Signs Regulations & General Directions 2016'.

Sources:
Topographical survey data based on MK Surveys drawing for project number 25445 dated June 2018.
Design based on TPA drawing number: 1211-80 RC-ALG-PLN-2.36.2.0
Rail Central drawing number RC-ALG-PLN-2.4.4

REV	DATE	DETAILS OF ISSUE/REVISION	DRW	REV
..	..	..	..	..

Gazeley a GLP company

ASHFIELD LAND

Rail Central Northamptonshire

THE RAIL CENTRAL RAIL FREIGHT INTERCHANGE AND HIGHWAY ORDER 201[x]

DRAWING TITLE
JUNCTION 7
GENERAL ARRANGEMENT
MASTERPLAN

SCALE	1:1,000	DRAWN	SMK
PAGE SIZE	A1	REVIEWED	RTBL

REGULATION	DOCUMENT
Reg 5(2)(o)	2.36

DRAWING STATUS
PLANNING

DRAWING No	REVISION
RC-ALG-PLN-2.36.3	

A5123, TOWCESTER ROAD / A5076, MERE WAY / TESCO STORE ACCESS / TOWCESTER ROAD / A5076, DANES CAMP WAY ROUNDABOUT

APPENIDX E

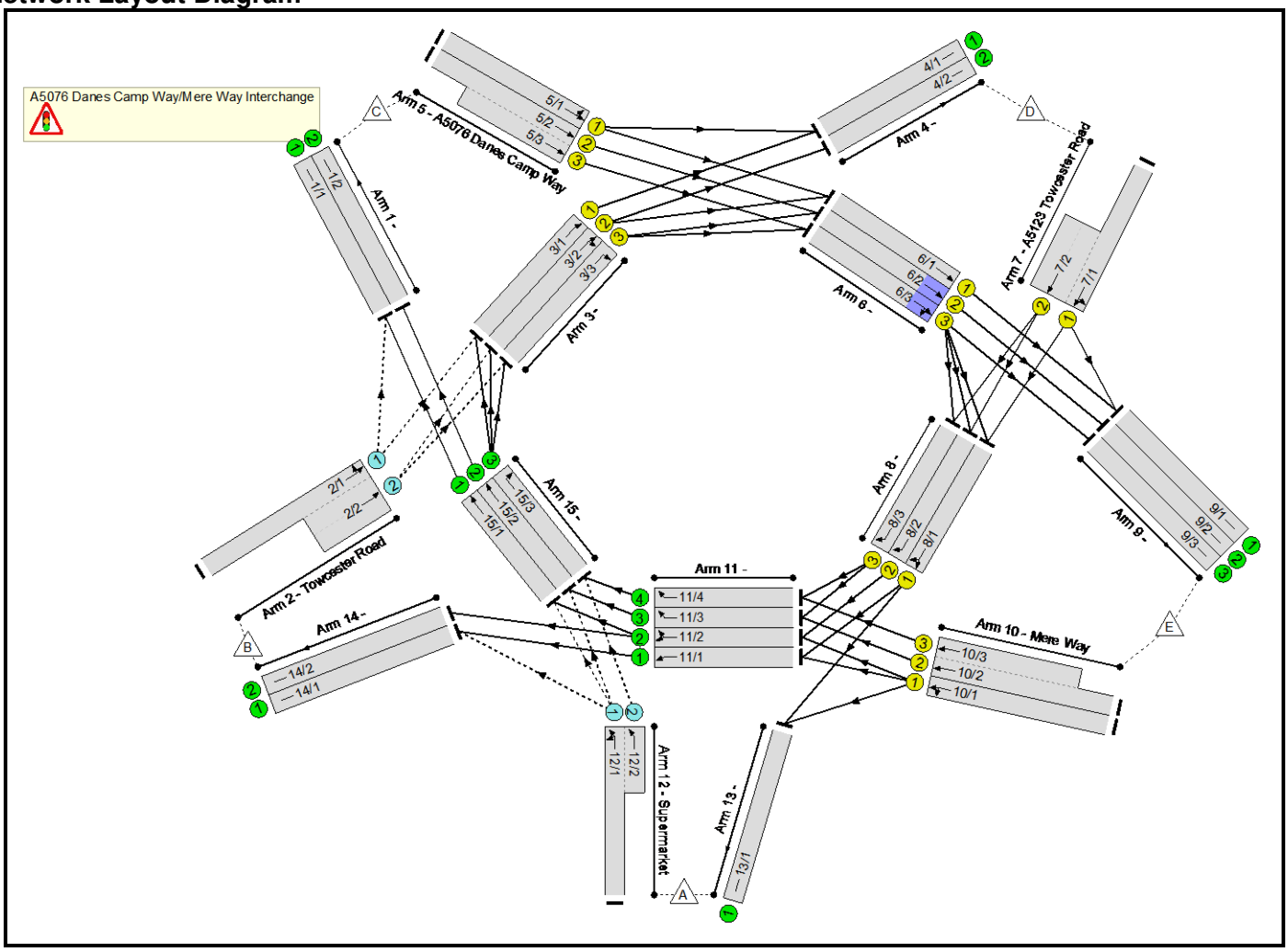
A5076/TOWCESTER ROAD/TESCO PROPOSED IMPROVEMENT SCHEME

Full Input Data And Results

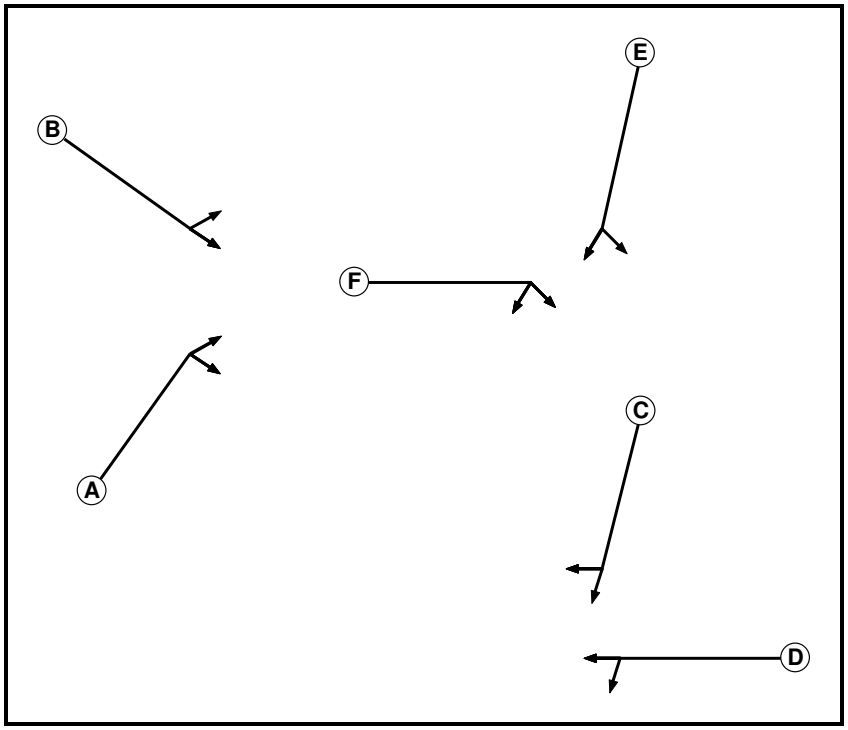
User and Project Details

Project:	**Northampton Gateway SRFI**
Title:	**Towcester Rd/Mere Way Gyratory - Rail Central mitigation**
Location:	
File name:	190107 Towcester Rd_Mere Way RC Mitigation.lsg3x
Author:	Mark Higgins
Company:	ADC Infrastructure
Address:	Nottingham
Notes:	

Network Layout Diagram



Phase Diagram



Phase Input Data

Phase Name	Phase Type	Stage Stream	Assoc. Phase	Street Min	Cont Min
A	Traffic	1		7	7
B	Traffic	1		7	7
C	Traffic	2		7	7
D	Traffic	2		7	7
E	Traffic	3		7	7
F	Traffic	3		7	7

Phase Intergreens Matrix

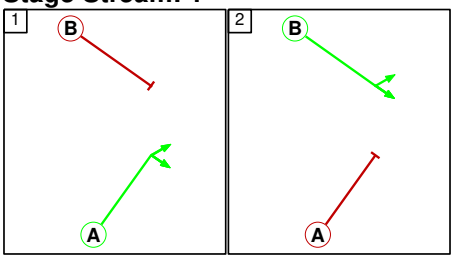
		Starting Phase					
		A	B	C	D	E	F
Terminating Phase	A		5	-	-	-	-
	B	5		-	-	-	-
	C	-	-		5	-	-
	D	-	-	5		-	-
	E	-	-	-	-		5
	F	-	-	-	-	5	

Phases in Stage

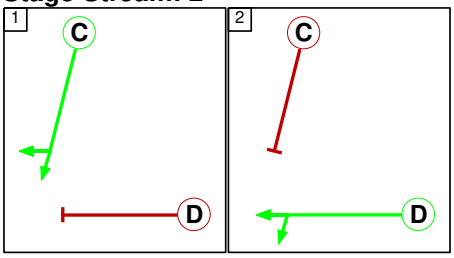
Stream	Stage No.	Phases in Stage
1	1	A
1	2	B
2	1	C
2	2	D
3	1	F
3	2	E

Stage Diagram

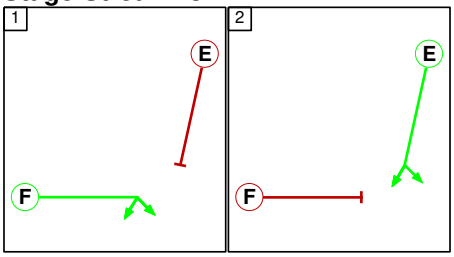
Stage Stream: 1



Stage Stream: 2



Stage Stream: 3



Prohibited Stage Change

Stage Stream: 1

	To Stage		
From Stage		1	2
	1		5
	2	5	

Stage Stream: 2

	To Stage		
From Stage		1	2
	1		5
	2	5	

Stage Stream: 3

	To Stage		
From Stage		1	2
	1		5
	2	5	

Give-Way Lane Input Data

Junction: A5076 Danes Camp Way/Mere Way Interchange											
Lane	**Movement**	**Max Flow when Giving Way (PCU/Hr)**	**Min Flow when Giving Way (PCU/Hr)**	**Opposing Lane**	**Opp. Lane Coeff.**	**Opp. Mvmnts.**	**Right Turn Storage (PCU)**	**Non-Blocking Storage (PCU)**	**RTF**	**Right Turn Move up (s)**	**Max Turns in Intergreen (PCU)**
2/1 (Towcester Road)	1/1 (Left)	942	0	15/1	0.21	All	-	-	-	-	-
	3/1 (Ahead)			15/1	0.21	All					
				15/2	0.21	All					
				15/3	0.21	To 3/1 (Right)					
2/2 (Towcester Road)	3/2 (Ahead)	942	0	15/1	0.21	All	-	-	-	-	-
				15/2	0.21	All					
				15/3	0.21	All					
	3/3 (Ahead)			15/1	0.21	All					
				15/2	0.21	All					
				15/3	0.21	All					
12/1 (Supermarket)	14/1 (Left)	1000	0	11/2	0.33	All	-	-	-	-	-
				11/1	0.33	All					
	15/1 (Ahead)	1000	0	11/2	0.33	All					
				11/1	0.33	All					
	15/2 (Ahead)	1000	0	11/2	0.33	All					
				11/3	0.33	All					
				11/1	0.33	All					
12/2 (Supermarket)	15/3 (Ahead)	1000	0	11/2	0.33	All	-	-	-	-	-
				11/3	0.33	All					
				11/4	0.33	All					
				11/1	1.09	All					

Lane Input Data

Junction: A5076 Danes Camp Way/Mere Way Interchange												
Lane	**Lane Type**	**Phases**	**Start Disp.**	**End Disp.**	**Physical Length (PCU)**	**Sat Flow Type**	**Def User Saturation Flow (PCU/Hr)**	**Lane Width (m)**	**Gradient**	**Nearside Lane**	**Turns**	**Turning Radius (m)**
1/1	U		2	3	5.0	Inf	-	-	-	-	-	-
1/2	U		2	3	5.0	Inf	-	-	-	-	-	-
2/1 (Towcester Road)	O		2	3	60.0	Inf	-	-	-	-	-	-
2/2 (Towcester Road)	O		2	3	6.0	Inf	-	-	-	-	-	-
3/1	U	A	2	3	7.0	User	1900	-	-	-	-	-
3/2	U	A	2	3	7.0	User	1900	-	-	-	-	-
3/3	U	A	2	3	7.0	User	1900	-	-	-	-	-
4/1	U		2	3	5.0	Inf	-	-	-	-	-	-
4/2	U		2	3	5.0	Inf	-	-	-	-	-	-
5/1 (A5076 Danes Camp Way)	U	B	2	3	60.0	Geom	-	3.30	0.00	Y	Arm 4 Left	Inf
											Arm 6 Ahead	Inf
5/2 (A5076 Danes Camp Way)	U	B	2	3	60.0	Geom	-	3.30	0.00	N	Arm 6 Ahead	Inf
5/3 (A5076 Danes Camp Way)	U	B	2	3	9.0	Geom	-	3.50	0.00	Y	Arm 6 Ahead	Inf
6/1	U	F	2	3	9.6	User	1900	-	-	-	-	-
6/2	U	F	2	3	9.6	User	1900	-	-	-	-	-
6/3	U	F	2	3	9.6	User	1900	-	-	-	-	-
7/1 (A5123 Towcester Road)	U	E	2	3	60.0	Geom	-	3.25	0.00	Y	Arm 8 Ahead	Inf
											Arm 9 Left	Inf
7/2 (A5123 Towcester Road)	U	E	2	3	6.0	User	3800	-	-	-	-	-
8/1	U	C	2	3	9.6	User	1900	-	-	-	-	-
8/2	U	C	2	3	9.6	User	1900	-	-	-	-	-
8/3	U	C	2	3	9.6	User	1900	-	-	-	-	-
9/1	U		2	3	5.0	Inf	-	-	-	-	-	-
9/2	U		2	3	60.0	Inf	-	-	-	-	-	-
9/3	U		2	3	5.0	Inf	-	-	-	-	-	-
10/1 (Mere Way)	U	D	2	3	60.0	Geom	-	3.60	0.00	Y	Arm 11 Ahead	Inf
											Arm 13 Left	20.00
10/2 (Mere Way)	U	D	2	3	60.0	Geom	-	3.60	0.00	N	Arm 11 Ahead	Inf

10/3 (Mere Way)	U	D	2	3	23.0	Geom	-	3.60	0.00	Y	Arm 11 Ahead	Inf
11/1	U		2	3	7.0	Inf	-	-	-	-	-	-
11/2	U		2	3	7.0	Inf	-	-	-	-	-	-
11/3	U		2	3	7.0	Inf	-	-	-	-	-	-
11/4	U		2	3	7.0	Inf	-	-	-	-	-	-
12/1 (Supermarket)	O		2	3	60.0	Inf	-	-	-	-	-	-
12/2 (Supermarket)	O		2	3	5.0	Inf	-	-	-	-	-	-
13/1	U		2	3	5.0	Inf	-	-	-	-	-	-
14/1	U		2	3	60.0	Inf	-	-	-	-	-	-
14/2	U		2	3	5.0	Inf	-	-	-	-	-	-
15/1	U		2	3	6.1	Inf	-	-	-	-	-	-
15/2	U		2	3	6.1	Inf	-	-	-	-	-	-
15/3	U		2	3	6.1	Inf	-	-	-	-	-	-

Traffic Flow Groups

Flow Group	Start Time	End Time	Duration	Formula
3: '2031 J3 AM Peak'	08:00	09:00	01:00	
4: '2031 J3 PM Peak'	17:00	18:00	01:00	
5: '2031 RC DS6 AM Peak'	08:00	09:00	01:00	
6: '2031 RC DS6 PM Peak'	17:00	18:00	01:00	

Scenario 1: '2031 J3 AM Peak' (FG3: '2031 J3 AM Peak', Plan 1: 'Network Control Plan 1')

Traffic Flows, Desired

Desired Flow :

		Destination					
		A	B	C	D	E	Tot.
Origin	A	0	44	165	86	201	496
	B	24	0	267	394	379	1064
	C	101	93	0	285	1546	2025
	D	73	271	297	0	532	1173
	E	98	186	1741	345	79	2449
	Tot.	296	594	2470	1110	2737	7207

Traffic Lane Flows

Lane	Scenario 1: 2031 J3 AM Peak
Junction: A5076 Danes Camp Way/Mere Way Interchange	
1/1	1039
1/2	1431
2/1 (with short)	1064(In) 594(Out)
2/2 (short)	470
3/1	586
3/2	530
3/3	392
4/1	871
4/2	239
5/1	785
5/2 (with short)	1240(In) 563(Out)
5/3 (short)	677
6/1	791
6/2	707
6/3	925
7/1 (with short)	1173(In) 635(Out)
7/2 (short)	538
8/1	239
8/2	325
8/3	295
9/1	1323
9/2	707
9/3	707
10/1	972
10/2 (with short)	1477(In) 1053(Out)
10/3 (short)	424
11/1	134
11/2	1106
11/3	1348
11/4	424
12/1 (with short)	496(In) 209(Out)
12/2 (short)	287
13/1	296
14/1	178
14/2	416
15/1	772
15/2	1431
15/3	711

Lane Saturation Flows

Lane	Lane Width (m)	Gradient	Nearside Lane	Allowed Turns	Turning Radius (m)	Turning Prop.	Sat Flow (PCU/Hr)	Flared Sat Flow (PCU/Hr)
1/1	Infinite Saturation Flow						Inf	Inf
1/2	Infinite Saturation Flow						Inf	Inf
2/1 (Towcester Road Lane 1)	Infinite Saturation Flow						Inf	Inf
2/2 (Towcester Road Lane 2)	Infinite Saturation Flow						Inf	Inf
3/1	This lane uses a directly entered Saturation Flow						1900	1900
3/2	This lane uses a directly entered Saturation Flow						1900	1900
3/3	This lane uses a directly entered Saturation Flow						1900	1900
4/1	Infinite Saturation Flow						Inf	Inf
4/2	Infinite Saturation Flow						Inf	Inf
5/1 (A5076 Danes Camp Way)	3.30	0.00	Y	Arm 4 Left	Inf	36.3 %	1945	1945
				Arm 6 Ahead	Inf	63.7 %		
5/2 (A5076 Danes Camp Way)	3.30	0.00	N	Arm 6 Ahead	Inf	100.0 %	2085	2085
5/3 (A5076 Danes Camp Way)	3.50	0.00	Y	Arm 6 Ahead	Inf	100.0 %	1965	1965
6/1	This lane uses a directly entered Saturation Flow						1900	1900
6/2	This lane uses a directly entered Saturation Flow						1900	1900
6/3	This lane uses a directly entered Saturation Flow						1900	1900
7/1 (A5123 Towcester Road)	3.25	0.00	Y	Arm 8 Ahead	Inf	16.2 %	1940	1940
				Arm 9 Left	Inf	83.8 %		
7/2 (A5123 Towcester Road Lane 2)	This lane uses a directly entered Saturation Flow						3800	3800
8/1	This lane uses a directly entered Saturation Flow						1900	1900
8/2	This lane uses a directly entered Saturation Flow						1900	1900
8/3	This lane uses a directly entered Saturation Flow						1900	1900
9/1	Infinite Saturation Flow						Inf	Inf
9/2	Infinite Saturation Flow						Inf	Inf
9/3	Infinite Saturation Flow						Inf	Inf
10/1 (Mere Way)	3.60	0.00	Y	Arm 11 Ahead	Inf	89.9 %	1960	1960
				Arm 13 Left	20.00	10.1 %		
10/2 (Mere Way)	3.60	0.00	N	Arm 11 Ahead	Inf	100.0 %	2115	2115
10/3 (Mere Way)	3.60	0.00	Y	Arm 11 Ahead	Inf	100.0 %	1975	1975
11/1	Infinite Saturation Flow						Inf	Inf
11/2	Infinite Saturation Flow						Inf	Inf
11/3	Infinite Saturation Flow						Inf	Inf
11/4	Infinite Saturation Flow						Inf	Inf
12/1 (Supermarket Lane 1)	Infinite Saturation Flow						Inf	Inf
12/2 (Supermarket Lane 2)	Infinite Saturation Flow						Inf	Inf
13/1	Infinite Saturation Flow						Inf	Inf
14/1	Infinite Saturation Flow						Inf	Inf
14/2	Infinite Saturation Flow						Inf	Inf
15/1	Infinite Saturation Flow						Inf	Inf
15/2	Infinite Saturation Flow						Inf	Inf
15/3	Infinite Saturation Flow						Inf	Inf

Scenario 2: '2031 J3 PM Peak' (FG4: '2031 J3 PM Peak', Plan 1: 'Network Control Plan 1')

Traffic Flows, Desired

Desired Flow :

		Destination					
		A	B	C	D	E	Tot.
Origin	A	0	87	241	86	85	499
	B	37	0	45	471	422	975
	C	203	197	2	217	1218	1837
	D	93	360	155	0	646	1254
	E	91	319	1512	127	138	2187
	Tot.	424	963	1955	901	2509	6752

Traffic Lane Flows

Lane	Scenario 2: 2031 J3 PM Peak
Junction: A5076 Danes Camp Way/Mere Way Interchange	
1/1	681
1/2	1274
2/1 (with short)	975(In) 516(Out)
2/2 (short)	459
3/1	511
3/2	482
3/3	373
4/1	728
4/2	173
5/1	650
5/2 (with short)	1187(In) 571(Out)
5/3 (short)	616
6/1	742
6/2	681
6/3	879
7/1 (with short)	1254(In) 794(Out)
7/2 (short)	460
8/1	399
8/2	493
8/3	155
9/1	1388
9/2	681
9/3	440
10/1	924
10/2 (with short)	1263(In) 998(Out)
10/3 (short)	265
11/1	226
11/2	1166
11/3	1153
11/4	265
12/1 (with short)	499(In) 328(Out)
12/2 (short)	171
13/1	424
14/1	313
14/2	650
15/1	636
15/2	1274
15/3	436

Lane Saturation Flows

Junction: A5076 Danes Camp Way/Mere Way Interchange								
Lane	**Lane Width (m)**	**Gradient**	**Nearside Lane**	**Allowed Turns**	**Turning Radius (m)**	**Turning Prop.**	**Sat Flow (PCU/Hr)**	**Flared Sat Flow (PCU/Hr)**
1/1	Infinite Saturation Flow						Inf	Inf
1/2	Infinite Saturation Flow						Inf	Inf
2/1 (Towcester Road Lane 1)	Infinite Saturation Flow						Inf	Inf
2/2 (Towcester Road Lane 2)	Infinite Saturation Flow						Inf	Inf
3/1	This lane uses a directly entered Saturation Flow						1900	1900
3/2	This lane uses a directly entered Saturation Flow						1900	1900
3/3	This lane uses a directly entered Saturation Flow						1900	1900
4/1	Infinite Saturation Flow						Inf	Inf
4/2	Infinite Saturation Flow						Inf	Inf
5/1 (A5076 Danes Camp Way)	3.30	0.00	Y	Arm 4 Left	Inf	33.4 %	1945	1945
				Arm 6 Ahead	Inf	66.6 %		
5/2 (A5076 Danes Camp Way)	3.30	0.00	N	Arm 6 Ahead	Inf	100.0 %	2085	2085
5/3 (A5076 Danes Camp Way)	3.50	0.00	Y	Arm 6 Ahead	Inf	100.0 %	1965	1965
6/1	This lane uses a directly entered Saturation Flow						1900	1900
6/2	This lane uses a directly entered Saturation Flow						1900	1900
6/3	This lane uses a directly entered Saturation Flow						1900	1900
7/1 (A5123 Towcester Road)	3.25	0.00	Y	Arm 8 Ahead	Inf	18.6 %	1940	1940
				Arm 9 Left	Inf	81.4 %		
7/2 (A5123 Towcester Road Lane 2)	This lane uses a directly entered Saturation Flow						3800	3800
8/1	This lane uses a directly entered Saturation Flow						1900	1900
8/2	This lane uses a directly entered Saturation Flow						1900	1900
8/3	This lane uses a directly entered Saturation Flow						1900	1900
9/1	Infinite Saturation Flow						Inf	Inf
9/2	Infinite Saturation Flow						Inf	Inf
9/3	Infinite Saturation Flow						Inf	Inf
10/1 (Mere Way)	3.60	0.00	Y	Arm 11 Ahead	Inf	90.2 %	1961	1961
				Arm 13 Left	20.00	9.8 %		
10/2 (Mere Way)	3.60	0.00	N	Arm 11 Ahead	Inf	100.0 %	2115	2115
10/3 (Mere Way)	3.60	0.00	Y	Arm 11 Ahead	Inf	100.0 %	1975	1975
11/1	Infinite Saturation Flow						Inf	Inf
11/2	Infinite Saturation Flow						Inf	Inf
11/3	Infinite Saturation Flow						Inf	Inf
11/4	Infinite Saturation Flow						Inf	Inf
12/1 (Supermarket Lane 1)	Infinite Saturation Flow						Inf	Inf

12/2 (Supermarket Lane 2)	Infinite Saturation Flow	Inf	Inf
13/1	Infinite Saturation Flow	Inf	Inf
14/1	Infinite Saturation Flow	Inf	Inf
14/2	Infinite Saturation Flow	Inf	Inf
15/1	Infinite Saturation Flow	Inf	Inf
15/2	Infinite Saturation Flow	Inf	Inf
15/3	Infinite Saturation Flow	Inf	Inf

Scenario 3: '2031 RC DS6 AM Peak' (FG5: '2031 RC DS6 AM Peak', Plan 1: 'Network Control Plan 1')

Traffic Flows, Desired

Desired Flow :

		Destination					
		A	B	C	D	E	Tot.
Origin	A	0	47	146	78	174	445
	B	11	0	76	17	243	347
	C	116	200	0	401	2196	2913
	D	80	0	559	0	516	1155
	E	118	292	1999	518	17	2944
	Tot.	325	539	2780	1014	3146	7804

Traffic Lane Flows

Lane	Scenario 3: 2031 RC DS6 AM Peak
Junction: A5076 Danes Camp Way/Mere Way Interchange	
1/1	1141
1/2	1639
2/1 (with short)	347(In) 85(Out)
2/2 (short)	262
3/1	418
3/2	378
3/3	262
4/1	819
4/2	195
5/1	1184
5/2 (with short)	1729(In) 817(Out)
5/3 (short)	912
6/1	966
6/2	878
6/3	1113
7/1 (with short)	1155(In) 596(Out)
7/2 (short)	559
8/1	252
8/2	401
8/3	313
9/1	1482
9/2	878
9/3	786
10/1	1156
10/2 (with short)	1788(In) 1253(Out)
10/3 (short)	535
11/1	191
11/2	1293
11/3	1566
11/4	535
12/1 (with short)	445(In) 193(Out)
12/2 (short)	252
13/1	325
14/1	238
14/2	301
15/1	1065
15/2	1639
15/3	787

Lane Saturation Flows

Junction: A5076 Danes Camp Way/Mere Way Interchange								
Lane	**Lane Width (m)**	**Gradient**	**Nearside Lane**	**Allowed Turns**	**Turning Radius (m)**	**Turning Prop.**	**Sat Flow (PCU/Hr)**	**Flared Sat Flow (PCU/Hr)**
1/1	Infinite Saturation Flow						Inf	Inf
1/2	Infinite Saturation Flow						Inf	Inf
2/1 (Towcester Road Lane 1)	Infinite Saturation Flow						Inf	Inf
2/2 (Towcester Road Lane 2)	Infinite Saturation Flow						Inf	Inf
3/1	This lane uses a directly entered Saturation Flow						1900	1900
3/2	This lane uses a directly entered Saturation Flow						1900	1900
3/3	This lane uses a directly entered Saturation Flow						1900	1900
4/1	Infinite Saturation Flow						Inf	Inf
4/2	Infinite Saturation Flow						Inf	Inf
5/1 (A5076 Danes Camp Way)	3.30	0.00	Y	Arm 4 Left	Inf	33.9 %	1945	1945
				Arm 6 Ahead	Inf	66.1 %		
5/2 (A5076 Danes Camp Way)	3.30	0.00	N	Arm 6 Ahead	Inf	100.0 %	2085	2085
5/3 (A5076 Danes Camp Way)	3.50	0.00	Y	Arm 6 Ahead	Inf	100.0 %	1965	1965
6/1	This lane uses a directly entered Saturation Flow						1900	1900
6/2	This lane uses a directly entered Saturation Flow						1900	1900
6/3	This lane uses a directly entered Saturation Flow						1900	1900
7/1 (A5123 Towcester Road)	3.25	0.00	Y	Arm 8 Ahead	Inf	13.4 %	1940	1940
				Arm 9 Left	Inf	86.6 %		
7/2 (A5123 Towcester Road Lane 2)	This lane uses a directly entered Saturation Flow						3800	3800
8/1	This lane uses a directly entered Saturation Flow						1900	1900
8/2	This lane uses a directly entered Saturation Flow						1900	1900
8/3	This lane uses a directly entered Saturation Flow						1900	1900
9/1	Infinite Saturation Flow						Inf	Inf
9/2	Infinite Saturation Flow						Inf	Inf
9/3	Infinite Saturation Flow						Inf	Inf
10/1 (Mere Way)	3.60	0.00	Y	Arm 11 Ahead	Inf	89.8 %	1960	1960
				Arm 13 Left	20.00	10.2 %		
10/2 (Mere Way)	3.60	0.00	N	Arm 11 Ahead	Inf	100.0 %	2115	2115
10/3 (Mere Way)	3.60	0.00	Y	Arm 11 Ahead	Inf	100.0 %	1975	1975
11/1	Infinite Saturation Flow						Inf	Inf
11/2	Infinite Saturation Flow						Inf	Inf
11/3	Infinite Saturation Flow						Inf	Inf
11/4	Infinite Saturation Flow						Inf	Inf
12/1 (Supermarket Lane 1)	Infinite Saturation Flow						Inf	Inf

12/2 (Supermarket Lane 2)	Infinite Saturation Flow	Inf	Inf
13/1	Infinite Saturation Flow	Inf	Inf
14/1	Infinite Saturation Flow	Inf	Inf
14/2	Infinite Saturation Flow	Inf	Inf
15/1	Infinite Saturation Flow	Inf	Inf
15/2	Infinite Saturation Flow	Inf	Inf
15/3	Infinite Saturation Flow	Inf	Inf

Scenario 4: '2031 RC DS6 PM Peak' (FG6: '2031 RC DS6 PM Peak', Plan 1: 'Network Control Plan 1')

Traffic Flows, Desired

Desired Flow :

		Destination					
		A	B	C	D	E	Tot.
Origin	A	0	88	249	88	152	577
	B	32	0	186	72	54	344
	C	180	206	22	162	1598	2168
	D	98	138	502	0	219	957
	E	138	310	1804	506	0	2758
	Tot.	448	742	2763	828	2023	6804

Traffic Lane Flows

Lane	Scenario 4: 2031 RC DS6 PM Peak
Junction: A5076 Danes Camp Way/Mere Way Interchange	
1/1	1104
1/2	1659
2/1 (with short)	344(In) 250(Out)
2/2 (short)	94
3/1	447
3/2	301
3/3	156
4/1	609
4/2	219
5/1	870
5/2 (with short)	1298(In) 509(Out)
5/3 (short)	789
6/1	790
6/2	523
6/3	931
7/1 (with short)	957(In) 324(Out)
7/2 (short)	633
8/1	367
8/2	448
8/3	363
9/1	1009
9/2	523
9/3	491
10/1	1081
10/2 (with short)	1677(In) 1171(Out)
10/3 (short)	506
11/1	212
11/2	1236
11/3	1534
11/4	506
12/1 (with short)	577(In) 337(Out)
12/2 (short)	240
13/1	448
14/1	300
14/2	442
15/1	918
15/2	1659
15/3	746

Lane Saturation Flows

Junction: A5076 Danes Camp Way/Mere Way Interchange								
Lane	**Lane Width (m)**	**Gradient**	**Nearside Lane**	**Allowed Turns**	**Turning Radius (m)**	**Turning Prop.**	**Sat Flow (PCU/Hr)**	**Flared Sat Flow (PCU/Hr)**
1/1	Infinite Saturation Flow						Inf	Inf
1/2	Infinite Saturation Flow						Inf	Inf
2/1 (Towcester Road Lane 1)	Infinite Saturation Flow						Inf	Inf
2/2 (Towcester Road Lane 2)	Infinite Saturation Flow						Inf	Inf
3/1	This lane uses a directly entered Saturation Flow						1900	1900
3/2	This lane uses a directly entered Saturation Flow						1900	1900
3/3	This lane uses a directly entered Saturation Flow						1900	1900
4/1	Infinite Saturation Flow						Inf	Inf
4/2	Infinite Saturation Flow						Inf	Inf
5/1 (A5076 Danes Camp Way)	3.30	0.00	Y	Arm 4 Left	Inf	18.6 %	1945	1945
				Arm 6 Ahead	Inf	81.4 %		
5/2 (A5076 Danes Camp Way)	3.30	0.00	N	Arm 6 Ahead	Inf	100.0 %	2085	2085
5/3 (A5076 Danes Camp Way)	3.50	0.00	Y	Arm 6 Ahead	Inf	100.0 %	1965	1965
6/1	This lane uses a directly entered Saturation Flow						1900	1900
6/2	This lane uses a directly entered Saturation Flow						1900	1900
6/3	This lane uses a directly entered Saturation Flow						1900	1900
7/1 (A5123 Towcester Road)	3.25	0.00	Y	Arm 8 Ahead	Inf	32.4 %	1940	1940
				Arm 9 Left	Inf	67.6 %		
7/2 (A5123 Towcester Road Lane 2)	This lane uses a directly entered Saturation Flow						3800	3800
8/1	This lane uses a directly entered Saturation Flow						1900	1900
8/2	This lane uses a directly entered Saturation Flow						1900	1900
8/3	This lane uses a directly entered Saturation Flow						1900	1900
9/1	Infinite Saturation Flow						Inf	Inf
9/2	Infinite Saturation Flow						Inf	Inf
9/3	Infinite Saturation Flow						Inf	Inf
10/1 (Mere Way)	3.60	0.00	Y	Arm 11 Ahead	Inf	87.2 %	1956	1956
				Arm 13 Left	20.00	12.8 %		
10/2 (Mere Way)	3.60	0.00	N	Arm 11 Ahead	Inf	100.0 %	2115	2115
10/3 (Mere Way)	3.60	0.00	Y	Arm 11 Ahead	Inf	100.0 %	1975	1975
11/1	Infinite Saturation Flow						Inf	Inf
11/2	Infinite Saturation Flow						Inf	Inf
11/3	Infinite Saturation Flow						Inf	Inf
11/4	Infinite Saturation Flow						Inf	Inf
12/1 (Supermarket Lane 1)	Infinite Saturation Flow						Inf	Inf

12/2 (Supermarket Lane 2)	Infinite Saturation Flow	Inf	Inf
13/1	Infinite Saturation Flow	Inf	Inf
14/1	Infinite Saturation Flow	Inf	Inf
14/2	Infinite Saturation Flow	Inf	Inf
15/1	Infinite Saturation Flow	Inf	Inf
15/2	Infinite Saturation Flow	Inf	Inf
15/3	Infinite Saturation Flow	Inf	Inf

Scenario 1: '2031 J3 AM Peak' (FG3: '2031 J3 AM Peak', Plan 1: 'Network Control Plan 1')

Stage Timings

Stage Stream: 1

Stage	1	2
Duration	43	23
Change Point	0	48

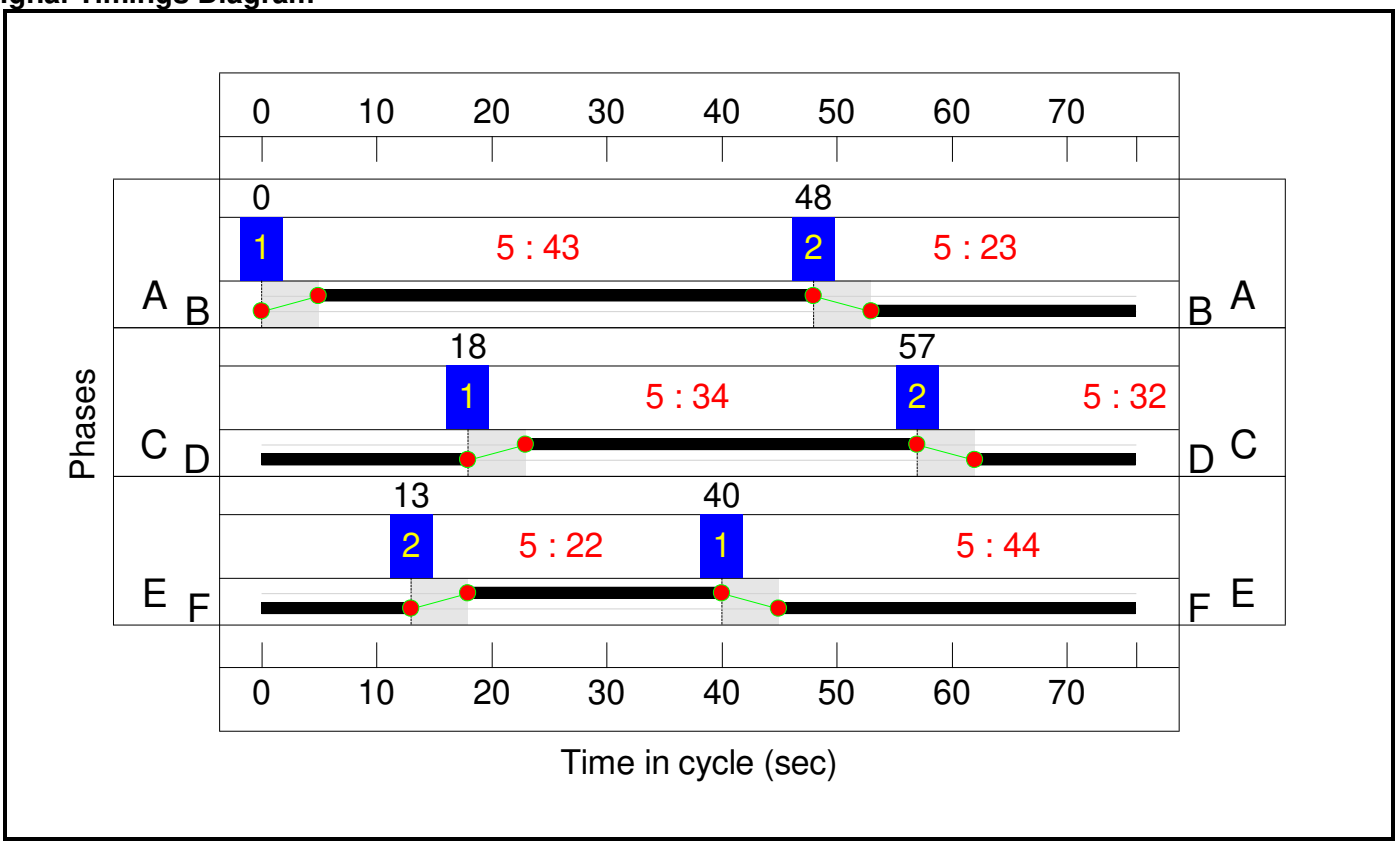
Stage Stream: 2

Stage	1	2
Duration	34	32
Change Point	18	57

Stage Stream: 3

Stage	1	2
Duration	44	22
Change Point	40	13

Signal Timings Diagram



Network Results

Item	Lane Description	Lane Type	Controller Stream	Position In Filtered Route	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)
Network: Towcester Rd/Mere Way Gyratory - Rail Central mitigation	-	-	**N/A**	-	-		-	-	-	-	-	-	**141.6%**
A5076 Danes Camp Way/Mere Way Interchange	-	-	**N/A**	-	-		-	-	-	-	-	-	**141.6%**
2/1+2/2	Towcester Road Left Ahead	O	N/A	N/A	-		-	-	-	1064	Inf : Inf	542+434	109.6 : 108.4%
3/1	Ahead	U	1	N/A	A		1	43	-	586	1900	1100	49.8%
3/2	Ahead Right	U	1	N/A	A		1	43	-	530	1900	1100	46.0%
3/3	Right	U	1	N/A	A		1	43	-	392	1900	1100	33.8%
5/1	A5076 Danes Camp Way Left Ahead	U	1	N/A	B		1	23	-	785	1945	614	127.8%
5/2+5/3	A5076 Danes Camp Way Ahead	U	1	N/A	B		1	23	-	1240	2085:1965	451+542	124.8 : 124.8%
6/1	Ahead	U	3	N/A	F		1	44	-	791	1900	1125	59.4%
6/2	Ahead	U	3	N/A	F		1	44	-	707	1900	1125	52.0%
6/3	Right Ahead	U	3	N/A	F		1	44	-	925	1900	1125	69.3%
7/1+7/2	A5123 Towcester Road Ahead Left	U	3	N/A	E		1	22	-	1173	1940:3800	448+380	141.6 : 141.6%
8/1	Right Ahead	U	2	N/A	C		1	34	-	239	1900	875	21.1%
8/2	Right	U	2	N/A	C		1	34	-	325	1900	875	27.1%
8/3	Right	U	2	N/A	C		1	34	-	295	1900	875	23.8%
10/1	Mere Way Ahead Left	U	2	N/A	D		1	32	-	972	1960	851	114.2%
10/2+10/3	Mere Way Ahead	U	2	N/A	D		1	32	-	1477	2115:1975	918+370	114.7 : 114.7%
12/1+12/2	Supermarket Left Ahead	O	N/A	N/A	-		-	-	-	496	Inf : Inf	306+420	68.3 : 68.3%

Item	Arriving (pcu)	Leaving (pcu)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Uniform Delay (pcuHr)	Rand + Oversat Delay (pcuHr)	Storage Area Uniform Delay (pcuHr)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)	Max. Back of Uniform Queue (pcu)	Rand + Oversat Queue (pcu)	Mean Max Queue (pcu)
Network: Towcester Rd/Mere Way Gyratory - Rail Central mitigation	**-**	**-**	**2943**	**0**	**0**	**93.7**	**604.7**	**0.0**	**698.4**	**-**	**-**	**-**	**-**
A5076 Danes Camp Way/Mere Way Interchange	**-**	**-**	**2943**	**0**	**0**	**93.7**	**604.7**	**0.0**	**698.4**	**-**	**-**	**-**	**-**
2/1+2/2	1064	975	1951	0	0	7.4	49.7	-	57.1	193.1	37.6	49.7	87.3
3/1	548	548	-	-	-	1.9	0.5	-	2.4	15.5	8.3	0.5	8.8
3/2	506	506	-	-	-	1.9	0.4	-	2.3	16.2	6.9	0.4	7.3
3/3	371	371	-	-	-	1.3	0.3	-	1.5	14.6	4.9	0.3	5.1
5/1	785	614	-	-	-	13.3	87.6	-	101.0	463.0	23.1	87.6	110.8
5/2+5/3	1240	993	-	-	-	18.1	125.8	-	144.0	418.0	26.7	125.8	152.5
6/1	668	668	-	-	-	0.8	0.7	-	1.6	8.4	3.9	0.7	4.6
6/2	585	585	-	-	-	0.3	0.5	-	0.9	5.4	1.3	0.5	1.9
6/3	779	779	-	-	-	1.0	1.1	-	2.1	9.8	3.4	1.1	4.5
7/1+7/2	1173	828	-	-	-	19.6	174.0	-	193.6	594.2	28.6	174.0	202.6
8/1	185	185	-	-	-	0.8	0.1	-	0.9	17.5	2.5	0.1	2.7
8/2	237	237	-	-	-	0.6	0.2	-	0.8	12.2	3.7	0.2	3.9
8/3	208	208	-	-	-	0.0	0.2	-	0.2	3.5	2.8	0.2	2.9
10/1	972	851	-	-	-	10.8	64.3	-	75.0	277.9	23.1	64.3	87.3
10/2+10/3	1477	1325	-	-	-	14.0	98.2	-	112.2	273.5	32.8	98.2	131.0
12/1+12/2	496	496	992	0	0	1.8	1.1	-	2.9	21.0	4.9	1.1	5.9

C1	Stream: 1 PRC for Signalled Lanes (%):	-42.0	Total Delay for Signalled Lanes (pcuHr):	251.09	Cycle Time (s): 76
C1	Stream: 2 PRC for Signalled Lanes (%):	-27.4	Total Delay for Signalled Lanes (pcuHr):	189.14	Cycle Time (s): 76
C1	Stream: 3 PRC for Signalled Lanes (%):	-57.3	Total Delay for Signalled Lanes (pcuHr):	198.15	Cycle Time (s): 76
	PRC Over All Lanes (%):	-57.3	Total Delay Over All Lanes(pcuHr):	698.35	

Scenario 2: '2031 J3 PM Peak' (FG4: '2031 J3 PM Peak', Plan 1: 'Network Control Plan 1')

Stage Timings

Stage Stream: 1

Stage	1	2
Duration	39	17
Change Point	0	44

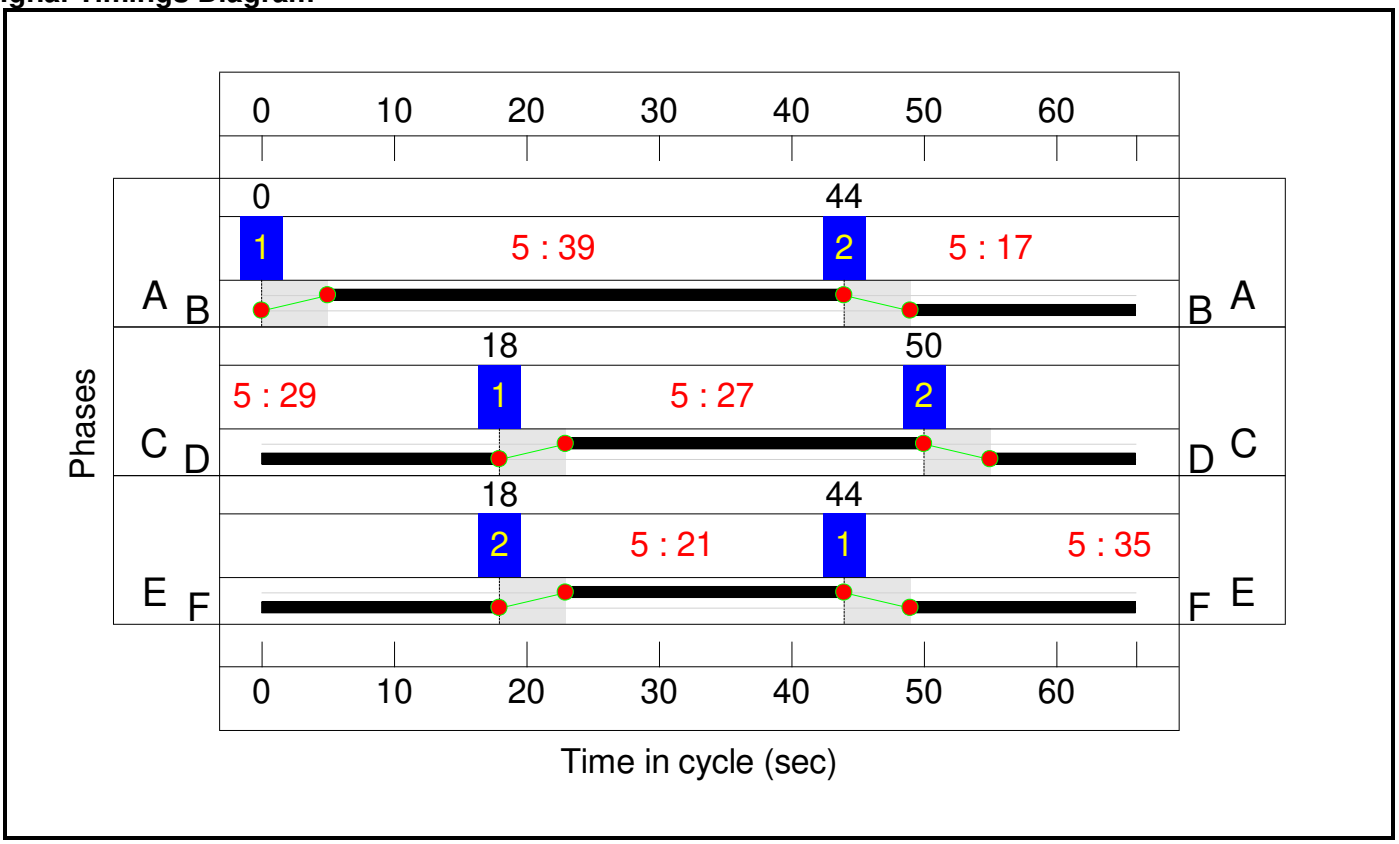
Stage Stream: 2

Stage	1	2
Duration	27	29
Change Point	18	50

Stage Stream: 3

Stage	1	2
Duration	35	21
Change Point	44	18

Signal Timings Diagram



Network Results

Item	Lane Description	Lane Type	Controller Stream	Position In Filtered Route	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)
Network: Towcester Rd/Mere Way Gyratory - Rail Central mitigation	-	-	**N/A**	-	-		-	-	-	-	-	-	**149.7%**
A5076 Danes Camp Way/Mere Way Interchange	-	-	**N/A**	-	-		-	-	-	-	-	-	**149.7%**
2/1+2/2	Towcester Road Left Ahead	O	N/A	N/A	-		-	-	-	975	Inf : Inf	565+485	91.4 : 94.6%
3/1	Ahead	U	1	N/A	A		1	39	-	511	1900	1152	44.4%
3/2	Ahead Right	U	1	N/A	A		1	39	-	482	1900	1152	41.9%
3/3	Right	U	1	N/A	A		1	39	-	373	1900	1152	32.4%
5/1	A5076 Danes Camp Way Left Ahead	U	1	N/A	B		1	17	-	650	1945	530	122.5%
5/2+5/3	A5076 Danes Camp Way Ahead	U	1	N/A	B		1	17	-	1187	2085:1965	485+523	117.9 : 117.9%
6/1	Ahead	U	3	N/A	F		1	35	-	742	1900	1036	63.9%
6/2	Ahead	U	3	N/A	F		1	35	-	681	1900	1036	57.4%
6/3	Right Ahead	U	3	N/A	F		1	35	-	879	1900	1036	75.8%
7/1+7/2	A5123 Towcester Road Ahead Left	U	3	N/A	E		1	21	-	1254	1940:3800	530+307	149.7 : 149.7%
8/1	Right Ahead	U	2	N/A	C		1	27	-	399	1900	806	39.4%
8/2	Right	U	2	N/A	C		1	27	-	493	1900	806	45.1%
8/3	Right	U	2	N/A	C		1	27	-	155	1900	806	12.8%
10/1	Mere Way Ahead Left	U	2	N/A	D		1	29	-	924	1961	891	103.7%
10/2+10/3	Mere Way Ahead	U	2	N/A	D		1	29	-	1263	2115:1975	961+255	103.8 : 103.8%
12/1+12/2	Supermarket Left Ahead	O	N/A	N/A	-		-	-	-	499	Inf : Inf	389+203	84.4 : 84.4%

Item	Arriving (pcu)	Leaving (pcu)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Uniform Delay (pcuHr)	Rand + Oversat Delay (pcuHr)	Storage Area Uniform Delay (pcuHr)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)	Max. Back of Uniform Queue (pcu)	Rand + Oversat Queue (pcu)	Mean Max Queue (pcu)
Network: Towcester Rd/Mere Way Gyratory - Rail Central mitigation	**-**	**-**	**2948**	**0**	**0**	**64.7**	**436.4**	**0.0**	**501.1**	**-**	**-**	**-**	**-**
A5076 Danes Camp Way/Mere Way Interchange	**-**	**-**	**2948**	**0**	**0**	**64.7**	**436.4**	**0.0**	**501.1**	**-**	**-**	**-**	**-**
2/1+2/2	975	975	1950	0	0	2.1	5.6	-	7.7	28.6	7.9	5.6	13.5
3/1	511	511	-	-	-	1.2	0.4	-	1.6	11.4	4.9	0.4	5.3
3/2	482	482	-	-	-	1.2	0.4	-	1.6	11.6	4.8	0.4	5.2
3/3	373	373	-	-	-	0.8	0.2	-	1.0	10.0	4.1	0.2	4.3
5/1	650	530	-	-	-	8.9	62.4	-	71.3	394.9	15.8	62.4	78.1
5/2+5/3	1187	1007	-	-	-	13.3	93.1	-	106.4	322.7	17.7	93.1	110.8
6/1	662	662	-	-	-	0.6	0.9	-	1.5	7.9	4.2	0.9	5.1
6/2	595	595	-	-	-	0.3	0.7	-	0.9	5.6	1.0	0.7	1.6
6/3	786	786	-	-	-	0.4	1.5	-	2.0	9.1	1.6	1.5	3.1
7/1+7/2	1254	838	-	-	-	18.3	209.6	-	228.0	654.4	28.9	209.6	238.5
8/1	317	317	-	-	-	1.6	0.3	-	1.9	21.9	4.4	0.3	4.7
8/2	363	363	-	-	-	1.2	0.4	-	1.6	16.0	5.2	0.4	5.6
8/3	104	104	-	-	-	0.0	0.1	-	0.1	2.6	0.0	0.1	0.1
10/1	924	891	-	-	-	5.8	25.4	-	31.2	121.5	17.5	25.4	42.9
10/2+10/3	1263	1226	-	-	-	7.1	32.8	-	39.9	113.8	19.0	32.8	51.8
12/1+12/2	499	499	998	0	0	1.8	2.6	-	4.4	31.6	5.5	2.6	8.0

C1	Stream: 1 PRC for Signalled Lanes (%):	-36.2	Total Delay for Signalled Lanes (pcuHr):	181.94	Cycle Time (s):	66
C1	Stream: 2 PRC for Signalled Lanes (%):	-15.3	Total Delay for Signalled Lanes (pcuHr):	74.72	Cycle Time (s):	66
C1	Stream: 3 PRC for Signalled Lanes (%):	-66.3	Total Delay for Signalled Lanes (pcuHr):	232.32	Cycle Time (s):	66
	PRC Over All Lanes (%):	-66.3	Total Delay Over All Lanes(pcuHr):	501.10		

Scenario 3: '2031 RC DS6 AM Peak' (FG5: '2031 RC DS6 AM Peak', Plan 1: 'Network Control Plan 1')

Stage Timings

Stage Stream: 1

Stage	1	2
Duration	31	35
Change Point	0	36

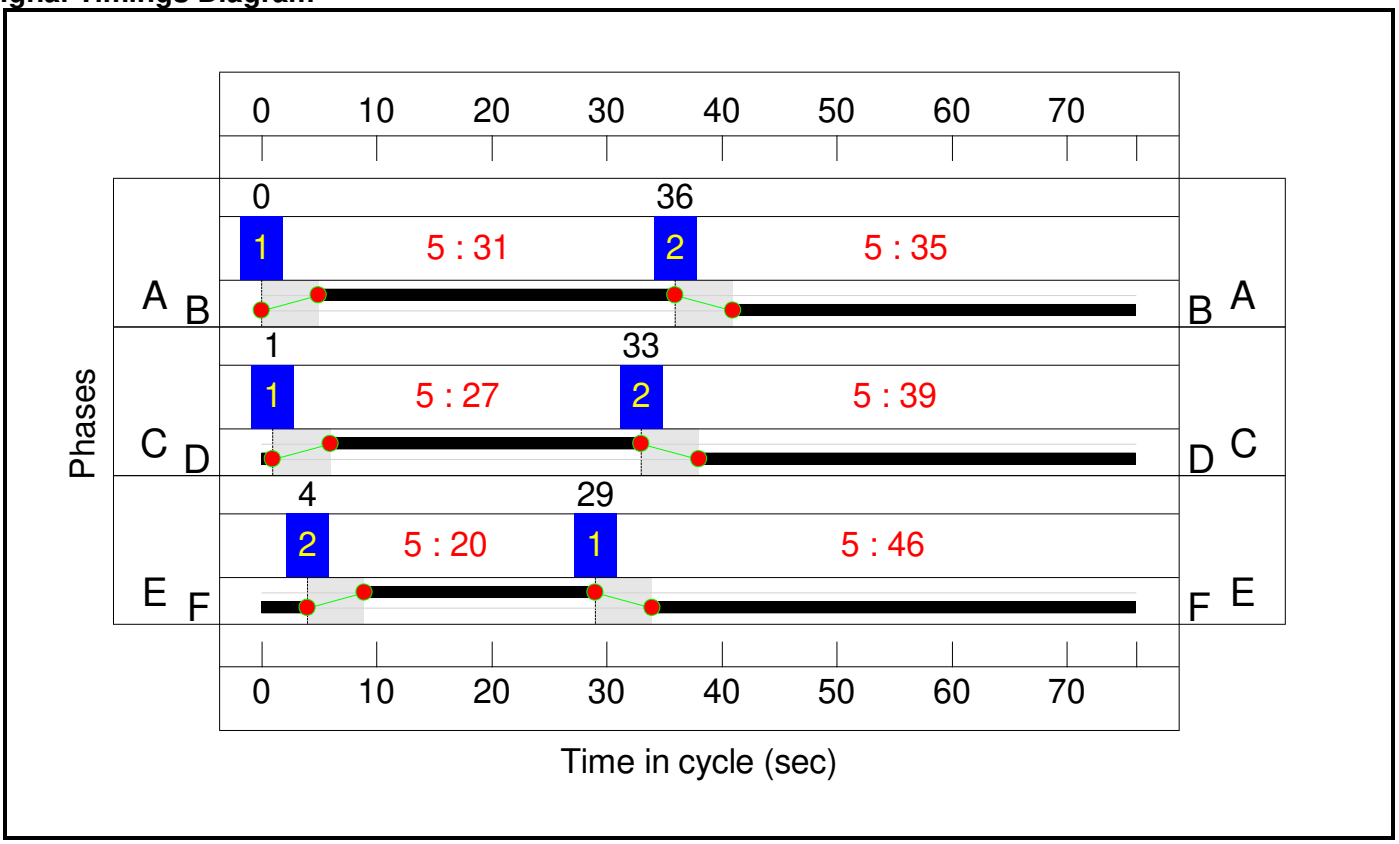
Stage Stream: 2

Stage	1	2
Duration	27	39
Change Point	1	33

Stage Stream: 3

Stage	1	2
Duration	46	20
Change Point	29	4

Signal Timings Diagram



Network Results

Item	Lane Description	Lane Type	Controller Stream	Position In Filtered Route	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)
Network: Towcester Rd/Mere Way Gyratory - Rail Central mitigation	-	-	**N/A**	-	-		-	-	-	-	-	-	**143.8%**
A5076 Danes Camp Way/Mere Way Interchange	-	-	**N/A**	-	-		-	-	-	-	-	-	**143.8%**
2/1+2/2	Towcester Road Left Ahead	O	N/A	N/A	-		-	-	-	347	Inf : Inf	113+347	75.5 : 75.5%
3/1	Ahead	U	1	N/A	A		1	31	-	418	1900	800	47.0%
3/2	Ahead Right	U	1	N/A	A		1	31	-	378	1900	800	45.0%
3/3	Right	U	1	N/A	A		1	31	-	262	1900	800	32.5%
5/1	A5076 Danes Camp Way Left Ahead	U	1	N/A	B		1	35	-	1184	1945	921	128.5%
5/2+5/3	A5076 Danes Camp Way Ahead	U	1	N/A	B		1	35	-	1729	2085:1965	633+707	129.1 : 129.1%
6/1	Ahead	U	3	N/A	F		1	46	-	966	1900	1175	67.4%
6/2	Ahead	U	3	N/A	F		1	46	-	878	1900	1175	59.1%
6/3	Right Ahead	U	3	N/A	F		1	46	-	1113	1900	1175	77.1%
7/1+7/2	A5123 Towcester Road Ahead Left	U	3	N/A	E		1	20	-	1155	1940:3800	415+389	143.8 : 143.8%
8/1	Right Ahead	U	2	N/A	C		1	27	-	252	1900	700	27.3%
8/2	Right	U	2	N/A	C		1	27	-	401	1900	700	41.6%
8/3	Right	U	2	N/A	C		1	27	-	313	1900	700	31.1%
10/1	Mere Way Ahead Left	U	2	N/A	D		1	39	-	1156	1960	1032	112.1%
10/2+10/3	Mere Way Ahead	U	2	N/A	D		1	39	-	1788	2115:1975	1109+473	113.0 : 113.0%
12/1+12/2	Supermarket Left Ahead	O	N/A	N/A	-		-	-	-	445	Inf : Inf	221+289	87.3 : 87.3%

Item	Arriving (pcu)	Leaving (pcu)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Uniform Delay (pcuHr)	Rand + Oversat Delay (pcuHr)	Storage Area Uniform Delay (pcuHr)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)	Max. Back of Uniform Queue (pcu)	Rand + Oversat Queue (pcu)	Mean Max Queue (pcu)
Network: Towcester Rd/Mere Way Gyratory - Rail Central mitigation	**-**	**-**	**1584**	**0**	**0**	**101.0**	**691.4**	**0.0**	**792.4**	**-**	**-**	**-**	**-**
A5076 Danes Camp Way/Mere Way Interchange	**-**	**-**	**1584**	**0**	**0**	**101.0**	**691.4**	**0.0**	**792.4**	**-**	**-**	**-**	**-**
2/1+2/2	347	347	694	0	0	0.8	1.5	-	2.3	23.7	2.1	1.5	3.6
3/1	376	376	-	-	-	3.1	0.4	-	3.5	33.5	7.5	0.4	7.9
3/2	360	360	-	-	-	1.8	0.4	-	2.2	22.4	4.8	0.4	5.3
3/3	260	260	-	-	-	0.8	0.2	-	1.0	14.2	2.1	0.2	2.3
5/1	1184	921	-	-	-	18.8	133.6	-	152.4	463.3	35.1	133.6	168.7
5/2+5/3	1729	1340	-	-	-	24.6	196.8	-	221.5	461.1	41.5	196.8	238.3
6/1	792	792	-	-	-	0.8	1.0	-	1.8	8.2	3.9	1.0	4.9
6/2	694	694	-	-	-	0.3	0.7	-	1.0	5.3	1.1	0.7	1.8
6/3	906	906	-	-	-	1.0	1.7	-	2.7	10.5	4.2	1.7	5.9
7/1+7/2	1155	803	-	-	-	21.0	177.4	-	198.4	618.5	27.8	177.4	205.2
8/1	191	191	-	-	-	0.8	0.2	-	1.0	19.2	2.9	0.2	3.1
8/2	291	291	-	-	-	0.7	0.4	-	1.0	12.6	2.5	0.4	2.9
8/3	218	218	-	-	-	0.0	0.2	-	0.2	3.9	3.0	0.2	3.2
10/1	1156	1032	-	-	-	11.6	66.6	-	78.2	243.4	28.4	66.6	94.9
10/2+10/3	1788	1583	-	-	-	12.5	107.2	-	119.7	241.1	36.4	107.2	143.6
12/1+12/2	445	445	890	0	0	2.3	3.1	-	5.4	44.0	5.0	3.1	8.2

C1	Stream: 1 PRC for Signalled Lanes (%):	-43.4	Total Delay for Signalled Lanes (pcuHr):	380.58	Cycle Time (s):	76
C1	Stream: 2 PRC for Signalled Lanes (%):	-25.6	Total Delay for Signalled Lanes (pcuHr):	200.17	Cycle Time (s):	76
C1	Stream: 3 PRC for Signalled Lanes (%):	-59.7	Total Delay for Signalled Lanes (pcuHr):	203.92	Cycle Time (s):	76
	PRC Over All Lanes (%):	-59.7	Total Delay Over All Lanes(pcuHr):	792.40		

Scenario 4: '2031 RC DS6 PM Peak' (FG6: '2031 RC DS6 PM Peak', Plan 1: 'Network Control Plan 1')

Stage Timings

Stage Stream: 1

Stage	1	2
Duration	35	21
Change Point	0	40

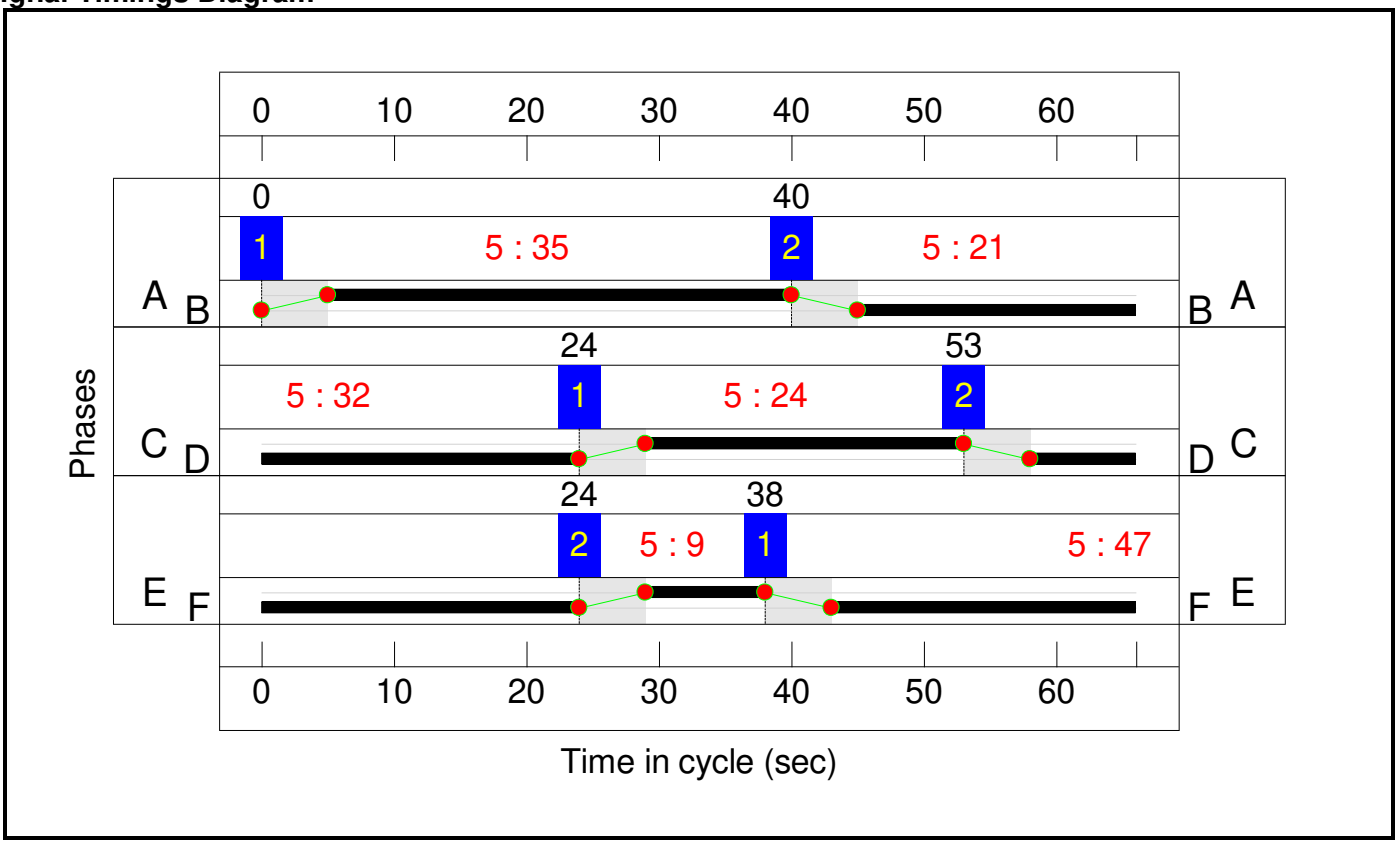
Stage Stream: 2

Stage	1	2
Duration	24	32
Change Point	24	53

Stage Stream: 3

Stage	1	2
Duration	47	9
Change Point	38	24

Signal Timings Diagram



Network Results

Item	Lane Description	Lane Type	Controller Stream	Position In Filtered Route	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)
Network: Towcester Rd/Mere Way Gyratory - Rail Central mitigation	-	-	**N/A**	-	-		-	-	-	-	-	-	**134.2%**
A5076 Danes Camp Way/Mere Way Interchange	-	-	**N/A**	-	-		-	-	-	-	-	-	**134.2%**
2/1+2/2	Towcester Road Left Ahead	O	N/A	N/A	-		-	-	-	344	Inf : Inf	518+195	48.3 : 48.3%
3/1	Ahead	U	1	N/A	A		1	35	-	447	1900	1036	43.1%
3/2	Ahead Right	U	1	N/A	A		1	35	-	301	1900	1036	29.0%
3/3	Right	U	1	N/A	A		1	35	-	156	1900	1036	15.1%
5/1	A5076 Danes Camp Way Left Ahead	U	1	N/A	B		1	21	-	870	1945	648	134.2%
5/2+5/3	A5076 Danes Camp Way Ahead	U	1	N/A	B		1	21	-	1298	2085:1965	388+602	131.1 : 131.1%
6/1	Ahead	U	3	N/A	F		1	47	-	790	1900	1382	44.1%
6/2	Ahead	U	3	N/A	F		1	47	-	523	1900	1382	29.1%
6/3	Right Ahead	U	3	N/A	F		1	47	-	931	1900	1382	53.8%
7/1+7/2	A5123 Towcester Road Ahead Left	U	3	N/A	E		1	9	-	957	1940:3800	294+576	110.2 : 109.9%
8/1	Right Ahead	U	2	N/A	C		1	24	-	367	1900	720	42.1%
8/2	Right	U	2	N/A	C		1	24	-	448	1900	720	53.0%
8/3	Right	U	2	N/A	C		1	24	-	363	1900	720	45.9%
10/1	Mere Way Ahead Left	U	2	N/A	D		1	32	-	1081	1956	978	110.5%
10/2+10/3	Mere Way Ahead	U	2	N/A	D		1	32	-	1677	2115:1975	1058+457	110.7 : 110.7%
12/1+12/2	Supermarket Left Ahead	O	N/A	N/A	-		-	-	-	577	Inf : Inf	292+270	115.6 : 89.0%

Item	Arriving (pcu)	Leaving (pcu)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Uniform Delay (pcuHr)	Rand + Oversat Delay (pcuHr)	Storage Area Uniform Delay (pcuHr)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)	Max. Back of Uniform Queue (pcu)	Rand + Oversat Queue (pcu)	Mean Max Queue (pcu)
Network: Towcester Rd/Mere Way Gyratory - Rail Central mitigation	**-**	**-**	**1751**	**0**	**0**	**70.5**	**494.8**	**0.0**	**565.3**	**-**	**-**	**-**	**-**
A5076 Danes Camp Way/Mere Way Interchange	**-**	**-**	**1751**	**0**	**0**	**70.5**	**494.8**	**0.0**	**565.3**	**-**	**-**	**-**	**-**
2/1+2/2	344	344	688	0	0	0.2	0.5	-	0.7	7.5	2.0	0.5	2.5
3/1	447	447	-	-	-	0.5	0.4	-	0.9	6.9	5.5	0.4	5.9
3/2	301	301	-	-	-	0.5	0.2	-	0.7	7.9	3.5	0.2	3.7
3/3	156	156	-	-	-	0.4	0.1	-	0.4	10.3	1.8	0.1	1.9
5/1	870	648	-	-	-	14.0	112.8	-	126.7	524.4	23.4	112.8	136.1
5/2+5/3	1298	990	-	-	-	18.0	155.9	-	173.9	482.3	26.7	155.9	182.6
6/1	610	610	-	-	-	0.0	0.4	-	0.4	2.5	0.4	0.4	0.8
6/2	402	402	-	-	-	0.0	0.2	-	0.2	2.2	0.5	0.2	0.7
6/3	744	744	-	-	-	0.1	0.6	-	0.7	3.4	0.7	0.6	1.3
7/1+7/2	957	870	-	-	-	9.8	48.6	-	58.4	219.5	8.8	48.6	57.4
8/1	303	303	-	-	-	1.7	0.4	-	2.0	24.2	3.9	0.4	4.3
8/2	381	381	-	-	-	1.2	0.6	-	1.8	16.6	3.7	0.6	4.3
8/3	330	330	-	-	-	0.1	0.4	-	0.5	5.4	6.1	0.4	6.5
10/1	1081	978	-	-	-	8.4	56.3	-	64.7	215.6	21.7	56.3	78.0
10/2+10/3	1677	1564	-	-	-	10.8	86.1	-	96.9	208.0	31.9	86.1	118.0
12/1+12/2	577	532	1063	0	0	4.9	31.4	-	36.3	226.6	18.5	31.4	50.0

C1	Stream: 1 PRC for Signalled Lanes (%):	-49.1	Total Delay for Signalled Lanes (pcuHr):	302.59	Cycle Time (s): 66
C1	Stream: 2 PRC for Signalled Lanes (%):	-23.0	Total Delay for Signalled Lanes (pcuHr):	165.95	Cycle Time (s): 66
C1	Stream: 3 PRC for Signalled Lanes (%):	-22.5	Total Delay for Signalled Lanes (pcuHr):	59.75	Cycle Time (s): 66
	PRC Over All Lanes (%):	-49.1	Total Delay Over All Lanes(pcuHr):	565.32	

APPENIDX F

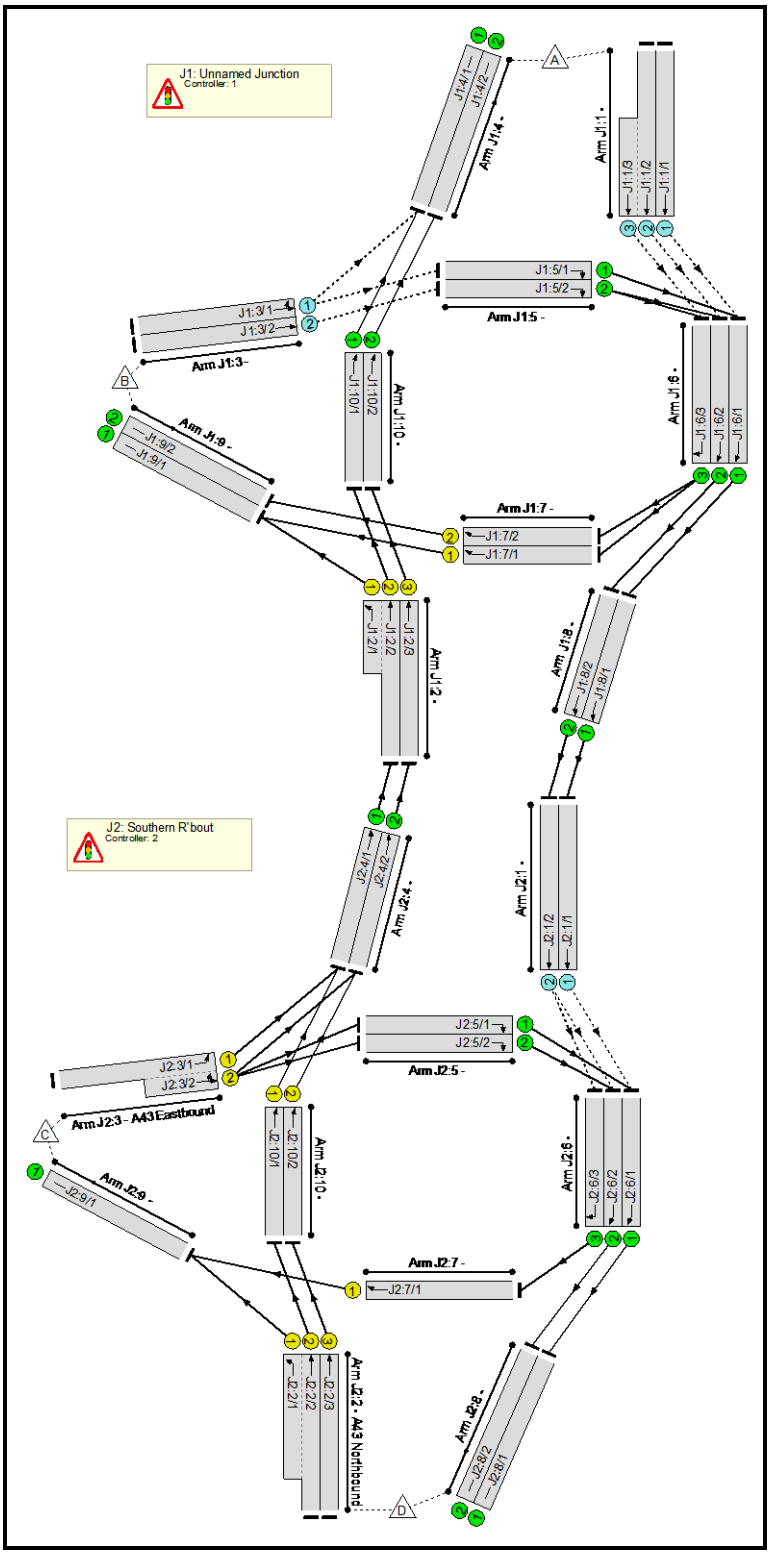
NORTHAMPTON GATEWAY M1 J15A LINGSIG MODELLING RESULTS

Full Input Data And Results

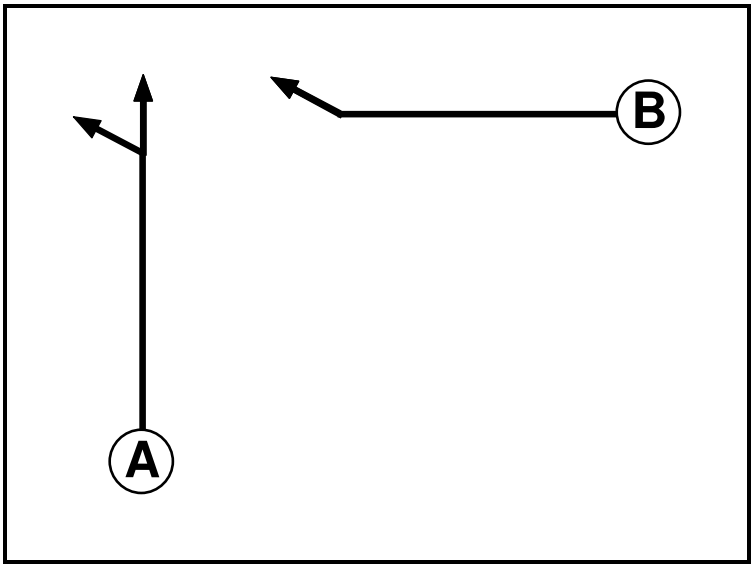
User and Project Details

Project:	**Northampton Gateway**
Title:	**NGW Proposed Mitigation - 2031 J3 CIA**
File name:	190107 M1 J15a NGW Mitigation.lsg3x
Author:	Mark Higgins
Company:	ADC Infrastructure
Address:	Nottingham

Network Layout Diagram



C1
Phase Diagram



Phase Input Data

Phase Name	Phase Type	Stage Stream	Assoc. Phase	Street Min	Cont Min
A	Traffic	1		7	7
B	Traffic	1		7	7

Phase Intergreens Matrix

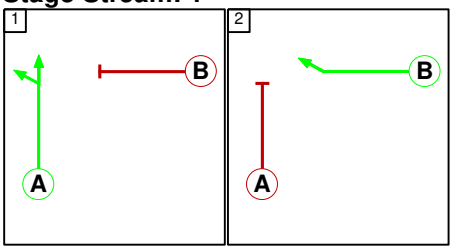
		Starting Phase	
		A	B
Terminating Phase	A		6
	B	6	

Phases in Stage

Stream	Stage No.	Phases in Stage
1	1	A
1	2	B

Stage Diagram

Stage Stream: 1

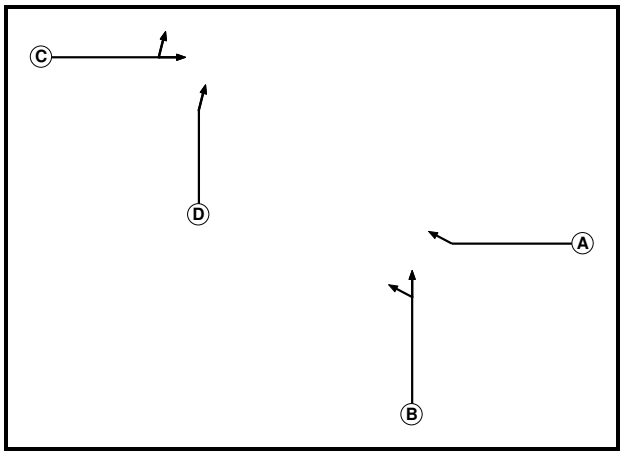


Prohibited Stage Change

Stage Stream: 1

		To Stage	
		1	2
From Stage	1		6
	2	6	

C2
Phase Diagram



Phase Input Data

Phase Name	Phase Type	Stage Stream	Assoc. Phase	Street Min	Cont Min
A	Traffic	1		7	7
B	Traffic	1		7	7
C	Traffic	2		7	7
D	Traffic	2		7	7

Phase Intergreens Matrix

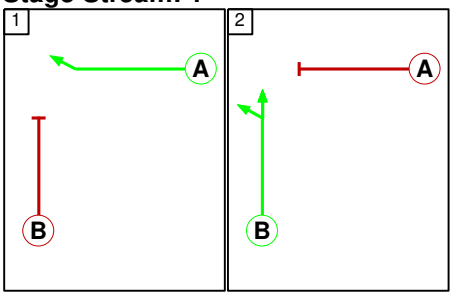
		Starting Phase			
		A	B	C	D
Terminating Phase	A		6	-	-
	B	6		-	-
	C	-	-		6
	D	-	-	6	

Phases in Stage

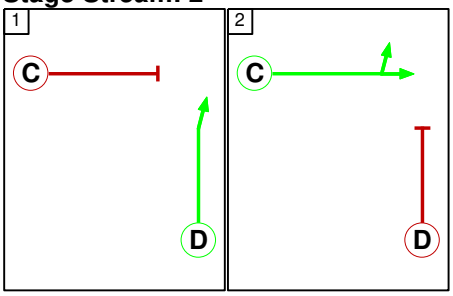
Stream	Stage No.	Phases in Stage
1	1	A
1	2	B
2	1	D
2	2	C

Stage Diagram

Stage Stream: 1



Stage Stream: 2



Prohibited Stage Change

Stage Stream: 1

		To Stage	
		1	2
From Stage	1		6
	2	6	

Stage Stream: 2

		To Stage	
		1	2
From Stage	1		6
	2	6	

Give-Way Lane Input Data

Junction: J1: Unnamed Junction											
Lane	**Movement**	**Max Flow when Giving Way (PCU/Hr)**	**Min Flow when Giving Way (PCU/Hr)**	**Opposing Lane**	**Opp. Lane Coeff.**	**Opp. Mvmnts.**	**Right Turn Storage (PCU)**	**Non-Blocking Storage (PCU)**	**RTF**	**Right Turn Move up (s)**	**Max Turns in Intergreen (PCU)**
J1:1/1	J1:6/1 (Ahead)	1100	0	J1:5/1	0.30	All	-	-	-	-	-
				J1:5/2	0.30	All					
J1:1/2	J1:6/2 (Ahead)	1100	0	J1:5/1	0.30	All	-	-	-	-	-
				J1:5/2	0.30	All					
J1:1/3	J1:6/3 (Ahead)	1100	0	J1:5/1	0.30	All	-	-	-	-	-
				J1:5/2	0.30	All					
J1:3/1	J1:4/1 (Left)	1274	0	J1:10/1	0.29	All	-	-	-	-	-
				J1:10/2	0.29	All					
	J1:5/1 (Ahead)	1274	0	J1:10/1	0.29	All					
				J1:10/2	0.29	All					
J1:3/2	J1:5/2 (Ahead)	1274	0	J1:10/1	0.29	All	-	-	-	-	-
				J1:10/2	0.29	All					

Junction: J2: Southern R'bout											
Lane	**Movement**	**Max Flow when Giving Way (PCU/Hr)**	**Min Flow when Giving Way (PCU/Hr)**	**Opposing Lane**	**Opp. Lane Coeff.**	**Opp. Mvmnts.**	**Right Turn Storage (PCU)**	**Non-Blocking Storage (PCU)**	**RTF**	**Right Turn Move up (s)**	**Max Turns in Intergreen (PCU)**
J2:1/1	J2:6/1 (Ahead)	1343	0	J2:5/1	0.29	All	-	-	-	-	-
				J2:5/2	0.29	All					
J2:1/2	J2:6/2 (Ahead)	1343	0	J2:5/1	0.29	All	-	-	-	-	-
				J2:5/2	0.29	All					
	J2:6/3 (Ahead)	1343	0	J2:5/1	0.29	All					
				J2:5/2	0.29	All					

Lane Input Data

Junction: J1: Unnamed Junction												
Lane	**Lane Type**	**Phases**	**Start Disp.**	**End Disp.**	**Physical Length (PCU)**	**Sat Flow Type**	**Def User Saturation Flow (PCU/Hr)**	**Lane Width (m)**	**Gradient**	**Nearside Lane**	**Turns**	**Turning Radius (m)**
J1:1/1	O		2	3	60.0	Inf	-	-	-	-	-	-
J1:1/2	O		2	3	60.0	Inf	-	-	-	-	-	-
J1:1/3	O		2	3	8.0	Inf	-	-	-	-	-	-
J1:2/1	U	A	2	3	6.0	User	1900	-	-	-	-	-
J1:2/2	U	A	2	3	24.3	User	1900	-	-	-	-	-
J1:2/3	U	A	2	3	24.3	User	1900	-	-	-	-	-
J1:3/1	O		2	3	60.0	User	1800	-	-	-	-	-
J1:3/2	O		2	3	60.0	Inf	-	-	-	-	-	-
J1:4/1	U		2	3	3.0	Inf	-	-	-	-	-	-
J1:4/2	U		2	3	3.0	Inf	-	-	-	-	-	-
J1:5/1	U		2	3	8.7	Inf	-	-	-	-	-	-
J1:5/2	U		2	3	8.7	Inf	-	-	-	-	-	-
J1:6/1	U		2	3	16.5	Inf	-	-	-	-	-	-
J1:6/2	U		2	3	16.5	Inf	-	-	-	-	-	-
J1:6/3	U		2	3	60.0	Inf	-	-	-	-	-	-
J1:7/1	U	B	2	3	4.3	User	1900	-	-	-	-	-
J1:7/2	U	B	2	3	4.3	User	1900	-	-	-	-	-
J1:8/1	U		2	3	3.0	Inf	-	-	-	-	-	-
J1:8/2	U		2	3	3.0	Inf	-	-	-	-	-	-
J1:9/1	U		2	3	3.0	Inf	-	-	-	-	-	-
J1:9/2	U		2	3	3.0	Inf	-	-	-	-	-	-
J1:10/1	U		2	3	12.2	Inf	-	-	-	-	-	-
J1:10/2	U		2	3	12.2	Inf	-	-	-	-	-	-

Junction: J2: Southern R'bout												
Lane	Lane Type	Phases	Start Disp.	End Disp.	Physical Length (PCU)	Sat Flow Type	Def User Saturation Flow (PCU/Hr)	Lane Width (m)	Gradient	Nearside Lane	Turns	Turning Radius (m)
J2:1/1	O		2	3	24.3	Inf	-	-	-	-	-	-
J2:1/2	O		2	3	24.3	Inf	-	-	-	-	-	-
J2:2/1 (A43 Northbound)	U	B	2	3	12.0	User	1900	-	-	-	-	-
J2:2/2 (A43 Northbound)	U	B	2	3	60.0	User	1900	-	-	-	-	-
J2:2/3 (A43 Northbound)	U	B	2	3	60.0	User	1900	-	-	-	-	-
J2:3/1 (A43 Eastbound)	U	C	2	3	60.0	User	1900	-	-	-	-	-
J2:3/2 (A43 Eastbound)	U	C	2	3	6.0	User	1900	-	-	-	-	-
J2:4/1	U		2	3	3.0	Inf	-	-	-	-	-	-
J2:4/2	U		2	3	3.0	Inf	-	-	-	-	-	-
J2:5/1	U		2	3	8.7	Inf	-	-	-	-	-	-
J2:5/2	U		2	3	8.7	Inf	-	-	-	-	-	-
J2:6/1	U		2	3	16.5	Inf	-	-	-	-	-	-
J2:6/2	U		2	3	16.5	Inf	-	-	-	-	-	-
J2:6/3	U		2	3	16.5	Inf	-	-	-	-	-	-
J2:7/1	U	A	2	3	4.3	User	1900	-	-	-	-	-
J2:8/1	U		2	3	3.0	Inf	-	-	-	-	-	-
J2:8/2	U		2	3	3.0	Inf	-	-	-	-	-	-
J2:9/1	U		2	3	3.0	Inf	-	-	-	-	-	-
J2:10/1	U	D	2	3	12.2	User	1900	-	-	-	-	-
J2:10/2	U	D	2	3	12.2	User	1900	-	-	-	-	-

Traffic Flow Groups

Flow Group	Start Time	End Time	Duration	Formula
7: '2031 J3 AM'	08:00	09:00	01:00	
8: '2031 J3 PM'	17:00	18:00	01:00	

Scenario 3: '2031 J3 AM' (FG7: '2031 J3 AM', Plan 1: '2031 AM Peak J1a')

Traffic Flows, Desired

Desired Flow :

	Destination					
Origin		A	B	C	D	Tot.
	A	0	188	315	2241	2744
	B	140	0	16	791	947
	C	424	100	0	452	976
	D	1284	803	820	0	2907
	Tot.	1848	1091	1151	3484	7574

Traffic Lane Flows

Lane	Scenario 3: 2031 J3 AM
Junction: J1: Unnamed Junction	
J1:1/1	1279
J1:1/2 (with short)	1465(In) 1277(Out)
J1:1/3 (short)	188
J1:2/1 (short)	903
J1:2/2 (with short)	1418(In) 515(Out)
J1:2/3	1193
J1:3/1	542
J1:3/2	405
J1:4/1	655
J1:4/2	1193
J1:5/1	402
J1:5/2	405
J1:6/1	1681
J1:6/2	1682
J1:6/3	188
J1:7/1	94
J1:7/2	94
J1:8/1	1681
J1:8/2	1682
J1:9/1	997
J1:9/2	94
J1:10/1	515
J1:10/2	1193
Junction: J2: Southern R'bout	
J2:1/1	1681
J2:1/2	1682
J2:2/1 (short)	820
J2:2/2 (with short)	1812(In) 992(Out)
J2:2/3	1095
J2:3/1 (with short)	976(In) 426(Out)
J2:3/2 (short)	550
J2:4/1	1418
J2:4/2	1193
J2:5/1	226
J2:5/2	226
J2:6/1	1907
J2:6/2	1577

J2:6/3	331
J2:7/1	331
J2:8/1	1907
J2:8/2	1577
J2:9/1	1151
J2:10/1	992
J2:10/2	1095

Lane Saturation Flows

Junction: J1: Unnamed Junction								
Lane	**Lane Width (m)**	**Gradient**	**Nearside Lane**	**Allowed Turns**	**Turning Radius (m)**	**Turning Prop.**	**Sat Flow (PCU/Hr)**	**Flared Sat Flow (PCU/Hr)**
J1:1/1	Infinite Saturation Flow						Inf	Inf
J1:1/2	Infinite Saturation Flow						Inf	Inf
J1:1/3	Infinite Saturation Flow						Inf	Inf
J1:2/1	This lane uses a directly entered Saturation Flow						1900	1900
J1:2/2	This lane uses a directly entered Saturation Flow						1900	1900
J1:2/3	This lane uses a directly entered Saturation Flow						1900	1900
J1:3/1	This lane uses a directly entered Saturation Flow						1800	1800
J1:3/2	Infinite Saturation Flow						Inf	Inf
J1:4/1	Infinite Saturation Flow						Inf	Inf
J1:4/2	Infinite Saturation Flow						Inf	Inf
J1:5/1	Infinite Saturation Flow						Inf	Inf
J1:5/2	Infinite Saturation Flow						Inf	Inf
J1:6/1	Infinite Saturation Flow						Inf	Inf
J1:6/2	Infinite Saturation Flow						Inf	Inf
J1:6/3	Infinite Saturation Flow						Inf	Inf
J1:7/1	This lane uses a directly entered Saturation Flow						1900	1900
J1:7/2	This lane uses a directly entered Saturation Flow						1900	1900
J1:8/1	Infinite Saturation Flow						Inf	Inf
J1:8/2	Infinite Saturation Flow						Inf	Inf
J1:9/1	Infinite Saturation Flow						Inf	Inf
J1:9/2	Infinite Saturation Flow						Inf	Inf
J1:10/1	Infinite Saturation Flow						Inf	Inf
J1:10/2	Infinite Saturation Flow						Inf	Inf

Junction: J2: Southern R'bout								
Lane	**Lane Width (m)**	**Gradient**	**Nearside Lane**	**Allowed Turns**	**Turning Radius (m)**	**Turning Prop.**	**Sat Flow (PCU/Hr)**	**Flared Sat Flow (PCU/Hr)**
J2:1/1	Infinite Saturation Flow						Inf	Inf
J2:1/2	Infinite Saturation Flow						Inf	Inf
J2:2/1 (A43 Northbound Lane 1)	This lane uses a directly entered Saturation Flow						1900	1900
J2:2/2 (A43 Northbound Lane 2)	This lane uses a directly entered Saturation Flow						1900	1900
J2:2/3 (A43 Northbound Lane 3)	This lane uses a directly entered Saturation Flow						1900	1900
J2:3/1 (A43 Eastbound Lane 1)	This lane uses a directly entered Saturation Flow						1900	1900
J2:3/2 (A43 Eastbound Lane 2)	This lane uses a directly entered Saturation Flow						1900	1900
J2:4/1	Infinite Saturation Flow						Inf	Inf
J2:4/2	Infinite Saturation Flow						Inf	Inf
J2:5/1	Infinite Saturation Flow						Inf	Inf
J2:5/2	Infinite Saturation Flow						Inf	Inf
J2:6/1	Infinite Saturation Flow						Inf	Inf
J2:6/2	Infinite Saturation Flow						Inf	Inf
J2:6/3	Infinite Saturation Flow						Inf	Inf
J2:7/1	This lane uses a directly entered Saturation Flow						1900	1900
J2:8/1	Infinite Saturation Flow						Inf	Inf
J2:8/2	Infinite Saturation Flow						Inf	Inf
J2:9/1	Infinite Saturation Flow						Inf	Inf
J2:10/1	This lane uses a directly entered Saturation Flow						1900	1900
J2:10/2	This lane uses a directly entered Saturation Flow						1900	1900

Scenario 4: '2031 J3 PM' (FG8: '2031 J3 PM', Plan 1: '2031 AM Peak J1a')

Traffic Flows, Desired

Desired Flow :

	Destination					
Origin		A	B	C	D	Tot.
	A	0	252	176	1147	1575
	B	387	0	6	522	915
	C	508	307	0	391	1206
	D	1519	681	908	0	3108
	Tot.	2414	1240	1090	2060	6804

Traffic Lane Flows

Lane	Scenario 4: 2031 J3 PM
Junction: J1: Unnamed Junction	
J1:1/1	689
J1:1/2 (with short)	886(In) 634(Out)
J1:1/3 (short)	252
J1:2/1 (short)	988
J1:2/2 (with short)	1739(In) 751(Out)
J1:2/3	1276
J1:3/1	526
J1:3/2	389
J1:4/1	1138
J1:4/2	1276
J1:5/1	139
J1:5/2	389
J1:6/1	828
J1:6/2	1023
J1:6/3	252
J1:7/1	126
J1:7/2	126
J1:8/1	828
J1:8/2	1023
J1:9/1	1114
J1:9/2	126
J1:10/1	751
J1:10/2	1276
Junction: J2: Southern R'bout	
J2:1/1	828
J2:1/2	1023
J2:2/1 (short)	908
J2:2/2 (with short)	1911(In) 1003(Out)
J2:2/3	1197
J2:3/1 (with short)	1206(In) 736(Out)
J2:3/2 (short)	470
J2:4/1	1739
J2:4/2	1276
J2:5/1	195
J2:5/2	196
J2:6/1	1023
J2:6/2	1037

J2:6/3	182
J2:7/1	182
J2:8/1	1023
J2:8/2	1037
J2:9/1	1090
J2:10/1	1003
J2:10/2	1197

Lane Saturation Flows

Junction: J1: Unnamed Junction								
Lane	**Lane Width (m)**	**Gradient**	**Nearside Lane**	**Allowed Turns**	**Turning Radius (m)**	**Turning Prop.**	**Sat Flow (PCU/Hr)**	**Flared Sat Flow (PCU/Hr)**
J1:1/1	Infinite Saturation Flow						Inf	Inf
J1:1/2	Infinite Saturation Flow						Inf	Inf
J1:1/3	Infinite Saturation Flow						Inf	Inf
J1:2/1	This lane uses a directly entered Saturation Flow						1900	1900
J1:2/2	This lane uses a directly entered Saturation Flow						1900	1900
J1:2/3	This lane uses a directly entered Saturation Flow						1900	1900
J1:3/1	This lane uses a directly entered Saturation Flow						1800	1800
J1:3/2	Infinite Saturation Flow						Inf	Inf
J1:4/1	Infinite Saturation Flow						Inf	Inf
J1:4/2	Infinite Saturation Flow						Inf	Inf
J1:5/1	Infinite Saturation Flow						Inf	Inf
J1:5/2	Infinite Saturation Flow						Inf	Inf
J1:6/1	Infinite Saturation Flow						Inf	Inf
J1:6/2	Infinite Saturation Flow						Inf	Inf
J1:6/3	Infinite Saturation Flow						Inf	Inf
J1:7/1	This lane uses a directly entered Saturation Flow						1900	1900
J1:7/2	This lane uses a directly entered Saturation Flow						1900	1900
J1:8/1	Infinite Saturation Flow						Inf	Inf
J1:8/2	Infinite Saturation Flow						Inf	Inf
J1:9/1	Infinite Saturation Flow						Inf	Inf
J1:9/2	Infinite Saturation Flow						Inf	Inf
J1:10/1	Infinite Saturation Flow						Inf	Inf
J1:10/2	Infinite Saturation Flow						Inf	Inf

Junction: J2: Southern R'bout								
Lane	**Lane Width (m)**	**Gradient**	**Nearside Lane**	**Allowed Turns**	**Turning Radius (m)**	**Turning Prop.**	**Sat Flow (PCU/Hr)**	**Flared Sat Flow (PCU/Hr)**
J2:1/1	Infinite Saturation Flow						Inf	Inf
J2:1/2	Infinite Saturation Flow						Inf	Inf
J2:2/1 (A43 Northbound Lane 1)	This lane uses a directly entered Saturation Flow						1900	1900
J2:2/2 (A43 Northbound Lane 2)	This lane uses a directly entered Saturation Flow						1900	1900
J2:2/3 (A43 Northbound Lane 3)	This lane uses a directly entered Saturation Flow						1900	1900
J2:3/1 (A43 Eastbound Lane 1)	This lane uses a directly entered Saturation Flow						1900	1900
J2:3/2 (A43 Eastbound Lane 2)	This lane uses a directly entered Saturation Flow						1900	1900
J2:4/1	Infinite Saturation Flow						Inf	Inf
J2:4/2	Infinite Saturation Flow						Inf	Inf
J2:5/1	Infinite Saturation Flow						Inf	Inf
J2:5/2	Infinite Saturation Flow						Inf	Inf
J2:6/1	Infinite Saturation Flow						Inf	Inf
J2:6/2	Infinite Saturation Flow						Inf	Inf
J2:6/3	Infinite Saturation Flow						Inf	Inf
J2:7/1	This lane uses a directly entered Saturation Flow						1900	1900
J2:8/1	Infinite Saturation Flow						Inf	Inf
J2:8/2	Infinite Saturation Flow						Inf	Inf
J2:9/1	Infinite Saturation Flow						Inf	Inf
J2:10/1	This lane uses a directly entered Saturation Flow						1900	1900
J2:10/2	This lane uses a directly entered Saturation Flow						1900	1900

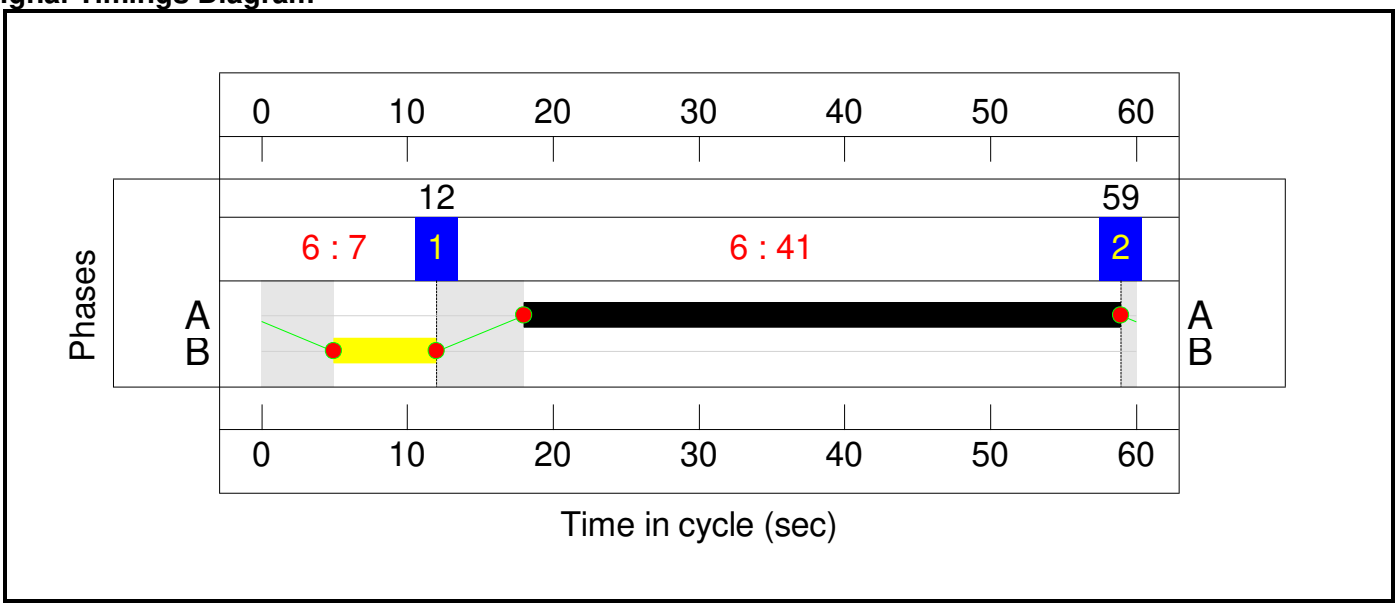
Scenario 3: '2031 J3 AM' (FG7: '2031 J3 AM', Plan 1: '2031 AM Peak J1a')
C1

Stage Timings

Stage Stream: 1

Stage	1	2
Duration	41	7
Change Point	12	59

Signal Timings Diagram



C2

Stage Timings

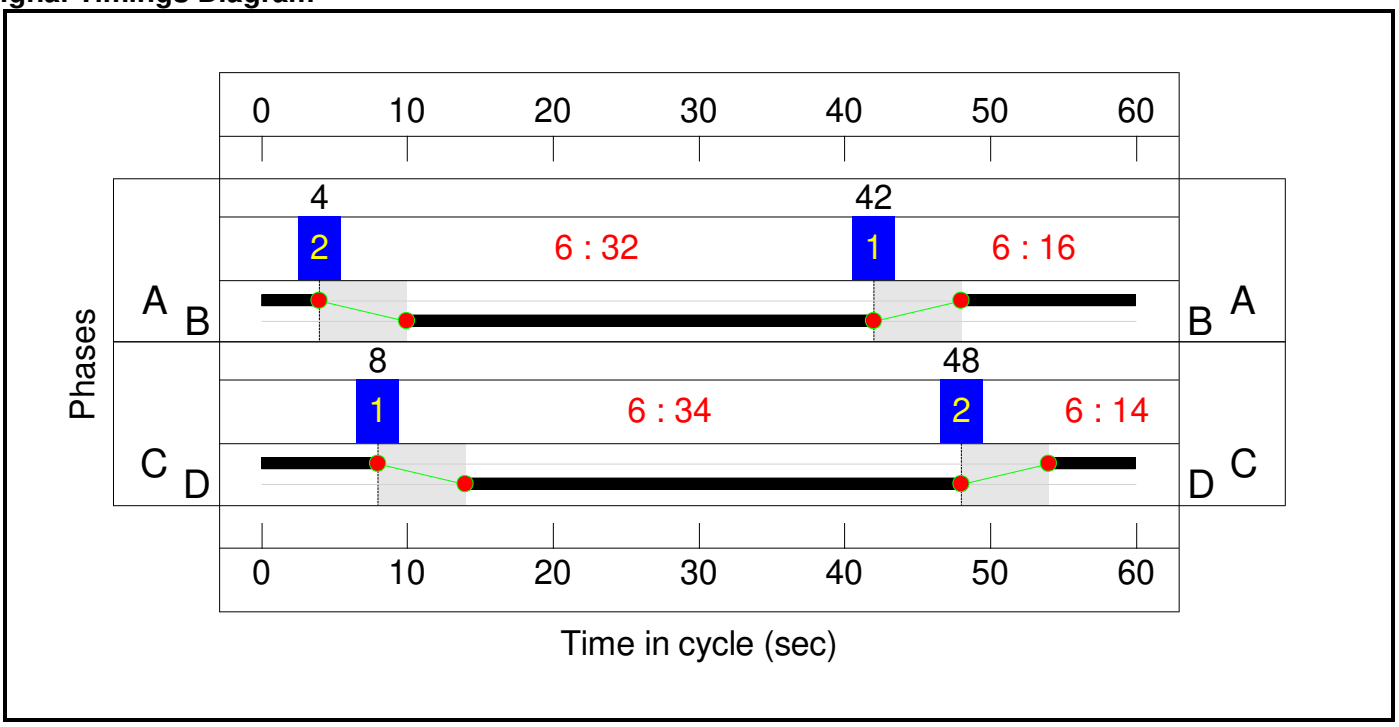
Stage Stream: 1

Stage	1	2
Duration	16	32
Change Point	42	4

Stage Stream: 2

Stage	1	2
Duration	34	14
Change Point	8	48

Signal Timings Diagram



Network Results

Item	Lane Description	Lane Type	Controller Stream	Position In Filtered Route	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)
Network: NGW Proposed Mitigation - 2031 J3 CIA	-	-	**N/A**	-	-		-	-	-	-	-	-	**149.1%**
J1: Unnamed Junction	-	-	**N/A**	-	-		-	-	-	-	-	-	**149.1%**
1/1	Ahead	O	N/A	N/A	-		-	-	-	1279	Inf	858	149.1%
1/2+1/3	Ahead	O	N/A	N/A	-		-	-	-	1465	Inf : Inf	858+126	148.9 : 148.9%
2/2+2/1	Left Ahead	U	1:1	N/A	C1:A		1	41	-	1418	1900:1900	562+985	75.8 : 81.4%
2/3	Ahead	U	1:1	N/A	C1:A		1	41	-	1193	1900	1330	84.4%
3/1	Left Ahead	O	N/A	N/A	-		-	-	-	542	1800	825	65.7%
3/2	Ahead	O	N/A	N/A	-		-	-	-	405	Inf	825	49.1%
7/1	Ahead	U	1:1	N/A	C1:B		1	7	-	94	1900	253	24.9%
7/2	Ahead	U	1:1	N/A	C1:B		1	7	-	94	1900	253	24.9%
J2: Southern R'bout	-	-	**N/A**	-	-		-	-	-	-	-	-	**127.5%**
1/1	Ahead	O	N/A	N/A	-		-	-	-	1681	Inf	1240	101.6%
1/2	Ahead	O	N/A	N/A	-		-	-	-	1682	Inf	1240	101.8%
2/2+2/1	A43 Northbound Left Ahead	U	2:1	N/A	C2:B		1	32	-	1812	1900:1900	893+738	111.0 : 111.0%
2/3	A43 Northbound Ahead	U	2:1	N/A	C2:B		1	32	-	1095	1900	1045	104.8%
3/1+3/2	A43 Eastbound Left Ahead	U	2:2	N/A	C2:C		1	14	-	976	1900:1900	334+431	127.5 : 127.5%
7/1	Ahead	U	2:1	N/A	C2:A		1	16	-	331	1900	538	41.5%
10/1	Ahead	U	2:2	N/A	C2:D		1	34	-	992	1900	1108	80.6%
10/2	Ahead	U	2:2	N/A	C2:D		1	34	-	1095	1900	1108	94.3%

Item	Arriving (pcu)	Leaving (pcu)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Uniform Delay (pcuHr)	Rand + Oversat Delay (pcuHr)	Storage Area Uniform Delay (pcuHr)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)	Max. Back of Uniform Queue (pcu)	Rand + Oversat Queue (pcu)	Mean Max Queue (pcu)
Network: NGW Proposed Mitigation - 2031 J3 CIA	**-**	**-**	**6253**	**0**	**0**	**70.9**	**753.0**	**0.0**	**823.8**	**-**	**-**	**-**	**-**
J1: Unnamed Junction	**-**	**-**	**3773**	**0**	**0**	**38.5**	**460.5**	**0.0**	**499.0**	**-**	**-**	**-**	**-**
1/1	1279	858	858	0	0	17.6	212.2	-	229.8	646.7	64.0	212.2	276.1
1/2+1/3	1465	984	1968	0	0	18.9	242.0	-	261.0	641.3	53.6	242.0	295.6
2/2+2/1	1227	1227	-	-	-	1.0	1.9	-	2.9	8.4	4.3	1.9	6.2
2/3	1122	1122	-	-	-	0.2	2.6	-	2.8	8.9	1.3	2.6	3.9
3/1	542	542	542	0	0	0.0	1.0	-	1.0	6.4	1.1	1.0	2.0
3/2	405	405	405	0	0	0.0	0.5	-	0.5	4.3	0.5	0.5	0.9
7/1	63	63	-	-	-	0.4	0.2	-	0.6	32.8	0.9	0.2	1.1
7/2	63	63	-	-	-	0.4	0.2	-	0.6	32.8	0.9	0.2	1.1
J2: Southern R'bout	**-**	**-**	**2480**	**0**	**0**	**32.4**	**292.5**	**0.0**	**324.8**	**-**	**-**	**-**	**-**
1/1	1260	1240	1240	0	0	1.5	23.3	-	24.8	70.9	62.3	23.3	85.6
1/2	1263	1240	1240	0	0	1.6	24.3	-	25.9	73.9	62.4	24.3	86.8
2/2+2/1	1812	1632	-	-	-	10.2	94.9	-	105.1	208.8	30.7	94.9	125.5
2/3	1095	1045	-	-	-	5.4	33.2	-	38.6	127.0	19.1	33.2	52.3
3/1+3/2	976	766	-	-	-	12.7	107.5	-	120.2	443.5	16.5	107.5	124.0
7/1	224	224	-	-	-	1.0	0.4	-	1.3	21.6	2.9	0.4	3.3
10/1	893	893	-	-	-	0.0	2.0	-	2.0	8.2	0.0	2.0	2.0
10/2	1045	1045	-	-	-	0.0	6.8	-	6.8	23.4	0.0	6.8	6.8

C1	Stream: 1 PRC for Signalled Lanes (%):	6.7	Total Delay for Signalled Lanes (pcuHr):	6.82	Cycle Time (s):	60
C2	Stream: 1 PRC for Signalled Lanes (%):	-23.4	Total Delay for Signalled Lanes (pcuHr):	145.03	Cycle Time (s):	60
C2	Stream: 2 PRC for Signalled Lanes (%):	-41.7	Total Delay for Signalled Lanes (pcuHr):	129.06	Cycle Time (s):	60
	PRC Over All Lanes (%):	-65.7	Total Delay Over All Lanes(pcuHr):	823.82		

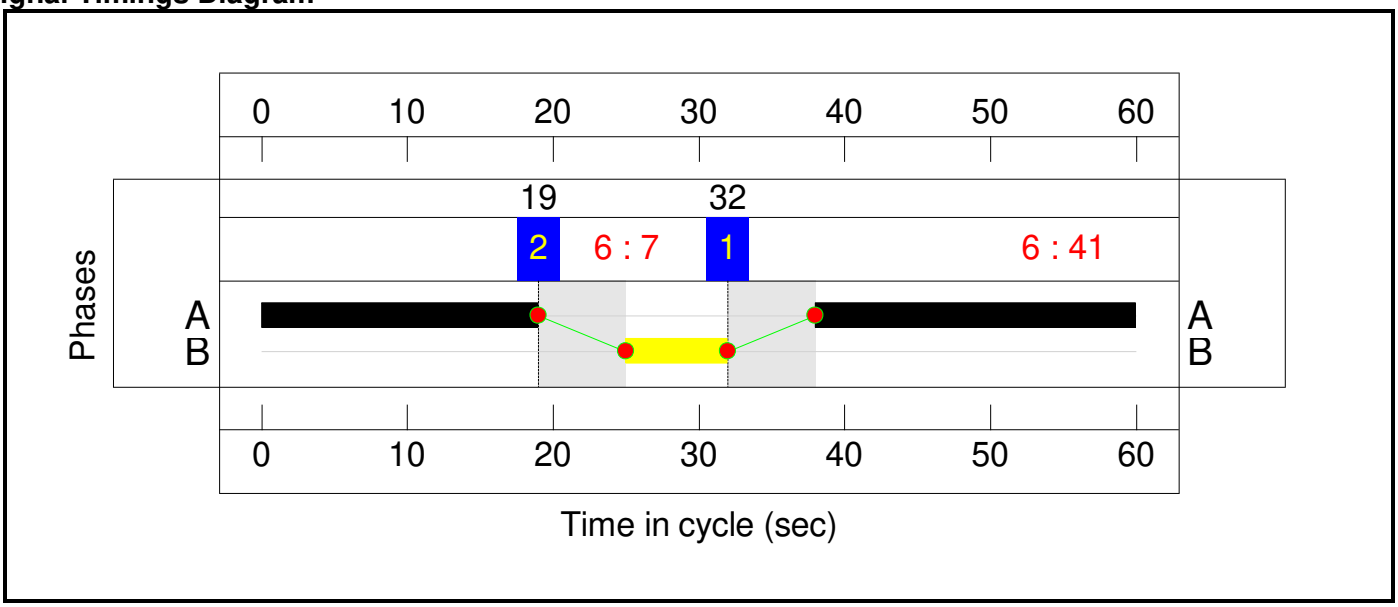
Scenario 4: '2031 J3 PM' (FG8: '2031 J3 PM', Plan 1: '2031 AM Peak J1a')
C1

Stage Timings

Stage Stream: 1

Stage	1	2
Duration	41	7
Change Point	32	19

Signal Timings Diagram



C2

Stage Timings

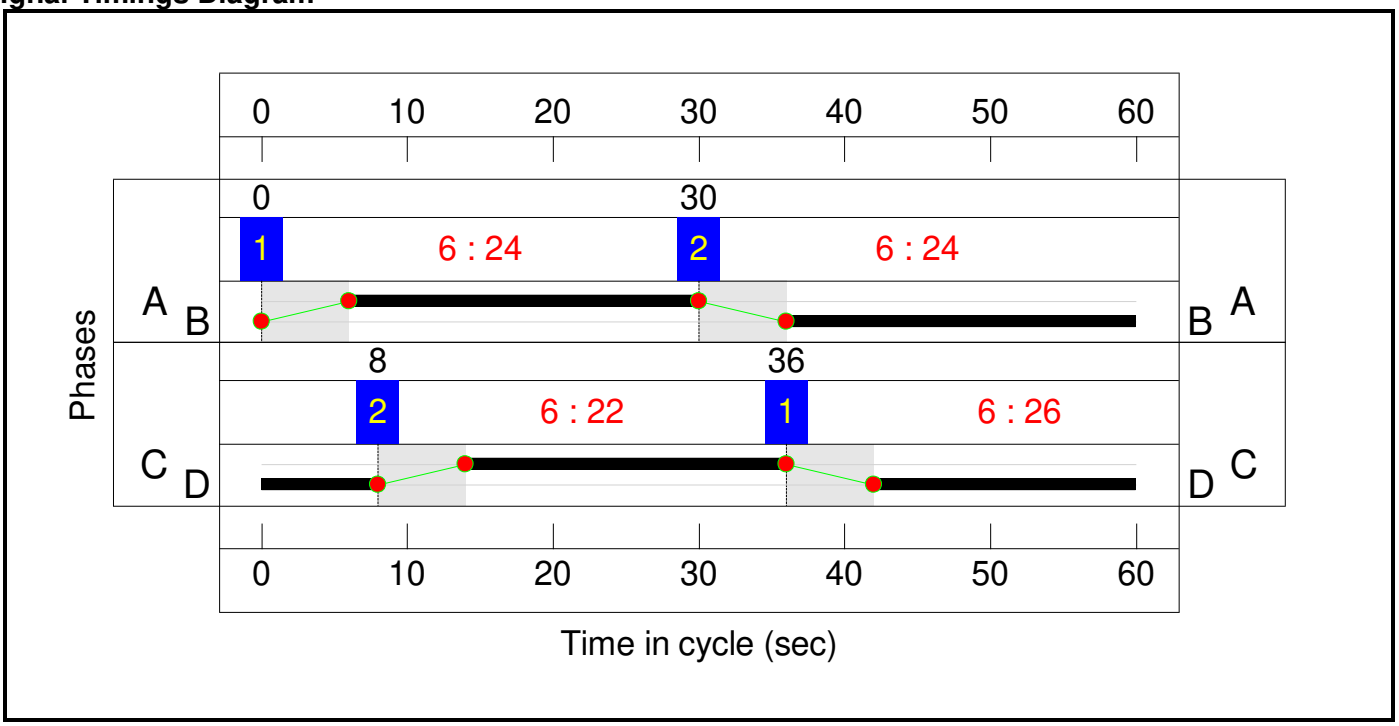
Stage Stream: 1

Stage	1	2
Duration	24	24
Change Point	0	30

Stage Stream: 2

Stage	1	2
Duration	26	22
Change Point	36	8

Signal Timings Diagram



Network Results

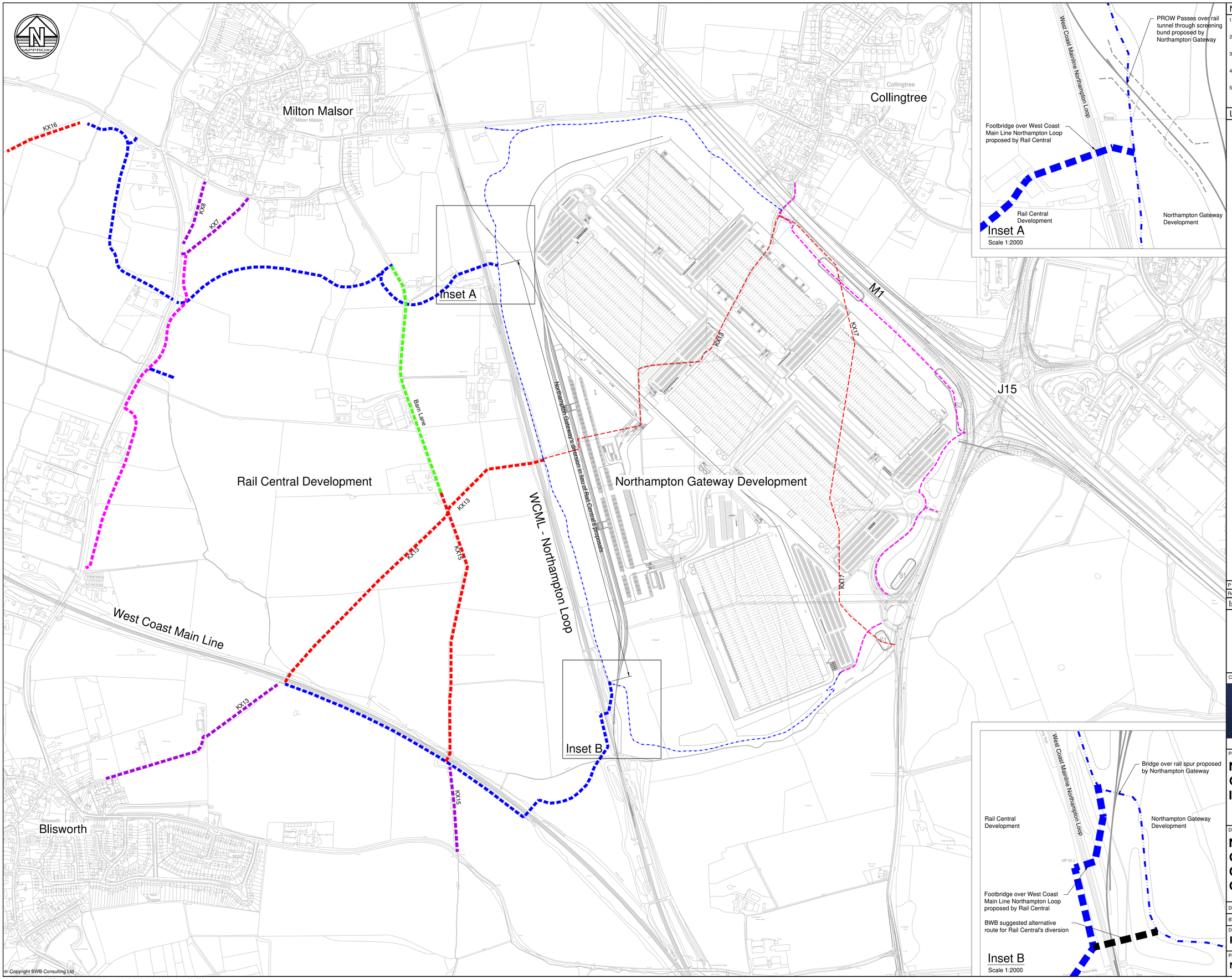
Item	Lane Description	Lane Type	Controller Stream	Position In Filtered Route	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)
Network: NGW Proposed Mitigation - 2031 J3 CIA	-	-	**N/A**	-	-		-	-	-	-	-	-	**151.2%**
J1: Unnamed Junction	-	-	**N/A**	-	-		-	-	-	-	-	-	**84.1%**
1/1	Ahead	O	N/A	N/A	-		-	-	-	689	Inf	941	73.2%
1/2+1/3	Ahead	O	N/A	N/A	-		-	-	-	886	Inf : Inf	941+374	67.3 : 67.3%
2/2+2/1	Left Ahead	U	1:1	N/A	C1:A		1	41	-	1739	1900:1900	698+918	84.1 : 82.6%
2/3	Ahead	U	1:1	N/A	C1:A		1	41	-	1276	1900	1330	64.3%
3/1	Left Ahead	O	N/A	N/A	-		-	-	-	526	1800	855	61.5%
3/2	Ahead	O	N/A	N/A	-		-	-	-	389	Inf	855	45.5%
7/1	Ahead	U	1:1	N/A	C1:B		1	7	-	126	1900	253	49.7%
7/2	Ahead	U	1:1	N/A	C1:B		1	7	-	126	1900	253	49.7%
J2: Southern R'bout	-	-	**N/A**	-	-		-	-	-	-	-	-	**151.2%**
1/1	Ahead	O	N/A	N/A	-		-	-	-	828	Inf	1252	66.2%
1/2	Ahead	O	N/A	N/A	-		-	-	-	1023	Inf	1252	81.7%
2/2+2/1	A43 Northbound Left Ahead	U	2:1	N/A	C2:B		1	24	-	1911	1900:1900	753+682	133.2 : 133.2%
2/3	A43 Northbound Ahead	U	2:1	N/A	C2:B		1	24	-	1197	1900	792	151.2%
3/1+3/2	A43 Eastbound Left Ahead	U	2:2	N/A	C2:C		1	22	-	1206	1900:1900	592+378	124.3 : 124.3%
7/1	Ahead	U	2:1	N/A	C2:A		1	24	-	182	1900	792	23.0%
10/1	Ahead	U	2:2	N/A	C2:D		1	26	-	1003	1900	855	88.1%
10/2	Ahead	U	2:2	N/A	C2:D		1	26	-	1197	1900	855	92.6%

Item	Arriving (pcu)	Leaving (pcu)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Uniform Delay (pcuHr)	Rand + Oversat Delay (pcuHr)	Storage Area Uniform Delay (pcuHr)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)	Max. Back of Uniform Queue (pcu)	Rand + Oversat Queue (pcu)	Mean Max Queue (pcu)
Network: NGW Proposed Mitigation - 2031 J3 CIA	**-**	**-**	**5227**	**0**	**0**	**57.7**	**584.7**	**0.0**	**642.4**	**-**	**-**	**-**	**-**
J1: Unnamed Junction	**-**	**-**	**3376**	**0**	**0**	**3.1**	**7.9**	**0.0**	**11.0**	**-**	**-**	**-**	**-**
1/1	689	689	689	0	0	0.0	1.4	-	1.4	7.1	0.0	1.4	1.4
1/2+1/3	886	886	1772	0	0	0.0	1.0	-	1.0	4.2	0.0	1.0	1.0
2/2+2/1	1345	1345	-	-	-	1.3	2.4	-	3.7	9.9	5.8	2.4	8.2
2/3	855	855	-	-	-	0.1	0.9	-	1.0	4.2	0.7	0.9	1.6
3/1	526	526	526	0	0	0.0	0.8	-	0.8	5.5	0.6	0.8	1.4
3/2	389	389	389	0	0	0.0	0.4	-	0.4	3.9	0.2	0.4	0.6
7/1	126	126	-	-	-	0.8	0.5	-	1.3	38.2	1.9	0.5	2.4
7/2	126	126	-	-	-	0.8	0.5	-	1.3	38.2	1.9	0.5	2.4
J2: Southern R'bout	**-**	**-**	**1851**	**0**	**0**	**54.7**	**576.7**	**0.0**	**631.4**	**-**	**-**	**-**	**-**
1/1	828	828	828	0	0	0.0	1.0	-	1.0	4.2	0.0	1.0	1.0
1/2	1023	1023	1023	0	0	0.0	2.2	-	2.2	7.8	2.8	2.2	5.0
2/2+2/1	1911	1435	-	-	-	21.8	239.9	-	261.7	493.0	31.0	239.9	270.9
2/3	1197	792	-	-	-	20.5	204.1	-	224.6	675.5	32.5	204.1	236.6
3/1+3/2	1206	970	-	-	-	11.8	120.6	-	132.4	395.1	21.9	120.6	142.4
7/1	182	182	-	-	-	0.6	0.1	-	0.7	14.3	1.9	0.1	2.1
10/1	753	753	-	-	-	0.0	3.5	-	3.5	16.6	0.0	3.5	3.5
10/2	792	792	-	-	-	0.0	5.3	-	5.3	24.3	0.0	5.3	5.3

C1	Stream: 1 PRC for Signalled Lanes (%):	7.0	Total Delay for Signalled Lanes (pcuHr):	7.40	Cycle Time (s):	60
C2	Stream: 1 PRC for Signalled Lanes (%):	-68.0	Total Delay for Signalled Lanes (pcuHr):	487.04	Cycle Time (s):	60
C2	Stream: 2 PRC for Signalled Lanes (%):	-38.2	Total Delay for Signalled Lanes (pcuHr):	141.16	Cycle Time (s):	60
	PRC Over All Lanes (%):	-68.0	Total Delay Over All Lanes(pcuHr):	642.38		

APPENIDX G

BWB DRAWING NGW-BWB-GEN-XX-SK-C-S2-P1-SK87



Notes

1. Do not scale this drawing. All dimensions must be checked/ verified on site. If in doubt ask.
2. This drawing is to be read in conjunction with all relevant architects, engineers and specialists drawings and specifications.
3. All dimensions in millimetres unless noted otherwise. All levels in metres unless noted otherwise.
4. Any discrepancies noted on site are to be reported to the engineer immediately.
5. This drawing is based on the combined Northampton Gateway PROW Plans and the Rail Central Public Rights of Way Strategy Plans

Legend

NORTHAMPTON GATEWAY

- EXISTING PUBLIC RIGHT OF WAY RETAINED
- EXISTING PUBLIC RIGHT OF WAY STOPPED UP
- NEW PUBLIC FOOTPATH CREATED
- NEW PUBLIC BRIDLEWAY CREATED
- NEW CYCLE TRACK CREATED (ALL PURPOSE HIGHWAY FOR USE BY PEDESTRIANS AND CYCLISTS ONLY)

RAIL CENTRAL

- EXISTING RETAINED PUBLIC RIGHT OF WAY
- EXISTING EXTINGUSHED PUBLIC RIGHT OF WAY
- PROPOSED PUBLIC RIGHT OF WAY
- PROPOSED COMBINED CYCLEWAY / PUBLIC FOOTPATH
- EXISTING HIGHWAY TO BE STOPPED UP

Rev	Date	Details of issue / revision	Drw	Rev
P1	23.11.18	Preliminary Issue	PG	SRH

Issues & Revisions

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Client

NORTHAMPTON GATEWAY STRATEGIC RAIL FREIGHT INTERCHANGE

Project Title

NORTHAMPTON GATEWAY RAIL FREIGHT INTERCHANGE

Drawing Title

NORTHAMPTON GATEWAY AND RAIL CENTRAL'S PUBLIC RIGHT OF WAYS

Drawn:	P. Goodyear	Reviewed:	S. Hilditch		
BWB Ref:	NTH 2315	Date:	23.11.18	Scale@A1:	1:5000

Drawing Status

PRELIMINARY

Project - Originator - Zone - Level - Type - Role - Number	Status	Rev
NGW-BWB-GEN-XX-SK-C-SK87	S2	P1

Y:\NTH\NTH2315_M1 J15 SRFI\02. Project Delivery\01. WIP\Sketches\NGW-BWB-GEN-XX-SK-C-SK87_NGW's & RC's PROWs.dwg