TRANSPORT ASSESSMENT

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EXECUTIVE SUMMARY

The purpose of this Transport Assessment (TA) is to assess the impact of the proposed Northampton Gateway Strategic Rail Freight Interchange (SRFI) development on the surrounding transport infrastructure, and to demonstrate that the development can be satisfactorily accessed by all relevant travel modes. It examines the relationship between the proposed development and the transport network, the effect of the development on that network, and the need to provide improvements to infrastructure to accommodate the development and reduce impacts to acceptable levels. In doing so, it presents the highway mitigation strategy for the development, and along with strategies for maximising the use of public transport, walking and cycling by people travelling to and from the development.

The scope of this TA report is as follows:

- Relevant transport planning policies are reviewed;
- Existing conditions on the transport networks surrounding the site are reviewed;
- The proposed development is described and the highway mitigation strategy, public transport access strategy and pedestrians/cyclist access strategy is presented;
- The agreed development trip generation forecasts, modal split and agreed development traffic distributions are presented;
- The assessment methodology and assessment scenarios are described;
- Predicted changes in traffic flow on the highway network are analysed as part of the strategic transport modelling and the evolution of the highway mitigation strategy is presented;
- The suitability of the highway mitigation strategy to accommodate residual traffic impacts is confirmed via detailed junction modelling, including VISSIM micro-simulation; and
- The construction effects of the scheme and associated highway works are assessed.

The key findings of this TA report are as follows:

i) Development of a SRFI at Northampton Gateway, once fully operational, would remove over 92 million HGV miles per year from the highway network equating to over £50 million in monetised environmental benefits per year as calculated using the methodology set out in the Department for Transport's Guide to Mode Shift Revenue Support Scheme. The proposed development would provide a distribution hub,

meaning that HGV journey distances would be reduced, reducing overall HGV mileage on the road network and helping to achieve the Government's objective of a modal shift from road freight to rail.

ii) As part of the consideration of development, improvements to the highway network to accommodate the development traffic are proposed. The proposed highway mitigation works are necessary to provide satisfactory access to the Northampton Gateway SRFI and to mitigate the traffic impacts of the development. However, the highway mitigation works also release existing constraints on the A508, M1 and A45 corridors, allowing the highway network to function in a safer and more efficient manner, and allowing the benefits of the proximity of the SRFI site to M1 Junction 15 to be fully realised. Existing traffic is drawn back onto the principal and strategic road network, particularly the A508, and away from less suitable routes. In doing so, traffic flows on many of the surrounding local roads and villages reduce. The improvements are shown diagrammatically at **drawing NGW-BWB-GEN-XX-SK-C-SK28-S1-P10** included in this TA, and comprise the following package of highway works:

- Construction of a new roundabout on the A508 Northampton Road to serve as the access to the development, configured to require all departing HGVs to travel north to M1 Junction 15;

- Dualling of the A508 between the new site access roundabout and M1 Junction 15;

- Significant enlargement and reconfiguration of M1 Junction 15;

- Widening of the A45 to the north of M1 Junction 15 and the signalisation of the C67 Watering Lane junction;

- Alteration of M1 Junction 15A to provide an additional lane and signalisation on the A43 northbound approach, signal control and additional flared lane on the A43 eastbound approach, an additional lane on the A5123 southbound approach and circulatory carriageway widening;

- Construction of a new bypass west of Roade between the A508 Northampton Road to the north of Roade and the A508 Stratford Road to the south of Roade, including a four-arm roundabout connecting the Bypass to Blisworth Road;

- 7.5T environmental weight restrictions (with access permitted for loading):
  - throughout Roade;
  - along Knock Lane/Blisworth Road between Roade Bypass and Stoke Road;
  - along Blisworth Road (Courteenhall) between the A508 and High Street, including parts of Blisworth;
  - along the unnamed road between the A508 and Quinton;
  - throughout Stoke Bruerne and Shutlanger; and
  - Wootton & East Hunsbury, to the west of the A45, east of Towcester Road and south of the A5076.

- Improvements at key locations along the A508 as part of an 'A508 route upgrade'; comprising:
  - Blisworth Road (Courteenhall) junction improvement;
  - C26 Rookery Lane/Ashton Road junction improvement;
  - C85 Pury Road junction improvement;
  - C27 Stoke Road/Knock Lane junction improvement and additional widening to Knock Lane/Blisworth Road (although not on the A508, this is required because of changing traffic volumes on the A508); and
  - Provision of a pedestrian crossing at a bus stop and ghost island in Grafton Regis.

- A financial contribution provided to Northamptonshire County Council for:
  - improvement schemes at the A45 Queen Eleanor Interchange and at junctions along the A5076, extending between the A45 and A5123; and
  - a Knock Lane and Blisworth Road maintenance and minor works fund, to be used in the event that the increased use of the roads should advance the need for maintenance or other remedial works.

iii) The proposed public transport strategy comprising a new bus service, which in conjunction with the Framework Travel Plan for the development, would positively influence the modal share of public transport and hence reduce traffic generation from the levels assessed in this TA.

iv) Providing pedestrian and cyclists routes through the site, together with improved connections and complementary improvements to the external networks as is proposed, would encourage travel by these modes.

vi) It is concluded that the proposed development would comply with the National Policy Statement for National Networks. Subject to the improvements presented within this TA and accompanying Framework Travel Plan, it would be satisfactorily accessed by a full range of travel modes. Improvements can be undertaken on the transport network that mitigate the significant impacts of the development and ensure that the residual impacts of the proposed development are reduced to acceptable levels.

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DRAWINGS

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ADC1475 001 P2	Existing Public Rights of Way in vicinity of Roade
NGW-BWB-SBR-R-DR-CB-0001-S4-P1	Bridleway underpass general arrangement
NGW-BWB-GEN-XX-SK-C-SK51-S2-P1	Knock Lane Blisworth Road extent of improvements
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APPENDICES

Appendix 1	Framework Travel Plan
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Appendix 3	Personal Injury Accident Assessment Technical Note
Appendix 4	TN1: Transport Modelling Methodology
Appendix 5	TN2: Trip Generation
Appendix 6	TN2 Addendum: Opening Year Trip Generation

1.0 INTRODUCTION

1.1 ADC Infrastructure Ltd are appointed by Roxhill (Junction 15) Ltd to assess the transport and infrastructure requirements of a proposed development to be known as Northampton Gateway Strategic Rail Freight Interchange (SRFI). The location of the proposed development is shown at **Figure 1.1**.

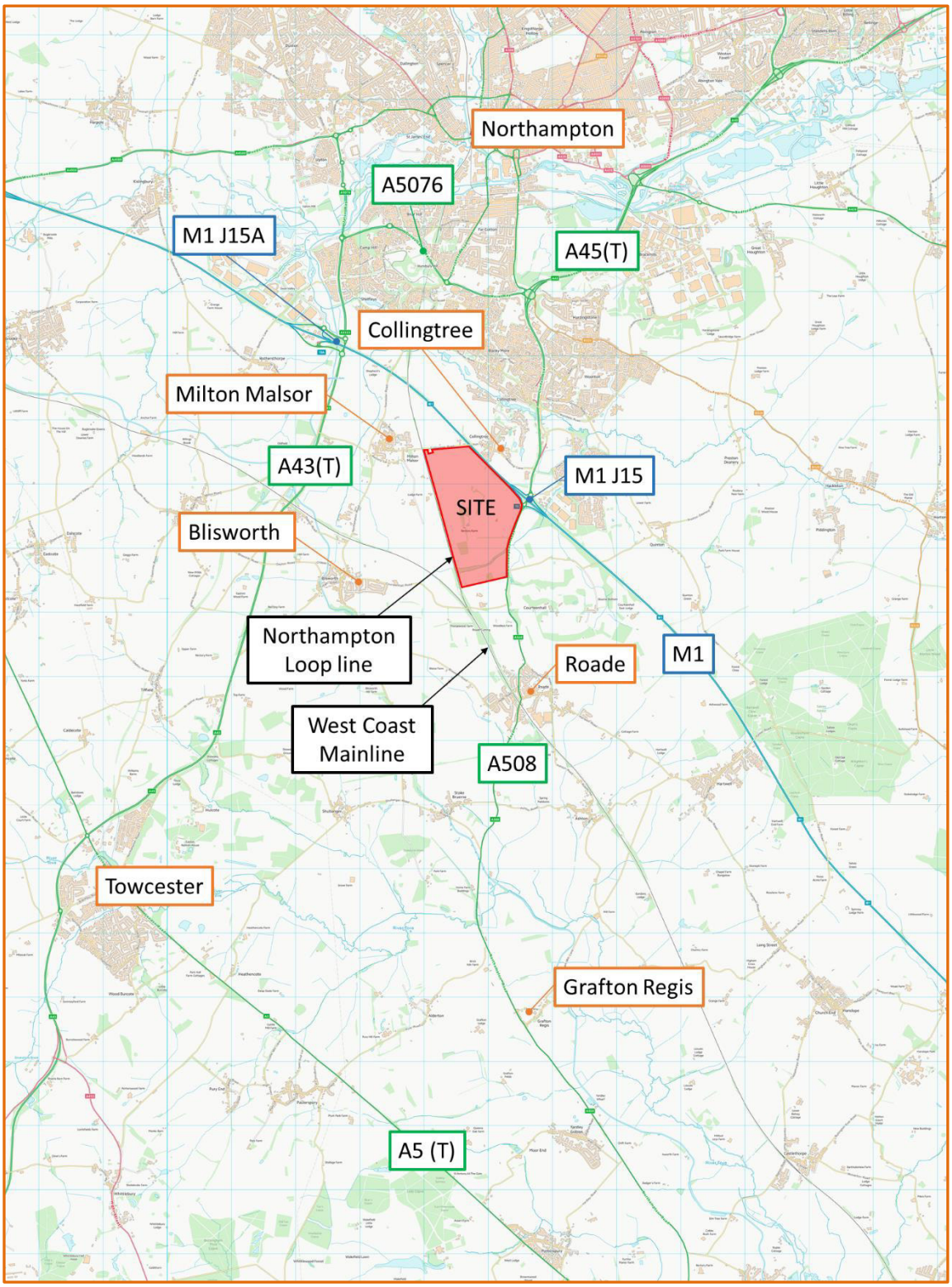


Figure 1.1: Site location

1.2 The site is located to the west of M1 Junction 15, approximately 6km from Northampton Town Centre, in Northamptonshire. The development is shown on the **Parameters Plan**[1]. The proposed development comprises:

- An intermodal freight terminal including container storage and HGV parking, rail sidings to serve individual warehouses, and the provision of an aggregates facility as part of the intermodal freight terminal, with the capability to also provide a 'rapid rail freight' facility;
- Up to 468,000 sqm (approximately 5 million sqft) (gross internal area) of warehousing and ancillary buildings, with additional floorspace provided in the form of mezzanines;
- A secure, dedicated, HGV parking area of approximately 120 spaces including driver welfare facilities to meet the needs of HGVs visiting the site or intermodal terminal;
- New road infrastructure and works to the existing road network, including the provision of a new access and associated works to the A508, a new bypass to the village of Roade, improvements to Junction 15 and to J15A of the M1 motorway, the A45, and other highway improvements at junctions on the local highway network and related traffic management measures;
- Strategic landscaping and tree planting, including diverted public rights of way;
- Earthworks and demolition of existing structures on the SRFI site.

1.3 Northamptonshire County Council (NCC) is the local highway authority responsible for the transportation issues within Northamptonshire. Highways England has responsibility for the Strategic Road Network (SRN), which near the proposed development comprises the M1 motorway, M1 Junctions 15 and 15A, the A45, A43 and A5.

1.4 The scale of development requires a balanced and comprehensive transport strategy that seeks managed travel demand from the outset, whilst providing appropriate access to serve the development and addressing the impact of the development trips on the existing local highway network and SRN.

1.5 An application for a Development Consent Order (DCO) has been prepared. It will be submitted to the Examining Authority for consideration. The Examining Authority will

[1] DCO document 2.10

examine the application before making a recommendation to the Secretary of State for Transport who will make the final decision.

1.6 In accordance with the PINS Scoping Opinion report (Ref TR050006), the assessment of the transport impact of the development is based on a comprehensive transport modelling exercise, for which a Transport Working Group was established to oversee the process and has met on an approximately monthly basis since July 2016. The Transport Working Group comprises representatives from the two Highway Authorities described above and, Highways England's term consultant Aecom, along with other specialist transport consultants representing Roxhill (Junction 15) Ltd. The members of the Transport Working Group are set out below:

- Highways England
- Northamptonshire County Council (NCC)
- Aecom
- Roxhill (Junction 15) Ltd
- ADC Infrastructure Ltd (ADC)
- BWB Consulting Ltd (BWB)
- Integrated Transport Planning Ltd (ITP)
- Multimodal Ltd (MM)

1.7 WSP Ltd maintain and operate NCC's strategic transport model, the Northamptonshire Strategic Transport Model (NSTM2) on NCC's behalf. All strategic transport modelling using the NSTM2 has therefore been undertaken independently by WSP and the outputs provided to ADC.

1.8 Buckinghamshire County Council and South Northamptonshire Council requested in the Scoping Opinion that they join the Transport Working Group. These requests were followed up with each Council. This included meeting with Buckinghamshire County Council on the 13th of March 2017 to discuss the proposed development, its likely impacts within Buckinghamshire, and their involvement in the Transport Working Group.

1.9 Following that meeting, having gained a fuller understanding of the role of the Transport Working Group, Buckinghamshire County Council confirmed that their representation on the Group was not necessary. It was agreed separately with South Northamptonshire Council that the they were appropriately represented on the Transport Working Group via the attendance of the NCC highway officer representing South Northamptonshire Development Control.

1.10 Highways England and NCC have agreed this TA methodology, scope and inputs via a series of transport related documents and Technical Notes. This report therefore presents the formal TA for the scheme. It brings together in one place the findings from the Transport Working Group approved documents and Technical Notes, as summarised in the Statements of Common Ground. Together with the ES Transport Chapter, they support the DCO for the development in accordance with the submitted **Parameters Plan**[1]. The supporting documents include a Framework Travel Plan (FTP) and Public Transport Strategy (PTS) as separate documents.

1.11 The key transport related documents and Technical Notes, which are to be read in conjunction with this TA, are listed in **Table 1.1** and are included at **Appendices 1 to 34**. The authoring organisation of each document is also indicated. A further 28 appendices to this TA (**Appendix 35 to 62**), provide supplementary baseline, assessment flows and modelling detail.

Table 1.1: Key Supporting Transport Documents and Technical Notes

document name	reference	author	TA appendix
Framework Travel Plan	FTP	ITP	1
Public Transport Strategy	PTS	ITP	2
Personal Injury Accident Assessment Technical Note	TNA	ADC	3
TN1: Transport Modelling Methodology	TN1	ADC	4
TN2: Trip Generation	TN2	ADC	5
TN2 Addendum: Opening Year Trip Generation	TN2A	ADC	6
TN3: HGV Trip Distribution	TN3	ADC	7
Light Vehicle Trip Distribution	WSPTN1	WSP	8
TN4: Scope of Highway Design Work	TN4	BWB	9
TN5: M1 Junction 15	TN5	ADC	10
TN6: M1 Junction 15A	TN6	ADC	11
TN7: A45 Queen Eleanor Gyratory and Wootton	TN7	ADC	12
TN8: A508 Corridor	TN8	ADC	13
TN9: Layby Capacity	TN9	ADC	14
TN10: Impacts north of the M1 including the A45 corridor	TN10	ADC	15
TN10 Addendum	TN10A	ADC	16
TN11: Impacts at junctions along the A5076 corridor	TN11	ADC	17
Walking, Cycling & Horse-Riding Assessment Review: Assessment Report	WCHAR1	ADC	18
Walking, Cycling & Horse-Riding Review: Review Report	WCHAR2	BWB	19
Roade Bypass Options Report	RBOR	BWB	20
M1 Junction 15: Summary of Highway Options Report	M1J15OR	BWB	21

document name	reference	author	TA appendix
NSTM2: M1J15 Northampton Gateway SRFI Local Model Validation Report	LMVR1	WSP	22
NSTM2: Reference Case Forecast Report	TMR1	WSP	23
NSTM2: Development Case Forecast Report	TMR2	WSP	24
M1 J15 & J15A VISSIM Model - Local Model Validation Report	LMVR2	Aecom	25
VISSIM Modelling Summary	VISSIM1	MM	26
VISSIM Modelling Summary – Proposed site access	VISSIM2	MM	27
Geometric Design Strategy Record – M1 J15 & A45 improvement, M1 J15A Improvement	GDSR1	BWB	28
Geometric Design Strategy Record – A508 Route Upgrade	GDSR2	BWB	29
Stage 1 Road Safety Audit	RSA1	BWB	30
Stage 1 Road Safety Audit Response Report	RSA1 RR	BWB	31
NSTM2: Environmental Statement Data Processing	WSPTN2	WSP	32
Construction traffic assumptions and calculations	-	ADC	33
Road to Rail Freight modal shift calculations	-	ADC	34

1.12 The purpose of this TA is to demonstrate that the proposed development can be satisfactorily accessed by all relevant travel modes and that the proposed FTP and highway mitigation measures are sufficient in scale to ensure that adverse impacts on the surrounding highway network as a result of the development will not occur. It presents the strategies for maximising the use of public transport, walking and cycling by people travelling to and from the development. This TA does not present the rail freight strategy, which is considered in separate reports[2,3].

1.13 A package of highway improvements is presented to demonstrate to the Highways Authorities that suitable mitigation measures will be provided. To confirm that the proposed highway improvements are appropriate in scale and layout, assessment of the scheme and the proposed highway mitigation has been undertaken using the NSTM2. Further detailed analysis of key junctions has then been undertaken using micro-

[2] Rail Operation Report (DCO Document 6.7)
[3] Rail Capacity Report (DCO Document 6.8)

simulation and industry standard assessment tools, supported by a Walking, Cycling & Horse-Riding Assessment and Review and Stage 1 Road Safety Audit.

1.14 The detailed geometric design of the highway improvements has been advanced to a sufficient stage to confirm that they are implementable, with only matters of detail to be agreed with the Highways Authorities as set out in the DCO protective provisions.

1.15 This TA identifies the general standards required for the access junction serving the site but does not provide detailed information on the internal layout of the development plots within it. The latter will be subject to separate assessment and design in accordance with the relevant design standards and guidance at the appropriate time.

1.16 The scope of this TA is therefore as follows:

- In **Chapter 2.0** the relevant transport planning policies are reviewed;
- In **Chapter 3.0** the existing conditions on the transport networks surrounding the site are reviewed;
- In **Chapter 4.0** the proposed development is described, and the public transport, non-motorised users and highway mitigation strategies are presented;
- The development trip generation forecasts, modal split and vehicle trip distribution, as agreed with the Highway Authorities, is presented in **Chapter 5.0**;
- In **Chapter 6.0** the transport modelling methodology, assessment process, and study area is described;
- In **Chapter 7.0** the initial highway impact is assessed, and the proposed highway mitigation strategy is established;
- **Chapter 8.0** describes the evolution of the highway mitigation strategy based upon an iterative process using the NSTM2;
- **Chapters 9.0** presents the assessment traffic flows.
- In **Chapter 10.0** the capacities of affected off-site junctions are assessed and their suitability to accommodate residual traffic impacts is confirmed using micro-simulation and detailed junction modelling;
- In **Chapter 11.0** an assessment of the opening year development traffic impact is presented, and the proposed phasing of the highway mitigation works is demonstrated;
- In **Chapter 12.0** the impact of the construction traffic is assessed; and
- **Chapter 13.0** presents the summary and conclusions.

2.0 PLANNING POLICY CONTEXT

General

2.1 This section considers relevant national and local policies together with guidance on transport and land use.

Committed development and infrastructure schemes

2.2 The SRFI site is not subject to any extant planning consents of significance in terms of traffic generation. On this basis, no account of any existing land uses at the SRFI site has been made.

2.3 There are a significant number of development schemes with planning consent in vicinity of the site, whose traffic effects need to be taken into account. In addition, committed or planned highway infrastructure, and other major development sites that are currently the subject of planning applications but are not yet committed, have been included where agreed with the Transport Working Group. These schemes, together with relevant and potential Local Plan allocations have been incorporated into the transport modelling work undertaken to assess the impact of the development. Further details of the committed development and infrastructure schemes is given at **Chapter 6.0** of this TA.

Relevant Transport Policy

2.4 The key transport-related policies and guidance of relevance to the proposed development are contained within the following documents:

- National Policy Statement for National Networks (December 2014);
- National Planning Policy Framework (March 2012);
- National Planning Practice Guidance: Travel Plans, Transport Assessments and Statements in Decision Making (2014);
- DfT Circular 02/2013 'The Strategic Road Network and the Delivery of Sustainable Development';
- West Northamptonshire Joint Core Strategy Local Plan Part 1 (December 2014);
- South Northamptonshire Local Plan Saved Policies (December 2014);
- Northamptonshire Transportation Plan (March 2012), including:
  - Northamptonshire Road Freight Strategy (December 2013);
  - Northamptonshire Major Roads Strategy (December 2013)
  - Northamptonshire Bus Strategy requirements (January 2013).
- A45/M1 Northampton Growth Managements Scheme (March 2012);

- Highways England Road Investment Strategy 2015 to 2020 (March 2015);
- Design Manual for Roads and Bridges (DMRB); and
- Northamptonshire Parking Standards (September 2016).

2.5 The policy framework of the transport-related policies listed above which are relevant to this TA are reviewed in the following sections.

The National Policy Statement for National Networks (NPSNN)

2.6 The purpose of the NPSNN is to set out the importance of delivering Nationally Significant Infrastructure Projects (NSIPs) on the national road and rail networks in England to support national and local economic growth and regeneration. Hence, the NPSNN provides direction for NSIPs, including SRFIs, from a planning and design perspective, which the Secretary of State will use to decide whether to consent NSIP applications.

2.7 The overall strategic aims of the NPSNN and the National Planning Policy Framework (NPPF) are consistent due to both documents' over-arching theme to support sustainable development. However, the NPPF is not intended to contain specific policies for NSIPs. The NPSNN assumes that function and provides the Transport Policy which will guide individual NSIPs brought under it. The NPSNN provides guidance and imposes requirements on matters such as good scheme design, as well as the treatment of environmental impact.

2.8 The Government's vision and strategic objectives for the national networks is described on page 9 of the NPSNN as follows:

2.9 *"The Government will deliver national networks that meet the country's long-term needs; supporting a prosperous and competitive economy and improving overall quality of life, as part of a wider transport system. This means:*

- *Networks with the capacity and connectivity and resilience to support national and local economic activity and facilitate growth and create jobs*
- *Networks which support and improve journey quality, reliability and safety*
- *Networks which support the delivery of environmental goals and the move to a low carbon economy*
- *Networks which join up our communities and link effectively to each other."*

2.10 A primary concern relating to the national network is the continued dependency on the strategic road network as *"…congestion is forecast to grow fastest on the strategic road network"* (paragraph 2.19). Paragraph 2.43 of the NPSNN identifies the importance of SRFIs to *"…enable freight to be transferred between transport modes, thus allowing rail to be used to best effect to undertake the long-haul primary trunk journey, with other modes (usually road) providing the secondary (final delivery) leg of the journey"*. Paragraph 2.44 states "*The aim of a SRFI is to optimise the use of rail in the freight journey by maximising rail trunk haul and minimising some elements of the secondary distribution leg by road, through co-location of other distribution and freight activities. SRFIs are a key element in reducing the cost to users of moving freight by rail and are important in facilitating the transfer of freight from road to rail thereby reducing trip mileage of freight movements on both the national and local road networks."*

2.11 To facilitate this modal transfer, the NPSNN states that a network of SRFIs is needed across the regions, to serve regional, sub-regional and cross-regional markets. In all cases it is essential that these have good connectivity with both the road and rail networks.

2.12 The Government has therefore concluded that *"…there is a compelling need for an expanded network of SRFIs"* (paragraph 2.56).

2.13 The NPSNN provides specific advice for SRFI development, stating that a project with significant transport impacts should include a Transport Assessment, using the WebTAG methodology stipulated in DfT guidance. If a development is subject to EIA and is likely to have significant environmental impacts arising from impacts on transport networks, the applicant's environmental statement should describe those impacts.

2.14 Paragraph 5.208 states *"Where appropriate, the applicant should prepare a travel plan including management measures to mitigate transport impacts. The applicant should also provide details of proposed measures to improve access by public transport and sustainable modes where relevant, to reduce the need for any parking associated with the proposal and to mitigate transport impacts."*

2.15 For schemes impacting on the Strategic Road Network, paragraph 5.209 states that *"…applicants should have regard to DfT Circular 02/2013 'The Strategic Road Network and the delivery of sustainable development' (or prevailing policy)."*

2.16 Regarding SRFIs, paragraph 5.213 states: *"Projects may give rise to impacts on the surrounding transport infrastructure including connecting transport networks. The*

Secretary of State should therefore ensure that the applicant has taken reasonable steps to mitigate these impacts. Where the proposed mitigation measures are insufficient to reduce the impact on the transport infrastructure to acceptable levels, the Secretary of State should expect applicants to accept requirements and/or obligations for funding infrastructure and otherwise mitigating adverse impacts on transport networks…"

2.17 Paragraph 5.215 sets out that *"mitigation measures for schemes should be proportionate and reasonable, focussed on promoting sustainable development",* and at paragraph 5.216 that "*where development would worsen accessibility such impacts should be mitigated so far as reasonably possible" and that "there is a very strong expectation that impacts on accessibility for non-motorised users should be mitigated".* Paragraph 5.218 sets out that *"…travel planning should be undertaken for all major developments which generate significant amounts of transport movement".*

2.18 Having regard to the NPSNN, the proposed SRFI access strategy includes measures to connect the SRFI site with the adjacent community and sustainable travel network and includes a separate public transport strategy to ensure, along with the measures set out in the FTP, that travel by sustainable modes are maximised as far as is practicable.

2.19 The transport impacts of the development are assessed using a WebTAG compliant strategic transport model and applying a methodology that accords with best practice guidance. Highway mitigation works are proposed to reduce the residual impact of the development trips on the nearby transport infrastructure to acceptable levels, with the proposed M1 Junction 15 and A45 major upgrade improvements directly related to the suitability of the site for development of an SRFI.

The National Planning Policy Framework (NPPF)

2.20 As referred to above, the NPSNN, rather than the NPPF, provides the national policy context for NSIP applications. However, for context with regard to transport issues paragraph 32 of the NPPF guides decision makers to apply the following key principles:

- *"the opportunity for sustainable transport modes have been taken up depending on the nature and location of the site, to reduce the need for major transport infrastructure;*
- *safe and suitable access to the site can be achieved for all people; and*
- *improvements can be undertaken within the transport network that cost effectively limits the significant impacts of the development. Developments should only be*

prevented or refused on transport grounds where the residual cumulative impacts of development are severe."

2.21 There is a requirement to ensure that development generating significant demand for travel is located where it can be accessed by sustainable travel modes and where efficient delivery of goods and supplies can be accommodated.

National Planning Practice Guidance (NPPG): Travel Plans, Transport Assessments and Statements in Decision Making

2.22 This document sets out the methodology and requirements for Travel Plans, Transport Assessments and Statements for developments. In determining whether a Transport Assessment and Travel Plan will be needed for a proposed development, this document states that local planning authorities should take into account the following considerations:

- the Transport Assessment and Statement policies, and the Travel Plan policies (if any) of the Local Plan;
- the scale of the proposed development and its potential for additional trip generation;
- existing intensity of transport use and the availability of public transport;
- proximity to nearby environmental designations or sensitive areas;
- impact on other priorities/ strategies (such as promoting walking and cycling);
- the cumulative impacts of multiple developments within a particular area;
- whether there are particular types of impacts around which to focus the Transport Assessment and Travel Plan (e.g. minimising traffic generated at peak times); and
- relevant national policies, including the decision to abolish maximum parking standards for both residential and non-residential development.

DfT Circular 02/2013

2.23 DfT Circular 02/2013 'The Strategic Road Network and the Delivery of Sustainable Development' sets out Highways England's (then Highways Agency) policy on how it will engage with local communities and the development industry to deliver sustainable development and maintaining the principal purpose of the SRN.

2.24 The policy is intended for all parties involved in development proposals which may result in traffic or other impacts on the strategic road network. The aim of the policy is to cut unnecessary red tape and make the planning process simpler and more straightforward.

2.25 Paragraph 9 sets out the broad policy aims of the Circular as it relates to development proposals, stating that *"Development proposals are likely to be acceptable if they can be accommodated within the existing capacity of a section (link or junction)… or they do not increase demand for use of a section that is already operating at over-capacity levels, taking account of any travel plan, traffic management and/or capacity enhancement measures that may be agreed".*

2.26 With reference to decision making regarding developments, paragraph 9 goes on to state *"However, development should only be prevented or refused on transport grounds where the residual cumulative impacts of development are severe".*

2.27 Circular 02/2013 places an emphasis on the role of sustainable travel modes and travel planning as a means of managing the impact of development on the road network, acknowledging the role that area-wide travel plan initiatives can play to 'free-up' additional capacity, so that travel demand created by a new development can be accommodated.

2.28 In assessing development impact, the Circular states, in paragraph 33, that *"only after travel plan and demand management measure have been fully explored and applied will capacity enhancement measures be considered"*.

2.29 In terms of mitigation of development impact, paragraph 34 states that *"Where insufficient capacity exists to provide for overall forecast demand at the time of opening, the impact of the development will be mitigated to ensure that at that time, the strategic road network is able to accommodate existing and development generated traffic".*

2.30 **Chapter 6.0** of this TA explains the forecast assessment scenarios use to evaluate the impact of the development on the highway network. These include specific DfT Circular 02/2013 compliant scenarios for the assessment of the development impacts on the SRN.

West Northamptonshire Joint Core Strategy (JCS) Local Plan (Part 1)

2.31 The Core Strategy sets out the long-term vision and objectives for the whole of the area covered by Daventry District, Northampton Borough and South Northamptonshire Councils for the plan period up to 2029, including strategic policies for steering and shaping development.

2.32 Paragraph 3.6 of the JCS emphasises private sector investment is *"fundamental to the successful achievement of the spatial vision and objectives through the spatial strategy"*

2.33 The JCS has provided 16 'Spatial Objectives' at paragraph 4.63, which provide the direction for the policies of the JCS, with the relevant listed below:

- Objective 1 - Climate Change
  - Promoting sustainable design and construction in all new developments.
  - Ensuring new developments promote the use of sustainable travel modes.
- Objective 2 - Infrastructure and Development.
  - Ensure social, physical and green infrastructure is adequately provided to meet the needs of people and business in a timely and sustainable manner, in response to regeneration and new development in West Northamptonshire.
- Objective 3 - Connections
  - Encourage the use of sustainable travel and consequently promote developments which will maximise the use of alternative travel modes in order to combat congestion, reduce carbon emissions and address social exclusion for those in both rural and urban areas who do not have access to a private car.
- Objective 8 - Economic Advantage
  - Strengthen and diversify West Northamptonshire's economy by taking advantage of West Northamptonshire's internationally well-placed location, strategic transport network and proximity to London and Birmingham.

2.34 The JSC notes at paragraph 8.16 that *"…in identifying sites for further strategic distribution development regional advice is that priority should be given to sites that can be served by rail freight and operate as intermodal terminals. At the regional level there is strong support for further rail related strategic distribution development and that further provision should be made in the West Northamptonshire area"*.

Northamptonshire Transportation Plan (NTP)

2.35 The third NTP was adopted in March 2012 and sets out NCC's long-term visions and objectives for transport and the policies to implement the objectives. The NTP encompasses a selection of 'Daughter Documents' and consists of Town and Thematic Strategies. The NTP's ultimate aim is to accompany the efforts of the Local Enterprise Partnerships in the area to secure the delivery of the JCS and provide a clear transport strategy for Northamptonshire.

2.36 The overall vision of the Transportation Plan is provided at page 17 of the NTP, it states: *"For Transport and Travel to contribute towards making Northamptonshire a great place to live and work, through creating tangible transport options to satisfy individual needs and*

to encourage more sustainable travel. The transport system will provide fast and efficient movement of people and goods, and will be accessible for all. Expanding networks and capacity of networks in Northamptonshire will be fully integrated into new developments and regeneration areas to support more sustainable communities. Economic growth and prosperity is a top priority for Northamptonshire and connectivity has a vital role to play in encouraging businesses to locate to the area, and getting people to work and services such as education and health, as well as to leisure activities and for shopping. Improved technology and local accessibility will reduce the need to travel, whilst supporting economic growth, within a low carbon environment and Northamptonshire will become an exemplar for the latest developments in information technology, fuel technology, and new forms of transport. The County Council will work in partnership with all stakeholders and the wider community to deliver this transport vision and strategy".

2.37 The following policies are given at pages 58 and 68 of the NTP relevant to the proposed development.

2.38 *"Strategic Policy 2: We will support the introduction of effective and attractive sustainable transport options that will encourage lasting modal shift in Northamptonshire. We have set two targets for modal shift, based on 2001 Census journey to work data, to achieve by 2031:*

- *A reduction of 5% in single occupancy car journeys to work from the existing built up areas of the towns.*
- *A reduction of 20% in single occupancy car journeys to work from new developments."*

2.39 *"Strategic Policy 3: We will ensure that all new developments are well connected by public transport and walking, cycling and motor vehicles routes, to the existing transport network or one that can be reasonable expected to be created – this will allow ease of movement between the development and existing built up areas and provide access to employment and key services."*

2.40 *"Strategic Policy 19: We will work to improve journey times and reliability on the highway and rail networks in order to increase the efficiency of freight movements and facilitate the local economy to grow."*

Northamptonshire Road Freight Strategy (NRFS)

2.41 Northamptonshire Road Freight Strategy (NRFS) is a 'daughter document' of the NTP and prioritises the existing road freight implications and measures required to mitigate such impacts.

2.42 In the strategic context, the NRFS states at page 15 that: *"The continuing choice of Northamptonshire as a location for distribution activity is dependent on continuing good transport links. Congestion causes delay and leads to unreliability in journey times, which has far-reaching negative consequences for distribution operation. The performance of the strategic road network is therefore of critical consequence. If, or when, it becomes severely congested it poses a threat that could lead to companies re-locating elsewhere. It can also cause rat-running on to less suitable routes"*.

2.43 The NRFS provides relevant material to the proposed development because the Strategic [Road] Freight Network identifies the A45, A508, and A43 located to the immediate north, east, and south of the SRFI site as 'strategic lorry routes'. Consequently, these respective routes, as well as the M1 Motorway, are prominent corridors for heavy goods vehicles (HGV) movements within Northamptonshire.

2.44 The NRFS contributes to Northamptonshire's vision given at page 12, to "encourage the sustainable distribution of goods through minimising road based travel and the associated environmental impacts of road haulage, whilst maintaining economic efficiency and helping to improve the quality of life for the residents of Northamptonshire".

2.45 To fulfil Northamptonshire's vision of an enhanced road freight network, the NRFS has set out at page 12 six objectives which will provide the framework of the document:

- To mitigate measures related to growing demand;
- To address the problems caused by HGV traffic in both urban and rural locations and to reduce the impact of HGVs on local communities, especially concerning overnight lorry parking;
- To influence movement patterns and encourage sustainable distribution within the county;
- To encourage commercial and economic growth;
- To reduce the environmental impact of freight movement and reduce the impact of HGVs on inappropriate routes e.g. rural areas, areas in Air Quality Management Areas (AQMAs), and areas with weight restrictions; and

- To manage the network to provide ease of movement through the county and to reduce the impacts of congestion and 'lost productive time.

2.46 Further, the NRFS draws out at page 19 the constraints and challenges posed by solely road freight movement, which include:

- The impacts on the SRN as *"lorries are the primary cause of road deterioration"*
- Problems related to *"link speeds, patterns and types of accidents"*
- Challenges to local areas notably; *"pick-up and delivery impacts, parking, noise and vibration emission, bridge strikes and queueing to access delivery sites".*

2.47 Therefore, the relevant constraints of purely road freight operations listed above emphasises *the "ability to move freight by rail is crucial to the economy"* (page 21) which is to become more prominent with the requirements of reducing emissions and congestion.

Northamptonshire Major Roads Strategy

2.48 The Northamptonshire Major Roads Strategy is a 'daughter document' of the NTP and concentrates on the main roads outside our larger towns, and complements the Town Transport Strategies which cover the road network within the larger towns.

2.49 The Northamptonshire Major Roads Strategy shows how the Major Roads Strategy ties in with the six over-arching Northamptonshire Transportation Plan objectives. Notably, the document outlines at page 10:

2.50 Investment in the highway infrastructure will be important to meet the transport demands of the future, including those arising from new development:

- Highway improvements help to discourage traffic from using unsuitable routes which have an adverse effect on local communities;
- Highway improvements will be planned to make suitable provision for all road users, not just the car;
- Highway improvements can have a significant impact on business, by shortening journey times and improving journey time reliability for key movements;
- Highway improvements can help to reduce congestion and the environmental impact of traffic; and
- Highway improvements need to be developed that offer the best value for money in tackling the problems identified.

Northamptonshire Bus Strategy

2.51 The Northamptonshire Bus Strategy is a 'daughter document' of the NTP. Page 7 of the NTP outlines that *"Expanding networks and capacity of networks in Northamptonshire will be fully integrated into new developments and regeneration areas to support more sustainable communities".*

2.52 Therefore, as set out at page 10, the Northamptonshire Bus Strategy aims amongst other objectives to *"increase the attractiveness of bus travel to encourage modal shift and allow the housing growth proposed in the county to be accommodated"*. In doing so, the bus network will provide benefits such as reduced congestion and carbon emissions, and the benefits from ensuring people can have good access to jobs and services and contribute to the economy.

2.53 It outlines that in all proposals where Transport Assessments are required, developers shall clearly set out the number of trips expected to be generated by each mode, including by bus. Credible mode shares, when compared with the existing census-derived data for journey-to-work mode, should be set out, having regard to the level of access to high quality bus services.

A45/M1 Northampton Growth Management Scheme (NGMS)

2.54 Highways England (formerly the Highways Agency) in partnership with NCC and other local authorities in west Northamptonshire undertook a study of the A45/M1 around Northampton. Following consideration of the forecast strategic road network impacts, it was concluded that the A45/M1 Northampton Growth Management Scheme (NGMS) should be implemented.

2.55 Central to potential impacts of developments on the Strategic Road Network (SRN) is a study by the then Highways Agency of the SRN around Northampton, notably the M1 and A45. As reported at paragraph 2.2, the study concluded that *"…there is no feasible and environmentally acceptable solution to accommodating potential peak period traffic demand through large scale capacity improvements to the A45 and its numerous junctions".*

2.56 The study determined the NGMS should be put into operation to satisfactorily cater for the projected development growth (to 2026). Paragraph 2.3 states that the *"NGMS has been designed to ensure that vehicular access and egress onto the SRN is managed effectively*

and that the safety and free flow of traffic on the A45 and M1 is maintained over the plan period"

2.57 The NGMS includes a list of proposed schemes (Annex 1) which will formulate the overall strategy for improvements to the A45/M1 corridor, consequently accommodating future developments and mitigating the impacts of the potential increase of traffic flows of the SRN in the Northampton area. The schemes comprise:

- M1 J15:
  - Ramp metering on northbound on-slip
  - Exit to A45 expanded from two to three lanes
  - Creation of fourth lane to the M1 southbound off-slip
  - Road markings to be upgraded for the eastern bridge section.
- A45 Wootton Interchange:
  - Ramp metering to be introduced for the northbound on-slip.
- A45 Queen Eleanor Interchange:
  - Upgraded MOVA traffic signals system to be proposed for all existing traffic signals.
  - Introduce ramp metering for the northbound and southbound on-slips
  - For the northbound on-slip, the short merge will be removed and traffic will access the A45 mainline only through the lane gain facility
  - London Road approach to be signalised (including circulatory carriageway)
  - Widening Newport Pagnell Road (B526).
- A45 Brackmills Interchange:
  - Upgraded MOVA traffic signals system for all existing traffic signals
  - Traffic signals at both the Caswell Road approach and entry to the A45 southbound on-slip (from Pavilion Drive).
- A45 Barnes Meadow Interchange:
  - Ramp metering on northbound on-slip
  - Removal of short merge and traffic can only access A45 mainline through the northbound lane gain facility
  - MOVA controlled traffic signals.
- A45 Lumbertubs Interchange:
  - Upgraded MOVA controlled traffic signals system to be proposed for all existing traffic signals
  - Ramp metering to be planned for both northbound and southbound on-slips
  - Removal of short merge on southbound on-slip road meaning traffic can access the A45 mainline only through the lane gain facility.

- A45 Great Billing Interchange:
  - Ramp metering at both northbound and southbound on-slips
  - MOVA controlled traffic signals.

2.58 The A45/M1 NGMS Memorandum of Understanding provides an agreed basis for supporting the funding and delivery of the NGMS, including through negotiated contributions secured by Section 106 planning obligations. It is an agreement between Highways England, NCC and the Local Planning Authorities.

2.59 Except for the works at M1 Junction 15 (which are not included following advice from Highways England[4]), all other NGMS works are included in the NSTM2.

Highways England Road Investment Strategy (2015-2020)

2.60 The purpose of Highways England's Frist Road Investment Strategy (RIS1) is to focus on the Strategic Road Network (SRN) by outlining *"the foundations for a better future – foundations on which future Road Investment Strategies will build, as we strive to achieve our vision of a revolutionised SRN that will underpin progress and prosperity for generations to come"* (page 9).

2.61 The RIS1 highlights the impact of increased congestion on the SRN, including an annual cost of £3.7 billion for the freight industry and indicated *"traffic density on UK motorways is 113 million vehicles per mile of road compared to 47 million in Germany and 39 million in France"* (page 19).

2.62 Therefore, central to RIS1 is the £15 billion investment which *"has been committed to road investment between 2015 and 2021, with annual funding on enhancements tripling to £3 billion per year by 2021"* (page 19).

2.63 The below lists the schemes in vicinity of the site that are described in the current RIS 2015 to 2020:

- M1 Junctions 13 to 19: The scheme upgrades the M1 to Smart Motorway between Junction 13 (Milton Keynes South) and Junction 19 (M6 Catthorpe interchange). It

[4] See paragraphs 3.1 and 3.2 of TN5 (**Appendix 10**).

involves the conversion of the hard shoulder to create a new additional permanent traffic lane, increasing capacity to reduce congestion. Junction 16 to 19 of the works is complete, and construction of Junctions 13 to 16 is due to be constructed between June 2018 and March 2022.

- Improvement to the Abthorpe junction on the A43 near Towcester. Along with the A5 Towcester relief road, the scheme supports the Towcester southern extension and helps remove traffic from the centre of the town. These works have been completed.
- A5 Towcester Relief Road (scheme committed subject to other contributions): A new link road to the south of Towcester, agreed as part of the Towcester southern expansion, allowing traffic to bypass the town centre.
- A45/A6 Chowns Mill junction improvement: Upgrade of the Chowns Mill junction between the A45 and A6 in Northamptonshire.
- A45 Thrapston to Stanwick (scheme developed for next road period) - Upgrading the existing single carriageway section of the A45 between Stanwick and Thrapston, so the A45 can provide a continuous Expressway between the A14 and the M1.

2.64 In addition to the above, Highways England announced a £220 million fund in March 2017 for junction upgrades, roundabout improvement and better traffic signalling for traffic hotspots. This include £3.3 million for improvements to the A5/A508 Old Stratford roundabout. Details of this scheme were obtained from Highways England and are included in the NSTM2.

Design Manual for Roads and Bridges (DMRB)

2.65 The purpose of the DMRB is to provide requirements, advice and guidelines for the SRN and is therefore mandatory for all works undertaken on motorway and all purpose trunk roads. In preparing the proposed highway mitigation works associated with the development the DMRB has been applied including relevant Interim Advice Notes (IANs).

2.66 The design standards to be used for the assessment and design for the DCO submission were agreed with the Transport Work Group, as set out in TN4 (**Appendix 9**). TN4 agrees that the DMRB are also be the design standards to be applied for works on the A508 corridor. All other local highway works should apply DMRB and elements of Manual for Streets[5] where applicable.

[5] Manual for Streets, DfT, 2007 and Manual for Street 2, Chartered Institution of Highways & Transportation, 2010

Northamptonshire Parking Standards (September 2016)

2.67 NCC adopted new parking standards in September 2016. The previous countywide parking standards applied a maximum car parking space allowance, as car parking was used as a demand management tool.

2.68 The aims of the September 2016 parking standards document are provided at page 2, and include *"to support the provision of sufficient, usable parking within development without compromising highway safety whilst supporting good design and sustainable travel."* The new standards therefore provided minimum car parking requirements. The new standards are the relevant guidance for the proposed development and have therefore been applied.

Overall Compliance with Policy

2.69 The proposed development and supporting transport documents have been developed with due regard to the above policy documents, with emphasis given to the guidance set out in the NPSNN. The proposals include improvements and alterations to both the SRN and local highway network, as well as to sustainable infrastructure and transport services.

2.70 The policy documents state that development should be sited in sustainable locations with access to existing facilities and services. In the case of an SRFI it is also necessary to identify a suitable location to provide the required connection to the rail freight network, with excellent connections to the SRN. The proposed development site achieves these requirements and, as such, meets with the Government Objectives in NPSNN and the national, regional and local transport policies and objectives summarised in this section. It can therefore be concluded that the proposed development meets relevant policy guidelines and specific requirements in terms of transport.

3.0 TRANSPORT NETWORK REVIEW

Site location

3.1 The SRFI site is in South Northamptonshire District, but adjacent to the boundary with Northampton Borough. It is located to the west of M1 Junction 15, approximately 6km from Northampton Town Centre. A general site location plan is shown at **Figure 1.1**. It is bounded to the northeast by the M1 Motorway, to the southeast by the A508, to the north by Collingtree Road, and by the Northampton Loop line of the West Coast Main Line (WCML) railway to the west.

3.2 The site is in a strategically significant location for logistics and distribution activity, with a considerable market demand and interest in national distribution activity. With immediate access to the M1 motorway and a direct rail connection, the site is excellently placed to accommodate an SRFI and to help deliver the Government's policy which seeks to encourage a network of SRFI.

Rail freight network

3.3 The rail freight strategy is considered in a separate Rail Operation[2] and a Rail Capacity report[3]. Whilst the specific reports should be referred to for the detail, the below summary provides the context of the location of Northampton Gateway SRFI within the Strategic Freight Network (SFN) and demonstrates the degree to which the site has significant potential to support the Government objectives for freight modal shift.

3.4 The SRFI site is adjacent to the Northampton Loop line, which is the WCML freight corridor, running from London to Scotland, serving the West Midlands, North Wales and the North West en route. The WCML is the UK's most important rail corridor for both freight and passenger services. It is electrified throughout, and freight trains are run using either diesel or electric traction. The Northampton Gateway SRFI will provide connections to both the southbound and northbound line in each direction, which means that trains will be able to enter and leave the site towards either London or Rugby. The location of the Northampton Gateway SRFI in relation to the SFN is shown at **Figure 3.1**.

3.5 The WCML is cleared to Network Rail's W12 structure gauge, making it suitable for the carriage of 9' 6" containers and European swapbodies on standard platform wagons. As such it provides the best rail access of any route on the National Rail Network.

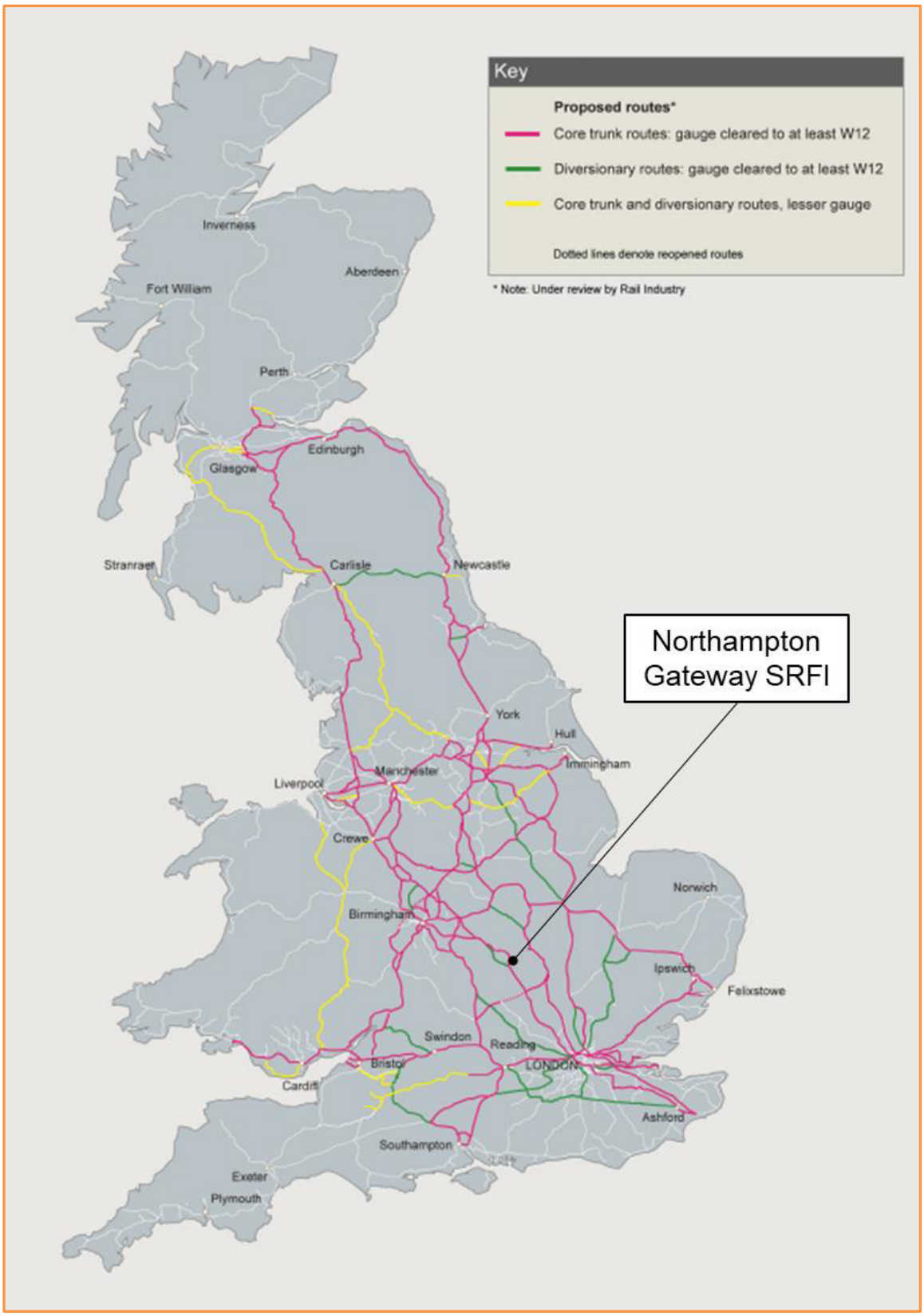


Figure 3.1: Northampton Gateway SRFI in relation to the Strategic Rail Freight Network

3.6 In 2010 Network Rail estimated that 43% of all UK rail freight travelled on the WCML at some stage of its journey, and the proportion of intermodal freight that travels on it between UK container ports and key National Distribution Centres is even higher. The WCML has connections to all parts of the country and connects through London to core intermodal

routes that run onwards to the UK's largest container ports at Southampton, London Gateway and Felixstowe, together with the Channel Tunnel. This means that the site will be connected to all the key independent ports, SRFIs and Rail Freight Interchanges in the UK.

3.7 The Rail Operation and Rail Capacity reports demonstrated that the Northampton Gateway SRFI:

- would provide the capability for 775 metres length trains and will be able to accommodate electric freight trains when the freight market requires;
- has growth plans consistent with Network Rail's and the DfT's intermodal traffic growth forecasts, which rely on the creation of SRFIs with good rail connections; and
- freight train path requirements can be met within the existing WCML capacity and that which is planned to be released by HS2.

3.8 Overall it is concluded that the SRFI site has excellent rail connection potential to support the movement of intermodal traffic by rail across all key areas of intermodal logistics operations and to support the Government's objectives for freight modal shift from road to rail.

Highway network

3.9 The SRN in relation to Northampton Gateway SRFI is shown at **Figure 3.2**. The location of the site, adjacent to Junction 15 of the M1 provides excellent connection opportunities with the rest of the UK, via the M1, M6, A45, A14 and A43.

Figure 3.2: Strategic Road Network map

3.10 As the majority of freight in the UK is moved by road, the NSPNN states that proposed SRFI should have good road access, as this will allow rail to effectively compete with, and work alongside road freight to achieve a modal shift to rail. **Figure 3.3** shows the location of the site in relation to the Strategic Freight Road Network in Northamptonshire, which in addition to the SRN, includes the strategic lorry routes of the A508, A428, A509, A43 (north of Northampton), and A6. This demonstrates that the site is excellently located in relation to the Strategic Freight Road Network.

Figure 3.3: Strategic Freight Road Network (source: Northamptonshire Road Freight Strategy, adopted December 2013)

M1 Motorway

3.11 The M1 Motorway is a strategic route for local, regional and international traffic and plays an important role as a direct motorway between the north and south and a major route connecting some of the largest conurbations in the UK. Near Junction 15 it comprises a standard 3-lane motorway with hard shoulders. This section of the M1 is congested during

the weekday morning and evening peak hours and at other times when traffic flows are heavy.

3.12 To the north of the proposed development, Highways England has recently completed works to up-grade the M1 between junctions 19 to 16, to all lane running as part of the Highways England Smart Motorway Project, which will reduce congestion of this section of the M1. To complement that scheme, Highways England have confirmed works to extend all lane running to include M1 Junctions 16 to 13, this will take the form of 4 lane 'all lane running' along with 'through junction running' (4 lanes with no hard shoulder) of M1 Junctions 15 and 15A. The SMP is programmed to be constructed between June 2018 and March 2022. However, whilst the works may include reconfiguration of the slip-roads, they do not include improvements to the junctions themselves.

M1 Junction 15

3.13 M1 Junction 15 was re-built in 1998 from a two-bridge roundabout to the current single bridge arrangement which passes over the M1 mainline. The final layout of the junction was a tear-drop arrangement incorporating a series of tight radii. The constrained geometry and high traffic demand, particularly during peak times, means the junction is often very heavily congested. Queue surveys undertaken in May 2014 showed that average queue lengths on the A45 approach reach approximately 160 to 200 metres in the morning and evening peak periods, with average queueing on the A508 approach observed to be approximately 240 metres in the morning peak and approximately 420 metres in the evening peak.

3.14 The M1 off-slips and A45 approach to Junction 15 are controlled by traffic signals, with the A508 and Saxon Avenue approaches operating under a give way priority arrangement. The junction can be difficult to navigate, and the lane allocation around the three-lane circulating carriageways at the A508 and A45 approaches are confusing; for example, vehicles from the M1 northbound off-slip can turn right in all three lanes despite there being two exit lanes onto M1 northbound, whilst vehicles from the bridge can only turn right onto the M1 northbound in two lanes, making it difficult for vehicles at the A508 give way line to judge entry onto the roundabout.

3.15 At M1 Junction 15 a shared use footway/cycleway is provided along the western side of the junction, connecting with a short section of footway/cycleway on the western side of A45 and the existing footway provided along the western side the A508. A separate footway/cycleway link is provided across the A45 on the northern part of Junction 15, to connect with the footway/cycleway on the northern side of Saxon Avenue. A narrow

footway is provided on the eastern side of the A45 as far north as public footpath LF2. Except for the M1 northbound on-slip, which is provided with a controlled signalised crossing, all other crossings at the junction do not have their own dedicated signal, but can be crossed on a 'walk with traffic' basis (i.e. when the main traffic signals are on red).

3.16 As described in paragraphs 2.54 to 2.59, Highways England, as part of their M1/A45 NGMS have identified an improvement scheme for Junction 15. The scheme could potentially provide a capacity improvement of around 9% at the junction. However, this would still leave the junction over capacity at current traffic levels, and Highways England advised that there is no certainty whether an improvement at Junction 15 would be delivered and that this scheme should not be included within the NSTM2.

M1 Junction 15A

3.17 M1 Junction 15A is a grade-separated dumb-bell interchange with northern and southern roundabouts connected by a dual carriageway link road which passes underneath the M1 mainline. M1 Junction 15A connects the A43 to the south and the A5123 to the north, which provides access to Northampton. M1 Junction 15A also provides access to the Swan Valley Industrial Estate and the Northampton Services, via a series of connected roundabouts.

3.18 The northern roundabout has three approaches, all providing two lanes and are priority controlled. There is also a stub arm to the east which was provided as a potential access to the Milton Ham development site. However, that site does not currently have a valid planning permission.

3.19 The southern roundabout also has three approaches. The M1 northbound off-slip approach has a single lane, with a give way entry to the roundabout. The A43 north and south approaches have two lanes and give way entries to the roundabout. There is a gated access to agricultural land to the east of the southern roundabout.

3.20 There are no walking, cycling or horse-riding facilities provided at M1 Junction 15A. However, there is an existing uncontrolled at grade crossing point on the A43 approximately 70m south of the junction, linking public footpath KX2 with LA13.

3.21 At peak times, the M1 northbound and southbound off-slips are susceptible to congestion, with queueing and delay experienced on the M1 northbound off-slip especially. Traffic and

queue surveys were undertaken on 10 March 2016[6] which showed that average queue lengths on the M1 northbound off-slip approach reach approximately 160 to 200 metres in the evening peak period. Queueing on the A5123 and A43 approaches were shown to be less significant in both peak periods.

A45

3.22 The A45 London Road forms the main arterial route between the M1, Northampton and the A14 and is of dual carriageway standard, expect for the single carriageway section between Stanwick and the A14. It is subject generally to the national speed limit beyond the immediate confines of Junction 15, where it is subject to a 40mph speed limit. The road carries large volumes of traffic throughout the day and is particularly busy during peak times.

3.23 A footway is provided along the western side of the road, although on the approach to Junction 15 there is also a footway on the eastern side connecting to footpath LF2.

3.24 To the north of M1 Junction 15, the C67 Watering Lane has a priority-controlled junction with the A45. Watering Lane provides access to Collingtree before becoming Collingtree Road and providing access to Milton Malsor. Access to Watering Lane from the A45 is subject to a 7.5T environmental weight restriction, except for access for loading.

3.25 The NGMS recognises the importance of the A45 in helping to support growth and sustain the economy throughout the region. The NGMS is agreed with the neighbouring planning authorities and NCC for its future management and safe-guarding. The proposals are described in detail at paragraph 2.57. They comprise a series of demand management measures such as signalisation and ramp-metering to limit congestion along the A45 at peak times. The NGMS contains only limited proposals for improving M1 Junction 15, and as described above, Highways England have advised that there is no certainty when that improvement would be delivered, as other NGMS junctions have been identified as priorities.

3.26 As a result, and with the exclusion of any improvements at M1 Junction 15 from the Smart Motorway Project, M1 Junction 15 will inevitably become more congested in the future.

[6] As provided to ADC by Aecom on behalf of Highways England

A508

3.27 The A508 forms the link with the A5 to the south and M1 Junction 15 to the north. It bisects the village of Roade and passes adjacent to the smaller village of Grafton Regis.

3.28 It is a single carriageway road and is an important part of the principal road network, forms part of the Strategic Freight Road Network shown at **Figure 3.3**, and it has been identified in the recent DfT consultation[7] as part of the proposed Major Road Network for England.

3.29 The A508 also forms part of the SRN emergency diversion route for the M1 and A5, as shown **Figure 3.4 to 3.7.**

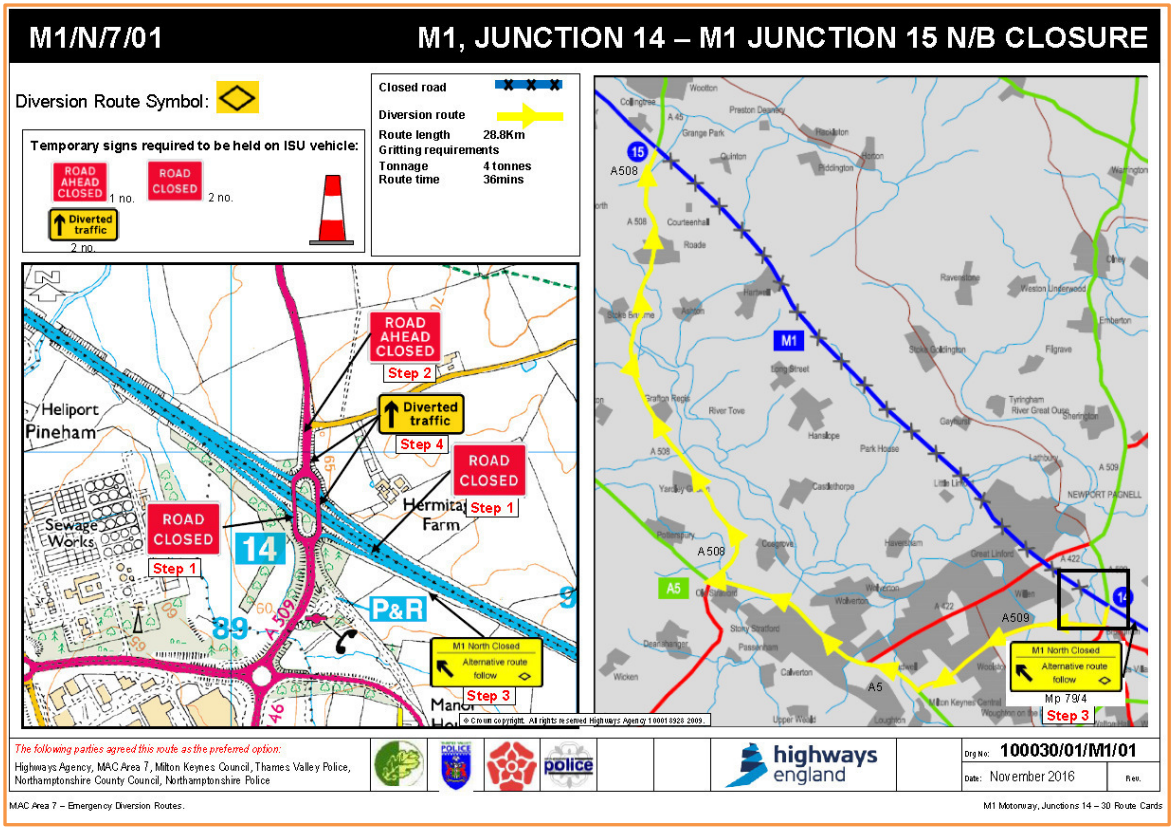


Figure 3.4: Emergency diversion route M1J14 to M1J15 northbound closure

[7] http://maps.dft.gov.uk/major-road-network-consultation/

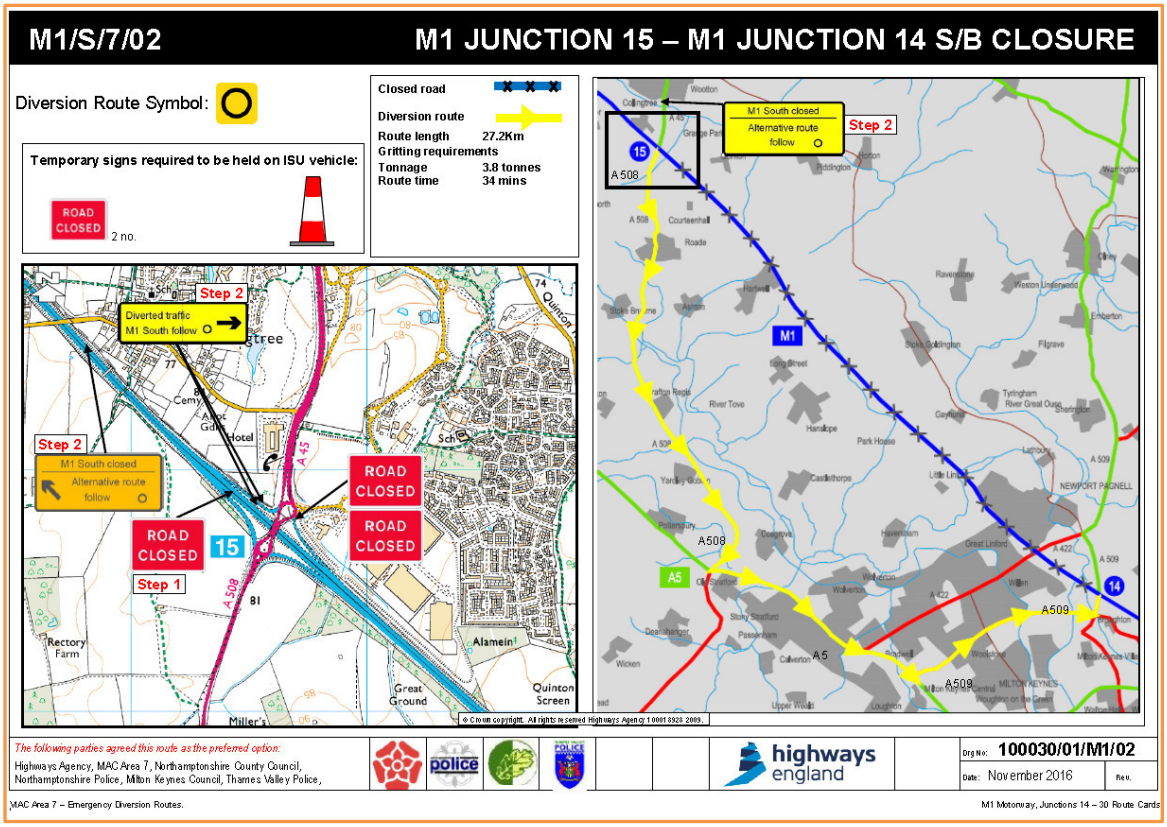


Figure 3.5: Emergency diversion route M1J15 to M1J14 southbound closure

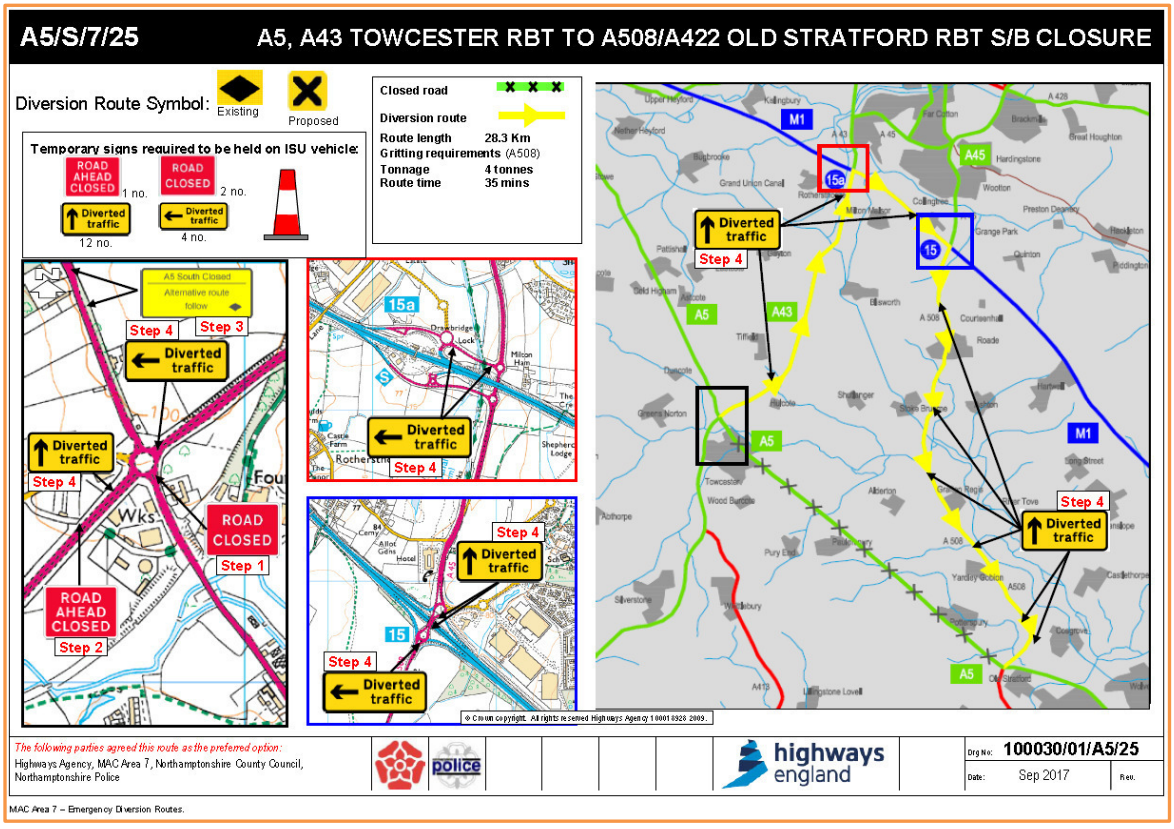


Figure 3.6: Emergency diversion route A5 southbound closure

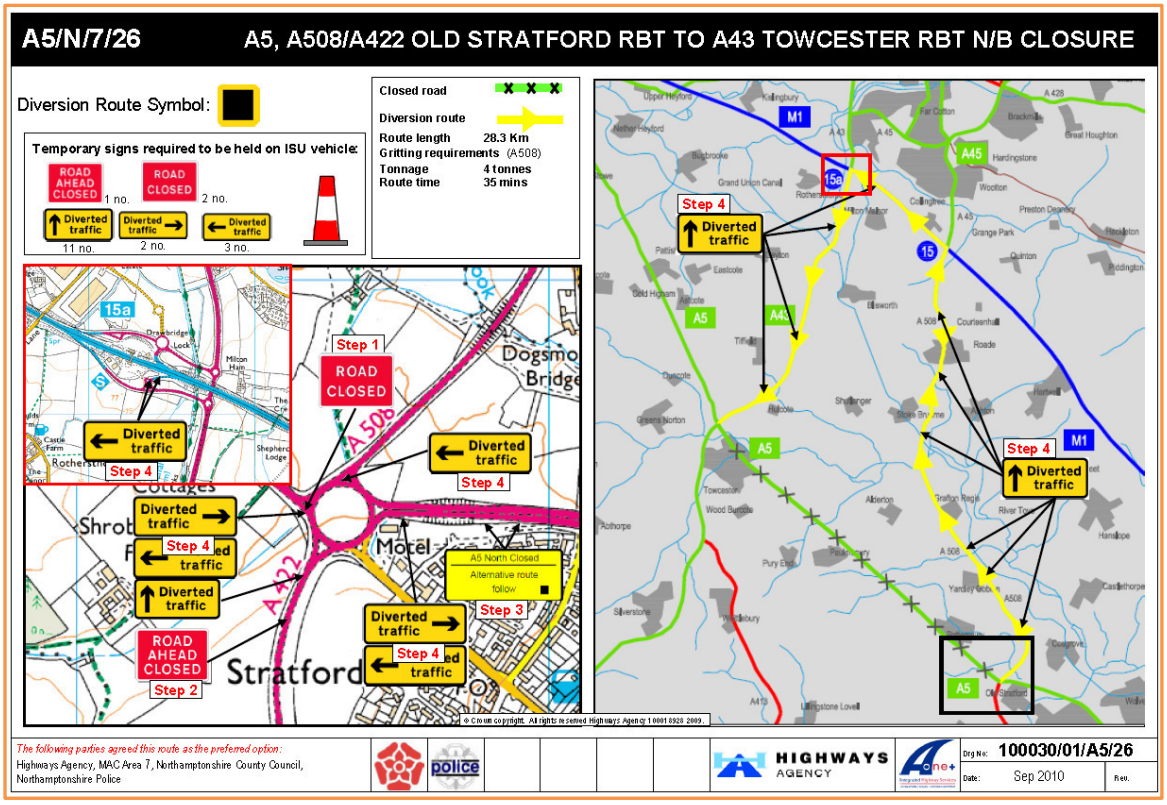


Figure 3.7: Emergency diversion route A5 northbound closure

3.30 The speed limit varies along the A508, with the northern and southern sections of the road generally derestricted, with 30mph speed limits present through Roade and Grafton Regis, and a 50mph speed limit on the sections to the north and south of Roade, where there is a higher concentration of bends and sub-standard priority-controlled junctions.

3.31 To the south of the SRFI site, Blisworth Road (becoming Courteenhall Road to the west) forms a simple priority controlled T-junction with the A508. Drivers turning right from the A508 into Blisworth Road block southbound traffic on the A508, leading to queueing traffic and delays. There is concern from residents that drivers use Blisworth Road to 'rat-run' between the A508 and the A43 and vice versa, passing through Blisworth village.

3.32 To the south of the SRFI site, the A508 passes through the village of Roade, where the alignment is constrained at the London Road/Stratford Road/High Street mini-roundabout and over the narrow railway bridge over the WCML. Stop-start traffic is frequently seen and at peak times queues of stationary traffic can quickly develop. HGVs travelling in opposing directions on the A508 bridge over the railway are often obliged to give way to each other as they are not able to pass safely on the bridge structure itself.

3.33 Queue surveys undertaken in September 2016 (see paragraph 3.76) at the A508/High Street mini-roundabout, recorded consistent queueing of up to 100 metres during the

morning peak hour on the A508 southbound approach to the junction. During the evening peak hour, queueing was more transient, reaching up to 155 metres on the A508 southbound, and up to 60 metres on the A508 northbound over the railway bridge.

3.34 Queueing was also observed at on the A508 in each direction at the A508 simple priority-controlled T-junction with Hyde Road, particularly during the morning peak hour and around 3 o'clock in the afternoon, when it is likely that the nearby signal controlled crossing was being used.

3.35 Hyde Road provides access to the west side of Roade, which is accessed by a further bridge over the WCML. To the west, Hyde Road becomes Blisworth Road towards the outskirts of the village. Blisworth Road then becomes Knock Lane, which to the west forms the minor arm in a simple priority-controlled T-junction with C27 Stoke Road.

3.36 As part of a committed development within Roade, the A508/Northampton Road T-junction is also to be replaced with a mini-roundabout.

3.37 To the south of Roade, the A508 has a staggered crossroads junction with the C26 Rookery Lane and Ashton Road. Immediately to the south of the junction, there are a series of bends in the A508, which are known to have an existing accident problem[8].

3.38 To the south of C26 Rookery Lane, the A508 forms the major arm in a priority-controlled junction with the C85 Pury Road, which provides a link through to the A5. A ghost land right turn harbourage facility is provided at the junction for right turn movements from the A508 to Pury Road. The entire length of the C85 Pury Road, between the A508 and A5, is subject to a 7.5T environmental weight restriction, except for access for loading.

3.39 The A508 passes to the east of Grafton Regis, which has a frontage of approximately 300 metres with the A508. Footways are provided on each side of the road along this frontage, providing access to a northbound and southbound bus stop. To the south of Grafton Regis there is no footway on the A508 until the junction for Yardley Gobion.

[8] See Section 8 of TNA (**Appendix 3**)

Pedestrian and cycle travel

3.40 The existing conditions for pedestrians and cyclist are described in detail in the Walking, Cycling & Horse Riding Assessment Review (WCHAR1) Assessment Report (**Appendix 18**).

3.41 **Drawing ADC1475 009 P2** shows the existing Public Rights of Way (PRoW) network includes footpaths KX13 and KX17 which run through the SRFI site. Public footpath KX13 and KG5 provides a connection from High Street, in Collingtree, over the M1 via an existing bridge and across the SRFI site towards the A508. KX17 links with public footpath KX13 which also crosses the SRFI site, linking with the existing bridge over the WCML railway. Footpath KX13 links with footpath RD1, providing access to Blisworth.

3.42 **Drawing ADC1475 009 P2** also shows the existing bridleways including Bridleways KG1, KG2, LD6 and LD7, located to the immediate north of the SRFI site. The sequence of bridleways links Collingtree with the network of cycleways within East Hunsbury, en-route to Northampton and form part of the Northampton cycle route network, as shown on the extract of the Northampton Cycle Map shown at **Figure 3.10** and provided in full at **Appendix 35**.

3.43 **Drawing ADC1475 001 P2** shows the existing PRoW in the vicinity of Roade, including public footpaths KZ30, KZ19, KZ2a, RZ3 and public bridleways KZ10/RZ1 and RZ6 located on the western side of the village.

3.44 The Guidelines for Providing for Journeys on Foot[9] describes walking as an essential part of much car and almost all public transport travel as bus stops are usually accessed on foot. Promoting sustainable, integrated transport involves providing good pedestrian links to public transport facilities.

3.45 Those Guidelines also provide acceptable walking distances for pedestrians without mobility impairment. They suggest that, for commuting, up to 500 metres is the desirable walking distance, up to 1,000 metres is an acceptable walking distance and 2,000 metres is the preferred maximum walking distance. **Figure 3.8** shows a 2km pedestrian catchment centred on the site.

[9] Guidelines for Providing for Journeys on Foot, Chartered Institution of Highways and Transportation, 2000.

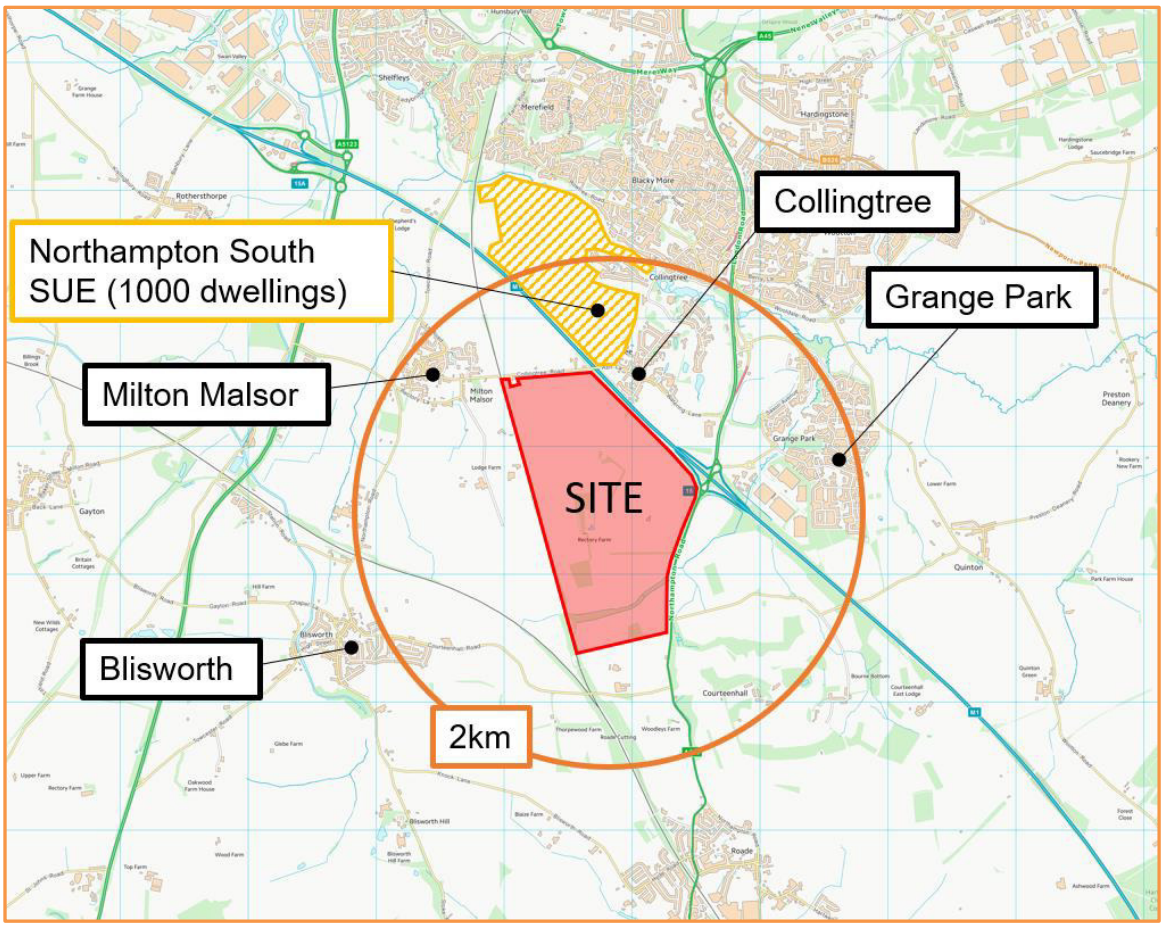


Figure 3.8: Pedestrian catchment area

3.46 Collingtree, Milton Malsor and Grange Park fall within the 2km walking distance of the SRFI site and parts of the South Northampton sustainable urban extension, which is a committed development of some 1000 dwellings, would also be within walking distance of the site. Hence in the future the SUE will provide additional opportunities for pedestrian journeys to and from the site.

3.47 The Department for Transport's (DfT) Local Transport Note 1/04 'Policy, Planning and Design for Walking and Cycling'[10] states that there are limits to the distances generally considered acceptable for cycling. The average length for cycling is 4km (2.4 miles), although journeys of up to three times this distance are not uncommon for regular commuters. It is widely considered that cycling has the potential to substitute for short car trips, particularly those under 5km, and form part of a longer journey by train. Cycling is

[10] Department for Transport – Local Transport Note 1/04. Policy, Planning and Design for Walking and Cycling, 2004

therefore an important journey to work mode that has the potential to perform a more significant role. **Figure 3.9** shows a 5km cycle catchment centred on the site.

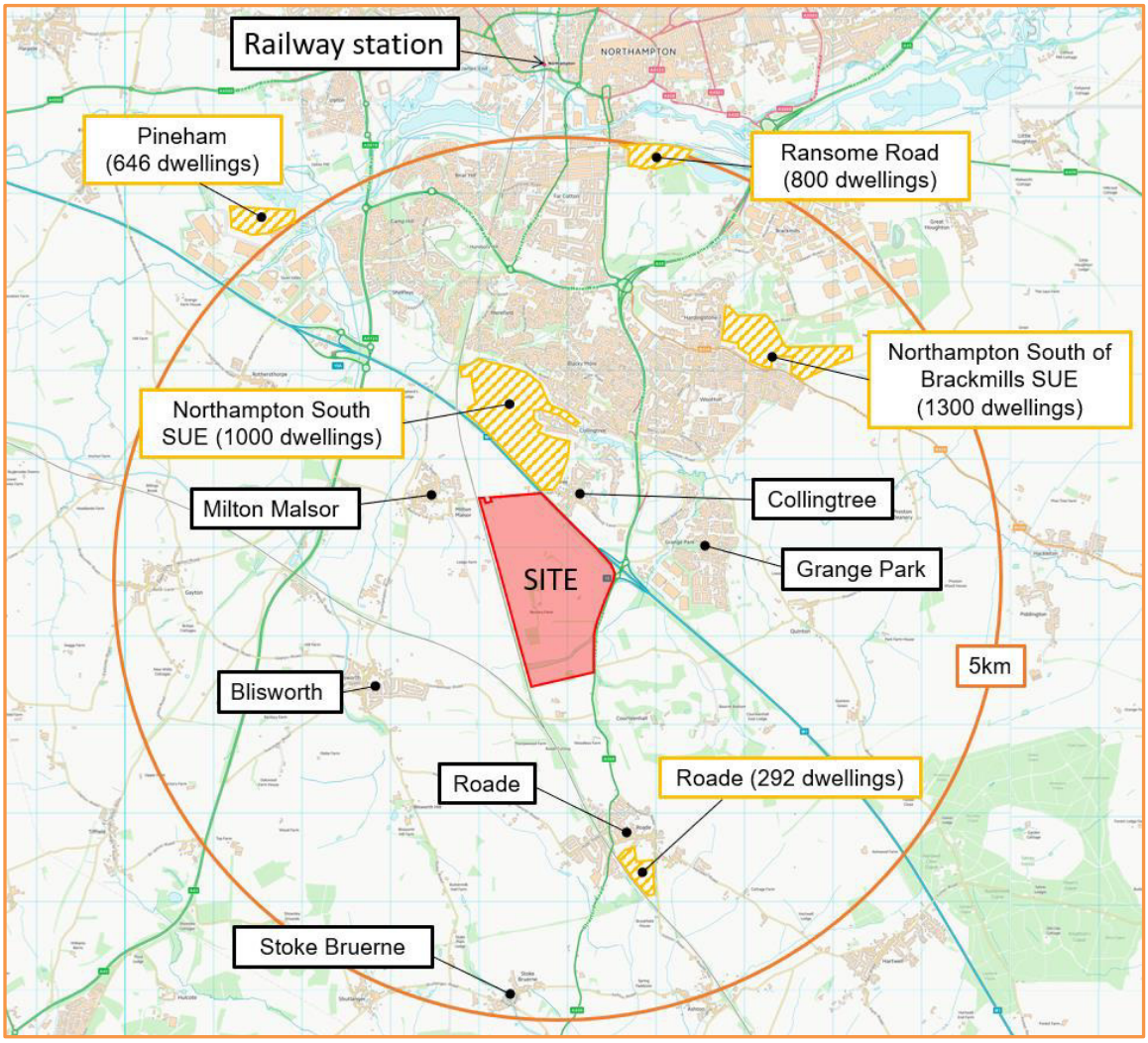


Figure 3.9: Cycle catchment area

3.48 The catchment shows that a large part of southern Northampton would be within cycling distance of the site, as would several of the surrounding villages, include Roade to the south. Northampton Railway Station falls just outside the 5km catchment but would still be within an acceptable cycle distance for regular commuters.

3.49 **Figure 3.9** shows that the cycle catchment area includes a number of large scale committed housing development sites, which would further increase the opportunities for cycle travel to and from the site.

3.50 The Northampton and South Northamptonshire cycle routes maps are provided at **Appendix 35**, and a composite extract of these plans is shown at **Figure 3.10**, which shows the existing cycling facilities within the cycle catchment area.

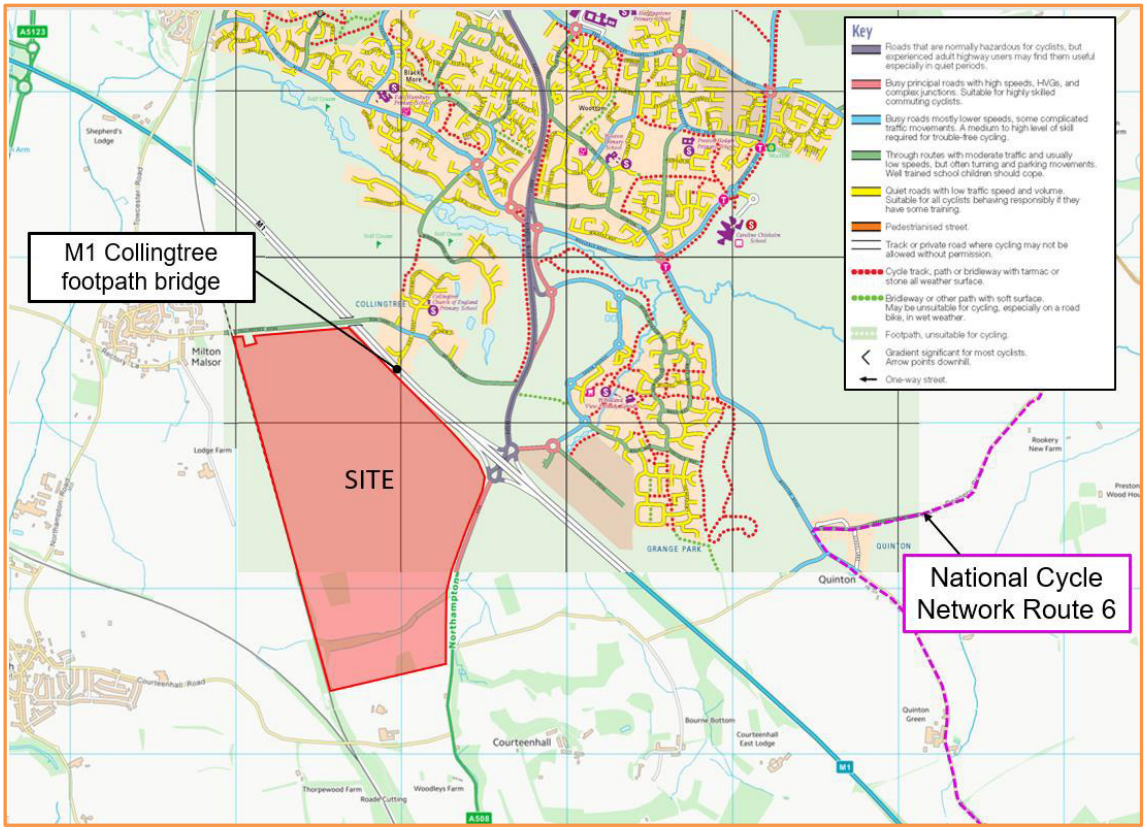


Figure 3.10: Cycle facilities (composite including extract from NCC Cycle Route Map)

3.51 At M1 Junction 15 a shared use footway/cycleway is provided along the western side of the junction, connecting with the short section of footway/cycleway on the western side of A45 and the existing footway provided along the western side the A508. A separate footway/cycleway link is provided across the A45 on the northern part of Junction 15, to connect with the footway/cycleway on the northern side of Saxon Avenue. A narrow footway is provided on the eastern side of the A45 as far north as public footpath LF2. Except for the M1 northbound on-slip, which is provided with a controlled signalised crossing, all other crossings at the junction do not have their own dedicated signal, but can be crossed on a 'walk with traffic' basis (i.e. when the main traffic signals are on red).

3.52 To the north of the A45/C67 Watering Lane junction a shared use footway/cycleway is shown on the Northampton Cycle Map to the north of Watering Lane, alongside the western side of the A45. However, the facility is not signed, and it is narrow and overgrown. It connects Watering Lane into the wider Northampton cycle network. But, to the north of M1 Junction 15 the current facility terminates at the A45 layby and therefore there is no connection currently provided between M1 Junction 15 and facility to the north of Watering Lane.

3.53 There is network of cycle facilities and 'Advisory Routes' within East Hunsbury that provide onwards connection to Northampton and are accessible via Collingtree. There is also a

network of cycle facilities within Grange Park, providing onwards links to the Wootton and Hardingstone residential areas.

3.54 NCN Route 6 is located to the east of the site as shown on **Figure 3.10**. The route encompasses Quinton, Hardingstone (including the Hardingstone SUE), and Brackmills Industrial Estate, en-route to Northampton Town Centre.

3.55 There are no walking, cycling or horse-riding facilities provided at M1 Junction 15A. However, there is an existing uncontrolled at grade crossing point on the A43 approximately 70m south of the junction, linking public footpath KX2 with LA13.

3.56 The Grand Union Canal is located to the west of the study area and provides a towpath route connecting Milton Keynes with Northampton.

3.57 There are currently no dedicated off-road cycle facilities provided on the A508 or within Roade. Signal controlled crossings are provided on the A508 at three separate locations within Roade providing priority for pedestrians wishing to cross the road. A number of at grade pedestrian crossings with central refuges are also provided within Roade allowing pedestrians to cross the A508 in two stages.

3.58 There is a continuous, but narrow, footway along the western side of the A508 from M1 Junction 15 to the bridge over the Grand Union Canal, near Stoke Bruerne, where it then switches to the eastern side for approximately 600m. Beyond this, and until the C85 Pury Road junction, there is no footway on the A508, although a continuous link between the two points is provided by a footway alongside the adjacent access road. At the C85 Pury Road junction the footway crosses back over to the western side, from where a continuous facility is provided linking with Grafton Regis. In Grafton Regis there are no pedestrian crossing facilities on the A508.

3.59 A narrow footway is provided on the northern side of the C26 Rookery Lane linking the footway on the western side of the A508 at the A508/Rookery Lane/Ashton Road junction, with those provided within Stoke Bruerne. There are no footways provided on the eastern side of the A508 or the C26 Ashton Road.

3.60 Overall, there are some opportunities for pedestrian travel associated with the site, but these will be relatively limited due to the restricted number of residential areas within an acceptable walking distance. Pedestrian journeys will however continue to play an important role, as promoting sustainable integrated transport involves providing good

pedestrian links to public transport facilities. There are good opportunities for cycle travel associated with the SRFI site, with a large part of south Northampton falling within an acceptable cycling distance.

3.61 However, the M1 could provide a barrier to travel to and from the north-east of the site. The development should therefore examine the opportunities to improve and enhance the existing links over the M1 bridge connecting with High Street in Collingtree and at M1 Junction 15.

Public transport

3.62 The existing bus services near to the site are shown in **Figure 3.11** and **Figure 3.12** and are summarised in **Table 3.1**. The services highlighted in **Table 3.1**, the X4, X7 and 33A/33 currently pass immediately in front of the proposed SRFI access on the A508.

3.63 The X4 and X7 bus services are both express limited stop services, with a combined 30 minute frequency; the nearest stop to the SRFI site can be found north of Roade. They begin operation just after 0630 hours and finish before 2100 hours. The X4 and X7 also stop in Grafton Regis, as does the 86 service. Although it is understood that the 86 bus service is to be discounted in summer 2018. The 33/33a is a frequent stop service that runs hourly (combined) between 0900 and 1800 hours. The nearest bus stops are on the A508, just to the south of the A508/Blisworth Road (Courteenhall) junction. The 86 bus service also stops here.

3.64 To the north of the M1, the northbound bus layby on the A45 near Watering Lane serves the 86 bus service. The southbound bus layby on the A45 serves the 86 bus service, although this is a request stop only and is not well used. There is also an existing westbound bus stop on Watering Lane that is served by the 86 service. The layby bus stops on the A45 would be removed as part of the scheme.

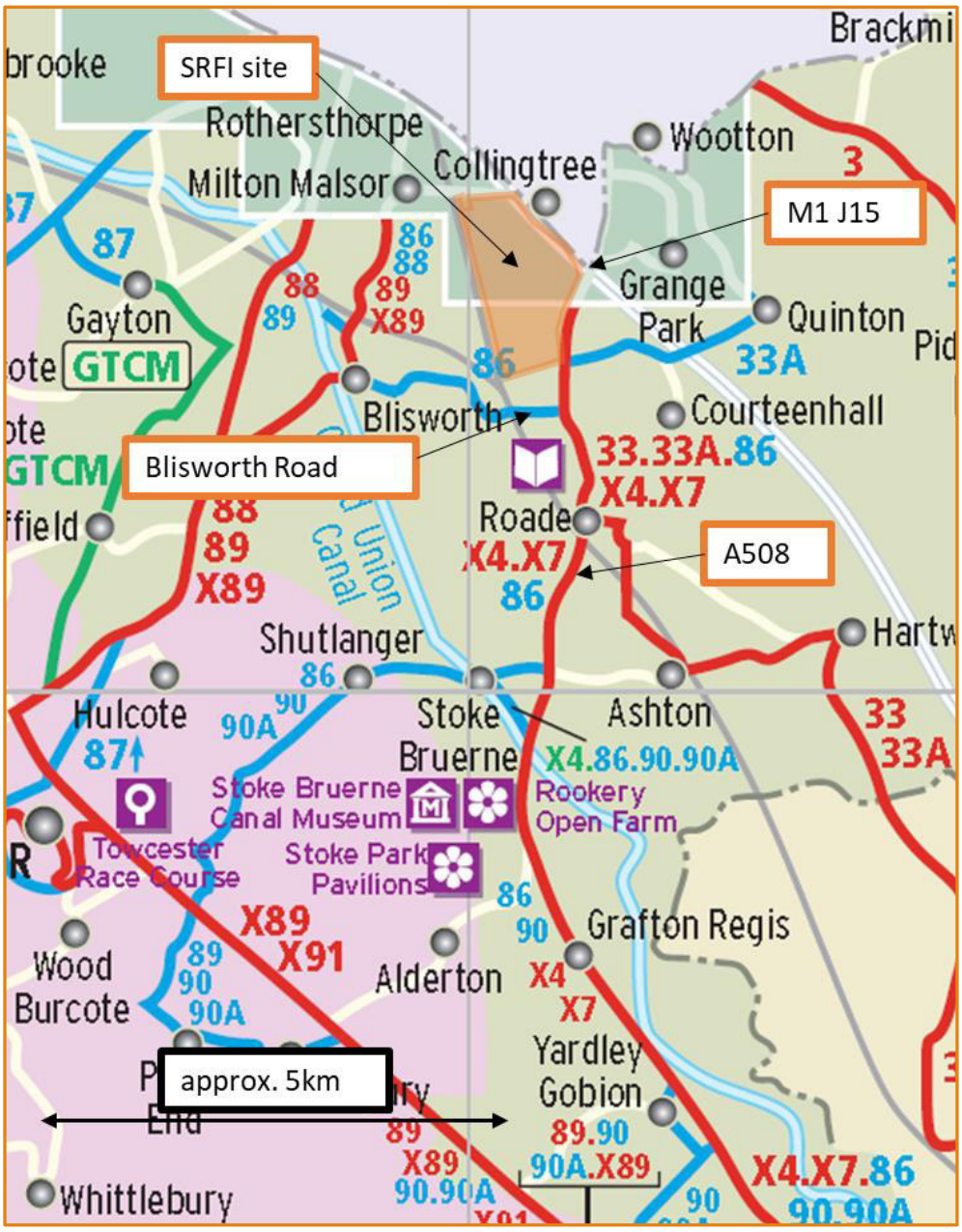


Figure 3.11: Bus routes near SRFI site (Northamptonshire, February 2018)

3.65 Overall are no services operating past the SRFI site at 0600 hours and 2200 hours, which are key shift changes for the proposed development. Public transport accessibility is better during the day, with a travel time of less than 30 minutes to Northampton Town Centre. However, in line with the Northamptonshire Bus Strategy requirements, an hourly service will not be adequate to meet the needs of employees and make public transport an attractive alternative to the private car. A comprehensive Public Transport Strategy (**Appendix 2**) to ensure that the development site is accessible by bus is therefore proposed. This is discussed further at **Chapter 4.0** of this TA.

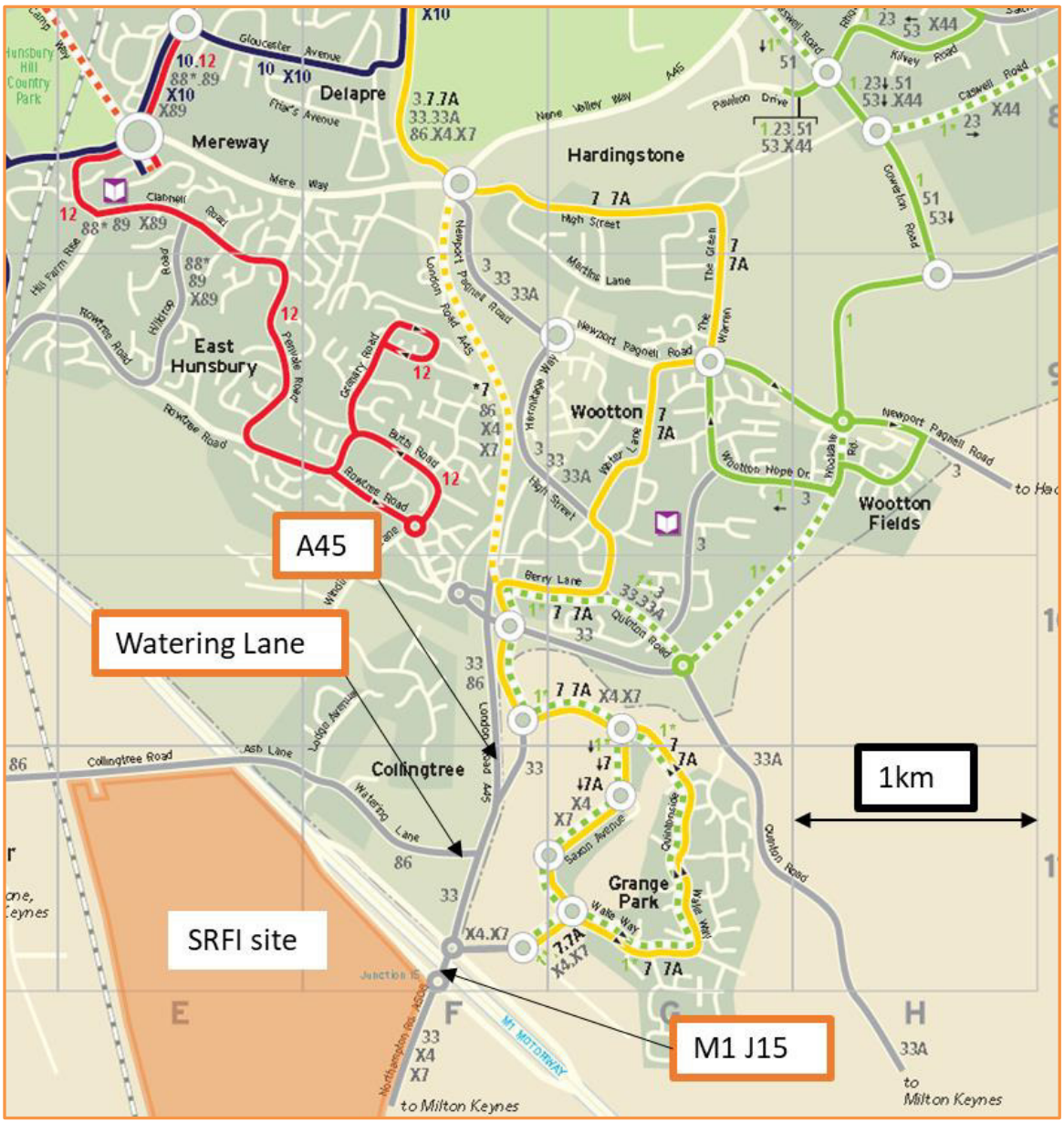


Figure 3.12: Bus routes near SRFI site (Northampton, February 2018)

3.66 The bus interchange in the centre of Northampton is at the North Gate Bus Station at Bradshaw Street, adjacent to the Grosvenor Shopping Centre. This provides a bus stop for most of the services listed above. The interchange includes ticketing facilities, toilets, café and shops.

3.67 The nearest railway station is Northampton, on the WCML loop from Birmingham to London. The station can be accessed via cycle or a bus to the North Gate Bus Station and the railway station is within a 10 minutes' walk of the bus station. There is a traffic free/lightly trafficked cycle route to the station although it is approximately 6km from the Northampton Gateway SRFI site. The railway station is served by a good service to and from Rugby, at least every 20 minutes at peak times, together with direct trains to London

and Birmingham. The opportunity will therefore exist for staff to travel by train to Northampton and complete their journey either by cycle or via the connecting bus services.

Table 3.1: Local bus routes (correct as February 2018)

service	operator	route	frequency		
			Mon-Fri	Sat	Sun
X4	Stagecoach Midlands	Peterborough - Oundle - Corby - Kettering - Wellingborough - Earls Barton - Northampton - Milton Keynes	60mins	60mins	2 hrs
X7	Stagecoach Midlands	Milton Keynes - Northampton - Brixworth - Market Harborough - Leicester	60mins	60mins	2 hrs
33/33A	Z & S Transport	Northampton - Hartwell - Hanslope - Woverton - Central Milton Keynes	60mins	60mins	No service
7	Stagecoach Midlands	Grange Park -Wootton - Hardingstone - London Road - Town Centre - Northampton College - Churchill Avenue - Moulton Park	30mins	30mins	60mins
86	Uno Buses	Towcester - Roade - Northampton	2hrs	2hrs	No service
88	Stagecoach Midlands	Northampton – Swan Valley - Towcetser	60mins	60mins	90 mins
89	Stagecoach Midlands	Northampton - Bilsworth - Towcester - Deanshanger - Milton Keynes	6 services a day	6 services a day	No service
X89	Stagecoach Midlands	Milton Keynes - Deanshanger - Towcester - Bilsworth - Northampton	60mins	60mins	No service

Committed highway improvements

3.68 The committed highway improvements on the SRN are described at paragraphs 2.54 to 2.64. These SRN schemes, along with the committed County road infrastructure schemes are described at Section 2.9 and Appendix A of the Reference Case Forecast Report

(**Appendix 23**). Table 8 of the Reference Case Forecast Report sets out the following major committed infrastructure structure schemes near to the Northampton Gateway site, as listed below. A full list of the committed infrastructure that is included in the NSTM2 is provided at **Appendix 36**:

- North-west bypass Phase 1 – link between A428 to Grange Farm development;
- North-west bypass Phase 2 – link between Grange Farm development and the A5199;
- Sandy Lane Relief Road – link between Weedon Road and the existing part of Sandy Lane;
- St Peter's Way / Green Street – signalised junction;
- Plough junction improvement – allowing two-way movement through Victoria Promenade and left-hand filter lane onto Bridge Street;
- Harlestone Road / Mill Lane Road junction – signalised of junction;
- Moulton Bypass;
- Northampton University Bedford Road access – new Northampton University Bedford Road site signalised access junction;
- Dallington Grange roundabout – new roundabout as part of Dallington Grange;
- A45 Wootton Interchange – Ramp metering as part of the NGMS;
- A45 Barnes Meadow Interchange – Ramp metering as part of the NGMS;
- A45 Brackmills Interchange – Junction upgrade as part of the NGMS;
- A45 Great Billing Interchange – Junction upgrade as part of the NGMS;
- A45 Lumbertubs Interchange – Ramp metering as part of the NGMS;
- A45 Queen Eleanor Interchange – Junction upgrade as part of the NGMS;
- A43 Phase 2 and 3 – Dualling to Holcot / Sywell;
- Northern Orbital;
- M1 Smart Motorway Project Junctions 13 to 16 – all lane running;
- M1 Smart Motorway Project Junctions 16 to 19 – all lane running;
- Daventry Development Link (Flore Bypass) – Bypass around Flore;
- A5 / B5385 junction improvement – signalisation of junction;
- Abthorpe Roundabout (Towcester) – part signalisation of roundabout and widening of approaches; and
- A5 Relief Road and junction associated with SUE – new link road betweenA43 and A5 to the south of Towcester.

Personal Injury Accidents (PIA) data

3.69 An assessment of the PIA data on the road network impacted by the proposed development has been undertaken. This is reported in the PIA Assessment report (TNA) provided at **Appendix 3**.

3.70 PIA records for the study area were obtained from Northamptonshire County Council (NCC) for the five-year period between 1 November 2011 and 31 October 2016. The study area comprised:

- M1 Junction 15;
- M1 Junction 15A;
- A45 between M1 Junction 15 and the Queen Eleanor Interchange;
- A508 between M1 Junction 15 and Roade;
- Roade village and Knock Lane/Blisworth Road;
- A508 south of Roade
- A508 Grafton Regis;
- Milton Malsor;
- Blisworth; and
- A43/Towcester Road.

3.71 A total of 210 accidents were recorded, 163 of which were classified as slight severity, 42 were classified as serious severity and the remaining five accidents were classified as fatal.

3.72 From the total of 210 accidents, 13 PIAs involved pedestrians or cyclists but none of the PIAs involved equestrians. Of the 13 accidents involving pedestrians and cyclists, six were classified as slight severity, six were classified as serious severity and the remaining one accident resulted in a fatality

3.73 The assessment identifies the following clusters and trends in PIAs that suggest existing problems:

- M1 Junction 15 - a cluster of six PIAs at the M1 southbound off-slip/A45 northbound exit at the junction, indicative of congested traffic conditions.
- M1 Junction 15 - a cluster of four PIAs on the A508 northbound approach to the junction, comprising a combination of rear end shunts and collisions on the circulatory carriageway and at the give way.

- M1 Junction 15A - a cluster of five PIAs on the A43 eastbound approach to the southern roundabout, and a cluster of three PIAs on the circulatory carriageway passing this approach towards the A43 north.
- Queen Eleanor Interchange – small clusters of PIAs on each approach to the junction, indicative of the busy conditions at the interchange.
- A45 – driver error was a prominent factor, including sudden breaking, rear end shunts, and travelling too fast for the road conditions.
- A508/Blisworth Road (Courteenhall) junction – a cluster of four PIAs at the junction, including one driver turning right into the Blisworth Road in an inappropriate gap in northbound traffic, and two rear end shuts on the A058 associated with traffic being held up at the junction.
- A508 bend to south of Blisworth Road (Courteenhall) – a cluster of four PIAs, three of which relate to loss of control and drivers travelling too fast for the road conditions.
- A508 bends south of C26 Rookery Lane/Ashton Road crossroads - a cluster of accidents on the bends to the south of the crossroads, suggesting a trend of drivers travelling too fast in adverse road conditions, as the majority of the PIAs occurred in wet/damp or frost/icy roads conditions.
- A43/Towcester Road – a cluster of four PIAs, all involving vehicles turning right from the A43 into Towcester Road.

3.74 At the remaining PIA study areas, the assessment did not identify any specific locations or trends to indicate specific existing traffic safety issues.

3.75 Road safety of the proposed improvements is considered separately via the Stage 1 Road Safety Audit process and the Design Team Response Report (see RSA1 and RSA1 RR at **Appendix 30** and **Appendix 31**).

Baseline traffic surveys

3.76 To inform the baseline position, a total of 42 traffic counts have been undertaken as part of the NSTM2 calibration and re-validation exercise of the area to the south of the M1. The locations of the traffic counts are shown in the figure provided in **Appendix 37**, and comprised:

- 39 two-week automatic tube counters undertaken in two batches between 19th and 3rd October 2016 and 10th and 23rd October 2016.
- Full morning and evening peak period turning counts undertaken on 22nd September 2016 at:

- A508/Northampton Road junction in Roade
- Stratford Road/High Street mini-roundabout in Roade
- A5/A508 Northampton Road roundabout.

3.77 Baseline traffic is also available from the following surveys:

- M1 Junction 15: one-week automatic tube counters on each approach arm to M1 Junction 15, undertaken between 1st May 2014 and 7th May 2014;
- M1 Junction 15: full peak hour turning count at M1 Junction 15 undertaken on 1st May 2014;
- M1 Junction 15 and 15A: count data provided by Highways England, undertaken on 10th March 2016;
- AM and PM peak period ANPR Camera surveys at the locations shown in **Appendix 37** on 21st and 22nd March 2017; and
- ATC speed surveys on Knock Lane undertaken between 23 and 30 November 2017.

3.78 Non-motorised user baseline traffic is also available from the following surveys:

- M1 Junction 15, A508 and Blisworth Road 12 hour (0700 to 1900hrs) non-motorised user surveys, undertaken on 6th and 7th of June 2017.

3.79 Layby occupation surveys were undertaken on the A45 and A43 as part of the work presented in Technical Note 9 (**Appendix 14**) as part of the assessment of the suitability of nearby laybys to accommodate the displaced demand that would result from the layby closure required as part of the M1 Junction 15 and A45 major upgrade.

Summary

3.80 The SRFI site is located to the immediate west of M1 Junction 15, approximately 6km from Northampton Town Centre. It is bounded to the northeast by the M1 Motorway, to the east by the A508, to the north by Collingtree Road, and to the west by the Northampton Loop line of the WCML railway, from where the rail connection would be provided.

3.81 The NSPNN states that, because the majority of freight in the UK is moved by road, proposed SRFI should have good road access to allow rail to effectively compete with and work alongside road freight to achieve a modal shift to rail. The SRFI site is in a strategically significant location for logistics and distribution activity and, being adjacent to Junction 15 of the M1, it provides excellent road connection opportunities with the rest of the UK, via the M1, M6, A45, A14 and A43. The site is also excellently located in relation

to the Strategic Freight Road Network in Northamptonshire, which in addition to the SRN, includes the strategic lorry routes of the A508, A428, A509, A43 (north of Northampton), and the A6.

3.82 However, the constrained geometry of M1 Junction 15 and high traffic demand, particularly during peak times, means that this junction is often very heavily congested and is an existing bottleneck for traffic using the A508 and A45. In addition, due to the existing conditions at Roade, with the A508 bisecting the village and existing congestion issues at the mini-roundabout and the narrow railway bridge over the WCML, stop-start traffic is frequently seen, and at peak times queues of stationary traffic can quickly develop on the A508 through the village.

3.83 There are some opportunities for pedestrian travel associated with the site, but these will be relatively limited due to the restricted number of residential areas within an acceptable walking distance. Pedestrian journeys will however continue to play an important role, as promoting sustainable integrated transport involves providing good pedestrian links to public transport facilities. There are good opportunities for cycle travel associated with the SRFI site, with a large part of south Northampton falling within an acceptable cycling distance. But the M1 could provide a barrier for travel to and from the northeast and the development should therefore examine the opportunities to improve and enhance the existing links over the M1 bridge connecting with High Street in Collingtree and at M1 Junction 15.

3.84 There are no existing bus services operating by the SRFI site at 0600 hours and 2200 hours, which are key shift changes for the proposed development. Public transport accessibility is better during the day, with a travel time of less than 30 minutes to Northampton Town Centre. However, in line with the Northamptonshire Bus Strategy requirements, an hourly service will not be adequate to meet the needs of employees and make public transport an attractive alternative to the private car and therefore enhancements to the bus service are required. The nearest railway station is Northampton. The station can be accessed via cycle or a bus to the North Gate Bus Station and the railway station is within a 10 minutes' walk of the bus station. There is a traffic free/lightly trafficked cycle route to the station.

4.0 PROPOSED DEVELOPMENT

SRFI development

4.1 The proposed development comprises a Strategic Rail Freight Interchange. The SRFI would consist of 'warehousing and distribution' B8 use (Zone A on the **Parameters Plan**[1]), and the 'intermodal rail freight terminal' (Zone B on the **Parameters Plan**).

4.2 Zone A would take the form of large scale units that would support a combination of B8 uses, with ancillary buildings. The **Illustrative Masterplan**[11] summarises the gross internal area of each unit. As shown, B1 office use would comprise around 5% of the total area and is therefore ancillary to the predominant B8 use.

4.3 The **Parameters Plan** sets out a maximum area for the warehousing and distribution use at the development, at 5,037,510sqft (468,000sqm).

4.4 The development could therefore comprise up to 468,000sqm of B8 use. However, to provide some flexibility for future occupiers seeking mezzanine space, the **Parameters Plan** includes an allowance for a further 155,000sqm in the form of B8 mezzanine floor space use. For assessment purposes the maximum floor area, including the allowance for mezzanine floor space, is therefore used in this TA.

4.5 The **Parameters Plan** includes direct rail served warehouse units by means of dedicated rail connection to development zones A2a, A2b, A3 and A4.

4.6 The intermodal rail freight terminal and aggregates terminal would take the form of an independent facility and associated container storage provided in Zone B. The loading and unloading sidings and the associated pad would be able to accommodate trains of up to 775 metres in length, to allow the longest trains to be accommodated.

4.7 There would also be capability to provide a Rapid Rail Facility (RRF) as part of the intermodal rail freight terminal.

4.8 The RRF facility is a new concept to SRFI operations. It is envisaged as meeting a growing 21st century market demand for high speed lightweight logistics operations being

[11] DCO document 2.11

accommodated in passenger type rail vehicles adapted for lightweight freight use and capable of operating at passenger train speeds.

4.9 Container movements to the individual warehouse units on the site would either be direct to the individual warehouse unit (or plot) by rail, by means of an adjacent rail loading/unloading pad, or by delivery of the containers to the main loading/unloading terminal at the intermodal facility, with the containers then being transferred by HGV between the rail terminal and warehouse unit.

Operation

4.10 In keeping with most inland rail freight terminals, the rail freight terminal is likely to operate on a 24-hour basis from Monday to Friday, and until Saturday lunchtime. However, volume growth at the main ports could lead to an increase to 6 or 7 day operation in the future. All the B8 units are likely to operate on a 24-hour basis, seven days a week. The main shifts are therefore likely to be 0600-1400 hours, 1400-2200 hours and 2200-0600 hours, although there will be some variation depending on the individual occupier requirements. For example, some occupiers may operate a 12-hour shift, from 0700-1900 hours and 1900-0700 hours.

4.11 It is anticipated that it would take several years before the rail freight terminal at Northampton Gateway would operate at full capacity. The rail freight terminal will be operational upon the opening of the development and will have capacity to accommodate at least 4 trains per day. For the purposes of assessment, the opening year capacity is therefore assessed at 4 trains per day. However, to ensure a robust approach, maximum capacity of 16 trains per day to the Intermodal Terminal site has been assumed to occur within the assessment periods set for the future year transport modelling assessment scenarios.

4.12 Initially the loading and unloading of containers to and from the rail vehicles at the intermodal terminal would be by reach stacker, which could be replaced by gantry cranes as volumes and throughput at the rail terminal increased.

Rail access

4.13 The SRFI would connect with the Northampton Loop rail line. It will provide connections to both the southbound and northbound lines in both directions, which means that trains would be able to enter and leave the site towards either London or Northampton. Reference should be made to the Rail Operation Report[1] for further details of rail access.

Highway access and mitigation strategy

4.14 The proposed SRFI development would provide improvements to the highway network as part of the proposed highway mitigation strategy. Improvements to public transport services, and facilities for pedestrians and cyclists would also be provided and these are described at paragraphs 4.48 to 4.84.

4.15 Section 3.0 of this TA concludes that the constrained geometry of M1 Junction 15 and high traffic demand, particularly during peak times, means that the junction is often very heavily congested and an existing bottleneck for traffic using the A508 and A45. The initial assessment work presented in **Chapter 7.0** of this TA confirmed that existing congestion at M1 Junction 15 would worsen with background traffic growth and, without mitigation, the junction performance would deteriorate further with the addition of the development traffic.

4.16 The need for a significant and comprehensive improvement scheme at M1 Junction 15 was therefore identified as a requirement for the project. In addition, due to the existing conditions at Roade, with the A508 bisecting the village and the existing congestion issues at the mini-roundabout and the narrow railway bridge, it was determined that the increases in traffic passing through the village because of the development proposals would not be an acceptable impact. Therefore, in consultation with NCC, an early concept for the highway mitigation strategy was the inclusion of a Roade Bypass to take through-traffic, particularly HGVs, out of the village. It was considered that a Roade Bypass would also be important in drawing development and background traffic back onto the A508 and away from local rural routes that are used as an alternative to the A508 due to the constrained nature of the road as it passes through Roade.

4.17 The overall package of highway mitigation works evolved from this starting point. The assessment process is described at **Chapter 6.0** of this TA. It followed an iterative design and assessment methodology, using traditional assessment based on the observed traffic count data, strategic modelling using the NSTM2, and detailed transport modelling including VISSIM micro-simulation modelling. The latter identified the need for an improvement scheme at M1 Junction 15A.

4.18 A key finding, reported in **Chapter 8.0**, of the combined impact of the proposed improvement works at M1 Junction 15 and the Roade Bypass, is that existing traffic is forecast to be drawn back onto the SRN and principal road network, particularly the A508. This is a beneficial impact since these are the roads most suited for that traffic and there

is a consequential reduction in traffic on the surrounding local roads and some of the surrounding villages. However, to ensure that the A508 can accommodate the traffic increase, a series of improvements are identified along the road as part of the proposed A508 route upgrade.

4.19 The resulting overall highway mitigation strategy is shown diagrammatically at **drawing NGW-BWB-GEN-XX-SK-C-SK28-S1-P10** and comprises the following:

A508 SRFI access

- Construction of a new roundabout on the A508 Northampton Road to serve as the access to the SRFI, configured to require all departing HGVs to travel north to M1 Junction 15; and
- Dualling of the A508 between the new site access roundabout and M1 Junction 15.

Bypass Corridor

- Construction of a new Bypass west of Roade between the A508 Northampton Road to the north of Roade and the A508 Stratford Road to the south of Roade, including a four arm roundabout connecting the Bypass to Blisworth Road;

Highway mitigation works

- Significant enlargement and reconfiguration of M1 Junction 15;
- Widening of the A45 to the north of M1 Junction 15 and the signalisation of the Watering Lane junction;
- Alteration of M1 Junction 15A to provide an additional lane and signalisation on the A43 northbound approach, signal control and additional flared lane on the A43 eastbound approach, an additional lane on the A5123 southbound approach and circulatory carriageway widening;
- 7.5T environmental weight restrictions to complement existing restrictions at Watering Lane and Pury Road (with access permitted for loading):
  - throughout Roade;
  - along Knock Lane/Blisworth Road between Roade Bypass and Stoke Road;
  - along Blisworth Road (Courteenhall Road) between the A508 and High Street, including parts of Blisworth;
  - along the unnamed road between the A508 and Quinton;
  - throughout Stoke Bruerne and Shutlanger; and
  - Wootton and East Hunsbury, to the west of the A45, east of Towcester Road and south of the A5076.

- Improvements at key locations along the A508 as part of an 'A508 route upgrade'; comprising:
  - Blisworth Road (Courteenhall) junction improvement;
  - C26 Rookery Lane/Ashton Road junction improvement;
  - C85 Pury Road junction improvement;
  - C27 Stoke Road/Knock Lane junction improvement and additional widening to Knock Lane/Blisworth Road (although not on the A508, this is required as a result of changing traffic volumes on the A508); and
  - Provision of a pedestrian crossing at a bus stop and ghost island in Grafton Regis.

4.20 A financial contribution will also be provided to NCC for:

- improvement schemes at the A45 Queen Eleanor Interchange and at junctions along the A5076, extending between the A45 and A5123; and
- a Knock Lane and Blisworth Road maintenance and minor works fund, to be used in the event that the increased use of the roads should advance the need for maintenance or other remedial works.

4.21 The above strategy would be complemented by the Highways England A45 NGMS and SMP J13 to J16 schemes as described at paragraphs 2.54 to 2.64 of this TA, and as indicated diagrammatically on **drawing NGW-BWB-GEN-XX-SK-C-SK28-S1-P10**.

4.22 Further details regarding each component of the proposed highway mitigation measures are provided in the following sections. The scope of the design works to be submitted with the DCO application has been agreed with Transport Working Group, as set out in Technical Note 4 (**Appendix 9**). It should be noted that the Highway Plans, Access and Rights of Way Plans (ARoW Plans), Traffic Regulation Plans and Speed Limit Plans are not included in this TA, as they are separate DCO documents. Where relevant, reference to the relevant DCO document number is therefore provided.

A508 SRFI access

4.23 Access to the proposed development would be taken from a new roundabout on the A508 that runs alongside the eastern boundary to the SRFI site. The approximately 500 metres section of the A508 between the site access roundabout and M1 Junction 15 would be upgraded to provide a dual carriageway. This would comprise two lanes in the southbound direction and three lanes in the northbound direction. The general arrangement of the proposed site access junction is shown on DCO **Highway Plans 2.4B**.

4.24 An integral part of the access layout is the provision of a segregated left turn lane for traffic travelling northbound to M1 Junction 15. The roundabout will include a height barrier (within the private estate road) to prevent HGVs turning right at the roundabout, thereby requiring all HGVs departing the site to travel north on the A508 and access the wider highway network via M1 Junction 15.

4.25 This physical enforcement of the site access layout will be supported by the installation and use of Automatic Number Plate Recognition (ANPR) enforcement cameras on the site access arm of the roundabout and on the A508 to the south of the access roundabout. The cameras will record the number plates of all departing HGVs and these will be matched with the number plates of HGVs travelling southbound on the A508. HGV drivers found to be disregarding the HGV right turn ban, for example by U-turning at M1 Junction 15, will thus be identified and the relevant site occupier subject to an enforcement regime.

M1 Junction 15 and A45 major upgrade

4.26 The general arrangement for the M1 Junction 15 and the A45 major upgrade are shown on DCO **Highway Plans 2.4A and 2.4B**. The works consist of the following elements:

- Enlargement of both the northern and southern dumbell 'roundabouts';
- Realignment and widening on the A45 approach to the junction to provide five lanes;
- Signalising and widening of the Saxon Avenue approach to the junction;
- Longer section of three lanes on the M1 northbound off-slip, widening to five lanes at the stop line;
- Dualling of the A508 approach and exit, with five lanes and signal control provided for the A508 northbound approach to the junction;
- A cut-through for M1 northbound traffic to the A45;
- Widening on the M1 southbound off-slip to provide six lanes at the stop line;
- A45 northbound widened to provide three lanes from J15 to beyond C67 Watering Lane junction;
- 67 Watering Lane junction with the A45 signalised;
- Change to the speed limit on this section of the A45 to become 50mph;
- Removal of the northbound parking lay-by; and
- Removal of two bus stop lay-bys, with a replacement bus stop provided on the C67 Watering Lane.

4.27 The layout includes improved routes for pedestrians and cyclists travelling across the junction, who would be provided with traffic signal controlled facilities at each crossing location. Further details are provided at paragraphs 4.53.

4.28 The scheme has been developed with regard to the committed M1 J13 to J16 Smart Motorway Project (SMP), which is due to be constructed between June 2018 and March 2022.

4.29 The SRFI scheme needs to include for the eventuality that the SMP is not constructed or is materially delayed. In this eventuality the general arrangement for M1 Junction 15 as shown on DCO **Highway Plans 2.4T and 2.4U** would be provided in lieu of the scheme shown on the DCO **Highway Plans 2.4A and 2.4B**. If this were to be implemented, then, as with the proposed scheme which includes the SMP, the SRFI scheme would obtain the necessary detailed design approvals in accordance with the protective provisions within the DCO.

M1 Junction 15A improvement works

4.30 The VISSIM micro-simulation modelling presented at **Chapter 10.0** demonstrates that in the Future Year assessment scenarios without the proposed development existing congestion at M1 Junction 15A is forecast to lead to significant congestion at the junction, resulting in queues forming on the slips roads that would block back to the M1 mainline. The additional of the development traffic was shown to cause further reassignment of existing traffic onto alternate routes because of this congestion, potentially leading to impacts at other locations. Therefore, an improvement scheme is proposed at M1 Junction 15A.

4.31 The general arrangement for the proposed highway improvement scheme at M1 Junction 15A is as shown at DCO **Highway Plans 2.4F**. The improvement comprises alterations to both the southern and northern roundabouts:

- Southern roundabout:
  - Provision of an additional flared lane and signalisation of the A43 northbound approach;
  - Signalisation and provision of a short flare on the A43 eastbound approach; and
  - Circulatory carriageway widening.
- Northern roundabout:
  - Signalisation of the A43 northbound entry;

- Provision of an additional flared lane on the A5123 approach to the roundabout; and
- Circulatory carriageway widening.

A508 Roade Bypass

4.32 The A508 Roade Bypass proposal is for a 100kph design speed (i.e. the national speed limit) single carriageway road around the western side of the village, with foot and cycle provision along the length of the route, with tree planting, environmental bunding and general landscaping. The options for the proposed Bypass and the reasons for the selected route are discussed in Roade Bypass Options Report provided at **Appendix 20**, along with the reasons for the selected route. The general arrangement of the proposed scheme is shown on DCO **Highway Plans 2.4C and 2.4D**.

4.33 The proposals comprise:

- The construction of a new highway linking the A508 Northampton Road to the A508 Stratford Road;
- The provision of roundabout junctions between the Roade Bypass and the A508 Northampton Road, A508 Stratford Road and Blisworth Road (in Roade);
- Drainage swales and attenuation features;
- A bridge over the West Coast Main Line railway;
- An underpass for bridleway RZ1/KZ10;
- The alteration and diversion of other existing public rights of way;
- The construction of a shared use footway and cycleway; and
- Environmental mitigation bunds.

4.34 Passive provision has been made in design of the A508 Roade Bypass and roundabout junctions to not prejudice the future dualling of the route. This has been made through provision of the pedestrian/cycle route and bunding on the village side of the bypass, leaving it more open to the west, and through provision of roundabouts sized for dual carriageway approaches and exits.

A508 corridor - route upgrade

4.35 A beneficial outcome of the M1 Junction 15 & A45 major upgrade and providing the A508 Roade Bypass is that background traffic is drawn back onto the A508. Therefore, in addition to the Roade Bypass, mitigation works are proposed at key locations on the A508 corridor to ensure that the route operates satisfactorily and safely. The route upgrade comprises:

- Alteration to the A508/Blisworth Road (Courteenhall) T-junction to become a left-in left-out only junction the general arrangement of which is as shown in DCO **Highway Plans 2.4C**. This would include the relocation of the existing bus stop currently located to the south of Blisworth Road approximately 70 metres further south.

- Alterations to the C27 Stoke Road/Knock Lane priority T-junction to widen the carriageway and improve the highway drainage, and additional widening to Knock Lane/Blisworth Roade (Roade), the general arrangement being as shown in DCO **Highway Plans 2.4F**;

- A capacity and road safety improvement scheme at the A508/C26 Rookery Lane/C26 Ashton Road crossroads to provide a single lane dualling staggered crossroads, the general arrangement being as shown in DCO **Highway Plans 2.4E**;

- Alteration to the A508/C85 Pury Road ghost island T-junction to increase the storage area for traffic turning right from the A508, the general arrangement being as shown in DCO **Highway Plans 2.4F**; and

- A new pedestrian refuge on the A508 at Grafton Regis to assist pedestrians with crossing to the northbound bus stop, and provision of a right turn harbourage facility for northbound traffic from the A508 turning in to Church Lane, the general arrangement being as shown in **DCO Highway Plans 2.4F**.

Speed limits

4.36 To complement the changes in road layouts, some changes to the existing speed limits are proposed on the A45 and A508. The proposed changes are shown at the DCO **Speed Limit Plans 2.7A, 2.7B, 2.7C, and 2.7D**.

4.37 In general, the proposed changes to the speed limits will provide a 50mph speed limit on the A45 from the vicinity of the Grange Park merge, through to M1 Junction 15 and along the A508 as far as the Roade Bypass.

HGV routing strategy and environmental weight restrictions

4.38 Roxhill (Junction 15) Ltd recognise local sensitivities regarding the potential for the SRFI to increase HGV movements on the local roads surrounding the SRFI site. As described at paragraphs 4.23 to 4.25 the proposed site access on the A508 would be configured to

require all departing HGV traffic to travel north, supported by ANPR cameras and an enforcement regime to deter U-turning movements at M1 Junction 15.

4.39 This system would be operational 24 hours a day and would minimise development HGV impacts to the south of the site. During periods when the A508 southbound was required to function as a diversion route (see paragraph 3.29), it would be possible to temporarily lift the restrictions and allow HGV traffic to follow the diversion route without penalty. HGV right turn movements would be facilitated by raising the height restriction at the site access and no enforcement of the ANPR cameras would be made. However, this would only occur following notification from the highway authorities of an official diversion route using the A508 southbound.

4.40 The following 7.5T environmental weight restriction (with access permitted for loading), as shown on the DCO **Traffic Regulation Plans 2.6, 2.6A and 2.6B**, are proposed on the local roads to the south and north of the SRFI site:

- throughout Roade;
- along Knock Lane/Blisworth Road between Roade Bypass and Stoke Road;
- along Blisworth Road and Courteenhall Road between the A508 and High Street, including parts of Blisworth;
- along the unnamed road between the A508 and Quinton;
- throughout Stoke Bruerne and Shutlanger; and
- Wootton and East Hunsbury, to the west of the A45, east of Towcester Road and south of the A5076.

4.41 These measures will complement the existing environmental weight restrictions that are in place on Watering Lane and Pury Road, which in combination with the configuration of the SRFI access and ANPR camera enforcement, will restrict HGV through traffic from accessing unsuitable local roads, many of which pass through the surrounding villages. HGVs arriving at the SRFI from the south will be restricted to use the A508, including the new A508 Roade Bypass, and departing HGVs will be required to exit the SRFI site to the north via the A508 and M1 Junction 15. The proposed environmental weight restrictions in Wootton and East Hunsbury will restrict HGVs from passing through these residential areas.

Geometric Design Strategy Record (GDSR)

4.42 To comply with the scope of the design works agreed with the Transport Working Group in TN4 (**Appendix 9**), the detailed geometric design of the highway mitigation measures

have been advanced to a sufficient stage to confirm that they are implementable, with only matters of detail to be agreed in accordance with the protective provisions set out in the DCO.

4.43 The detailed geometry for the M1 Junction 15 and A45 major upgrade and M1 Junction 15A Improvement is presented within the GDSR1 report (**Appendix 28**).

4.44 The detailed geometry for the A508 Route Upgrade is presented within the GDSR2 report (**Appendix 29**).

Highway lighting and signage

4.45 A highway lighting strategy has been prepared for the relevant parts of the proposed highway mitigation measures.

4.46 The highway lighting strategy for the M1 Junction 15 and A45 major upgrade and A508 Roade Bypass is presented at Chapter 11 of the Environmental Statement.

4.47 A strategy for directional signage has been developed for both the SRN network and the A508. These strategies are presented Section 13 of the M1 Junction 15 and A45 major upgrade and M1 Junction 15A Improvement GDSR1 report (**Appendix 28**) for the SRN, and at Section 13 of the A508 Route Upgrade GDSR2 report (**Appendix 29**) for the A508.

Non-motorised user (NMU) access strategy

4.48 The walking and cycling strategies for the proposed development are shown on DCO **Highway Plans 2.4, 2.4A to 2.4F** and on the DCO **Access and Rights of Way Plans (ARoW), 2.3, 2.3A to 2.3E**, and the **Illustrative Masterplan**[11]. The proposed changes in relation to non-motorised users (pedestrian, cyclists and equestrians) are described in the following sections.

4.49 The proposed development will provide new walking and cycling infrastructure connecting the SRFI site with the existing networks in Collingtree, Northampton and Roade.

4.50 The SRFI access roundabout is shown on DCO **Highway Plans 2.4B** and DCO **ARoW Plans 2.3C**. The access would provide a controlled crossing for pedestrians on the A508 northern arm of the roundabout to facilitate access to the new southbound bus stop. A controlled crossing would be provided for pedestrians and cyclists on the segregated left turn exit lane of the SRFI site access arm, with uncontrolled crossings provided on the right turn exit and entry arm to the SRFI site. A shared use footway/cycleway would be

provided running around the roundabout and connecting into the site access. The footway/cycleway would extend to connect with the new northbound bus stops that is proposed to the south of the site access roundabout on the A508.

4.51 This new footway/cycleway would be extended alongside the west side of the A508 linking the site access roundabout and Roade and the proposed footway/cycleway facility to be provided alongside the western side of the A508 Roade Bypass. When taken together, the proposals would provide a new shared use footway/cycleway connecting Roade with the site and the existing Northampton footway/cycleway network to the north.

4.52 At the junction with the unnamed road to Quinton, a refuge would be provided on the A508 to assist cyclists wishing to cross to and from the unnamed road. This would provide a link with National Cycle Network (NCN) Route 6, which is accessible from Quinton.

4.53 As shown on DCO **Highway Plans 2.4B and 2.4C,** DCO **ARoW Plans 2.3C and 2.3B**, and the **Illustrative Masterplan**, a new shared use footway/cycleway is proposed to the northeast of the SRFI site. This would be provided along the western side of the dualled section of the A508 between the site access roundabout and M1 Junction 15. A second pedestrian and cycle access to the SRFI is proposed midway along this section of the A508, providing direct access to the main development spine road. The new footway/cycleway would connect with the existing footway/cycleway facilities at M1 Junction 15, which would be improved to provide traffic signal controlled facilities at each crossing location. A new shared use pedestrian and cyclist link is proposed from M1 Junction 15 linking with C67 Watering Lane to the north.

4.54 It is proposed to signalise the C67 Watering Lane junction with the A45, with pedestrian crossings to assist pedestrians and cyclists accessing the facility on the northern side of Watering Lane. In addition, an uncontrolled crossing is also proposed between the hotel and the footway on the northern side of Watering Lane.

4.55 Within the Northampton Gateway SRFI site, shared footway/cycleways would provide access to each of the warehouse development plots and Rail Terminal, as shown on the **Illustrative Masterplan**. Public footpaths KX17 and KX13 that cross the SRFI site would be diverted and extended to form a loop within the landscape bunding. Part of the diverted route would be upgraded to provide a cycle track(for use by pedestrians and cyclists) that would link the bridge over the M1 at Collingtree with the new facility adjacent to the A508 and the improved facilities at M1 Junction 15.

4.56 The cycle path would extend within the SRFI site to the south of the SRFI access roundabout, thereby providing cycle access to Zone A4 of the SRFI site. 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 WCML railway. The changes to the PRoW are shown on the DCO **ARoW Plans 2.3A to 2.3E** in conjunction with the **Illustrative Masterplan**[11].

4.57 To the northeast of the SRFI site, a cycle track (for use by pedestrians and cyclists) would connect the development to Collingtree, and the wider Northampton area, via the existing bridge over the M1. A private footway/cycleway would also connect directly from the bridge to the main spine road, providing direct access into the development from Collingtree and Northampton beyond. These proposals are shown on the **Illustrative Masterplan**[11] and on the DCO **ARoW Plans 2.3A and 2.3B**.

4.58 There are several PRoW, including footpaths and bridleways, in and around Roade. PRoW KZ30, KZ19, KZ2a, RZ3 and KZ10/RZ1 and RZ6 located on the western side of Roade would be affected by the proposed Roade Bypass as shown on the DCO **ARoW Plans 2.3D and 2.3E**. The scheme would maintain access and connections for pedestrians, cyclists and equestrians using these PRoW.

4.59 At grade crossings are proposed on all three arms of the Roade Bypass/A508 Northampton Road roundabout. As shown on DCO **Highway Plans 2.4D** and **ARoW Plans 2.3D**, new footways would be provided adjacent to the roundabout to maintain the footpath link between PRoW KZ30 and KZ19.

4.60 Further south along the Bypass, public footpath KZ2a, which runs to the west of the WCML railway, is proposed to be diverted. An uncontrolled crossing with refuge island is proposed to cross the carriageway and connect with the shared footway/cycleway on the eastern edge of the Roade Bypass.

4.61 A roundabout junction is proposed to connect Blisworth Road (in Roade) with the Roade Bypass. A shared use footway/cycleway would be provided around the northern arm of the Bypass, with an at grade crossing of the road. This would link with the proposed footway/cycleway provided along the eastern side of the Bypass, and ensure pedestrians and cyclists could continue to access Knock Lane.

4.62 The two-way AADT for the northern (busier) section of the bypass is approximately 23,239 vehicles. Under TA91/05 Table 6/1[12], this would mean that an at-grade crossing would be 'not normally appropriate'. It is therefore proposed to provide a central refuge island at both crossing points which would result in an at-grade crossing being assessed as 'potentially appropriate'. Given the predicted pedestrian flows for the crossings are low this is considered acceptable.

4.63 Further south along the Roade Bypass it is proposed to provide an underpass crossing for bridleway RZ1/KZ10 beneath the Bypass, this would link bridleway KZ10 with RZ1, as shown on DCO **ARoW Plans 2.3D**. As detailed in Section 9 of the GDSR2 (**Appendix 29**), an underpass is considered more appropriate than at grade crossing of the Roade Bypass, given the proximity of the bridleway to stables at Dovecote Farm and its known use by equestrians (see WCHAR1, **Appendix 18**).

4.64 A footway/cycleway link is also proposed between the Roade Bypass and the bridleways KZ10/RZ1. The proposed underpass layout and design is shown on **drawing NGW-BWB-SBR-R-DR-CB-0001-S4-P1** included within this TA. It would provide a 4m wide x 3.7m high underpass (3.8m minus 0.1m surfacing). This accords with guidance publicised by the British Horse Society[13] and also the DMRB.

4.65 The proposed Bypass crosses public footpath RZ3. An at grade uncontrolled crossing with refuge island is proposed to maintain the footpath in an east/west direction.

4.66 An at-grade roundabout is proposed to the south of Roade to connect Roade Bypass to the A508 Stratford Road. At grade crossings are proposed on the eastern and southern arms of the roundabout, as shown on DCO **ARoW Plans 2.3E**. On the western side of the A508, along the southern arm of the roundabout a footway/cycleway is proposed to link to bridleway RZ6.

4.67 The proposed scheme involves alteration to the A508/Blisworth Road (Courteenhall) T-junction to become a left-in left-out only junction. This would include the relocation of the existing bus stop currently located to the south of Courteenhall Road, approximately 70 metres further south. There is currently a footway which runs along the western edge of

[12] DMRB, Volume 5, Section 2, Part 4, TA 91/05 Provision for Non-Motorised Users
[13] http://www.bhs.org.uk/access-and-bridleways/free-leaflets-and-advice

the A508 from north to south past the junction, which would be upgraded to provide a shared use footway/cycleway as part of the new facility linking Roade with M1 Junction 15.

4.68 At Grafton Regis a new pedestrian refuge is proposed on the A508 to assist pedestrians with crossing the road to the northbound bus stop. Through Grafton Regis there is a footway on both sides of the A508, these are to be maintained.

4.69 The proposals have been subject to a Walking, Cycling & Horse-Riding Assessment and Review (WCHAR) in accordance with HD42/17[14]. The Assessment Report (WCHAR1) is provided at **Appendix 18** and the Review Report (WCHAR2) is provided at **Appendix 19**. Opportunities have been reviewed against the scheme proposals and have been addressed. Where necessary, changes to the scheme have been incorporated within the drawings accompanying the DCO submission.

Public Transport Strategy

4.70 Public transport will play an important role in providing access for staff coming to the site and the strategy for the development is described in detail in the Public Transport Strategy (PTS) report provided at **Appendix 2**.

4.71 The PTS includes the introduction of a new bus service specifically to serve the SRFI site, as well as building on the existing local bus network through provision of additional capacity and improved infrastructure. The PTS has emerged from discussion with the local bus operator (Stagecoach) and the public transport officers at NCC.

4.72 The focus of the strategy is:

- The development of a new bus service to/from the Northampton Gateway SRFI site to Northampton Town Centre and associated infrastructure; and
- New bus stops on the A508, giving access to the site for the 33/33a, X4 and X7 Services.

4.73 In addition to the above, the FTP (**Appendix 1**) proposes a Sustainable Transport Working Group for the site, led by the area-wide Travel Plan co-ordinator, and formed of key

[14] DMRB, Volume 5, Section 2, Part 5 HD 42/17 Walking, Cycling & Horse-riding Assessment and Review

stakeholders (including NCC, public transport operators, car share providers, Highways England etc.) and the Unit Travel Plan Coordinators. Their role will be to oversee the delivery of the Travel Plan, and Bus Strategy, and to review changes in priorities and promotions suggested by the area-wide Travel Plan Co-ordinator, depending on requirements. The Group would meet bi-annually and could develop ad-hoc working groups where specific needs arise at certain times.

4.74 Figure 7.1 of the PTS, extract shown at **Figure 4.1**, summarises the existing bus services and proposed public transport network.

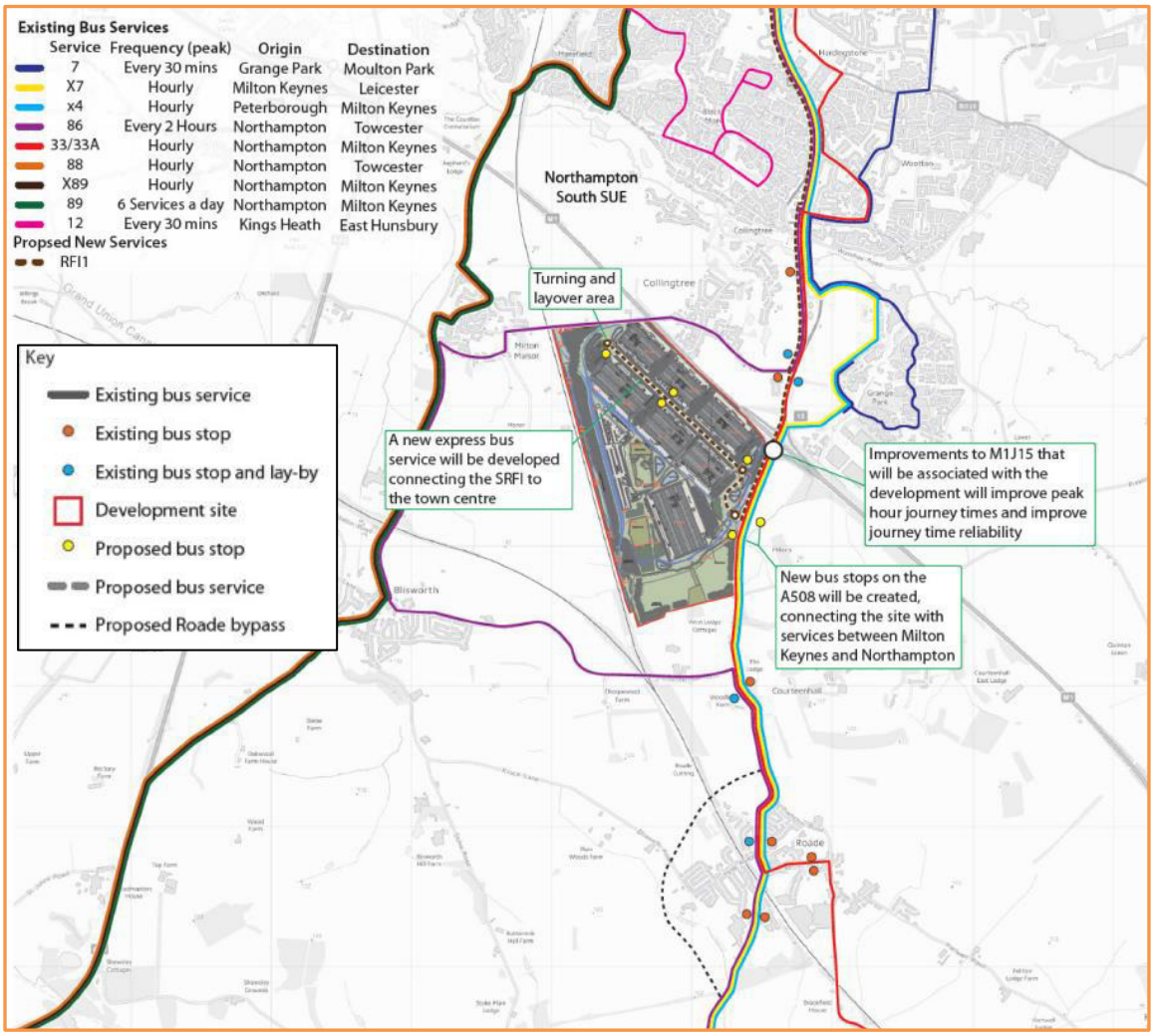


Figure 4.1: Existing and proposed public transport network

4.75 The bus service will be developed in line with NCC's adopted Bus Strategy, with regard to the 10% modal share target for bus. Given this, the trigger for providing a bus journey to the site is defined, based on NCC guidelines, as:

A bus journey will be provided between the site and Northampton Town Centre when 100 employees or more start or finish work within a 15 minute window (unless an existing journey is available within 30 minutes before the start of shift, or within 30 minutes of the end of shift)

4.76 The end occupier's shift patterns, employee numbers and site requirements are unknown at the planning stage, so the strategy needs to be flexible to actual need. Using the trigger ensures that the PTS can be responsive and can develop a bus network that is built around actual demand.

4.77 The Sustainable Transport Working Group would also seek to be pragmatic and proactive as the PTS is implemented, seeking opportunities to further develop the bus service wherever feasible. For example, the group should investigate opportunities to develop service frequencies in-between peaks or triggered journeys, to provide a more consistent and regular service throughout the day, when this can be provided at marginal short-term cost, or commercially.

4.78 The proposed bus service would offer direct access from the site to Northampton Town Centre. The most direct route would see the service following the A508/A45/A508 to The Drapery (or North Gate Bus Station). As well as serving the town centre, the service could also serve stops on London Road (A508). On the SRFI site, the service would utilise the SRRI access on the A508, penetrate the site serving the bus stops on the spine road and utilising the turning circle at the westerly end of the site. One-way travel time would likely be 20 minutes, and less in the off-peak. Given the journey length and the requirement of NCC's Bus Strategy to have a 30 minute frequency, a two vehicle operation could serve the site. Timetables would be developed depending on need, and examples are provided at Figure 8.3 and Figure 8.4 of the PTS.

4.79 Four bus stops will be included within the development site, one near the entrance to the site and another two bus stops along the estate road of the development. A final stop will be positioned at the far end of the internal estate road. The locations of bus stops are shown on Figure 7.2 of the PTS. These bus stops will ensure that employees commuting by bus will not have a long walk from the bus stop to their workplace. Layover facilities will be provided to allow the service to drop off passengers before the start of the shift and then pick up passengers finishing their shift.

4.80 Three phases to developing the strategy are proposed, enabling it to adapt to demand that arises as new occupiers arrive on site:

- Phase 1: Introduction of the new service at key shift time start/finishes from occupation of the first warehouse unit on the site. This is most likely to be around 0600-1400-2200 hours, however it will need to be flexible to the end user's requirements. Whatever the shift pattern, public transport would be in place from first occupation to make it an attractive and realistic alternative to the private car.

- Phase 2a: Development of the service through the day. Based in the predicted trip generation, it is likely that additional journeys will be required between 0800 and 0900 hours and from 1500 to 1800 hours from the third year of development. Given that these services fall at peak times there will be a requirement to add a new bus to the network in Northampton. Rather than provide buses just at these times, the Sustainable Transport Working Group should investigate the opportunity of continuing the bus service in between peaks, potentially at marginal costs, therefore beginning to develop a regular service for users throughout the day.

- Phase 2b: as the site develops, there will be the need to extend the operating times of the service from 0700 to 0900 hours and 1400 to 1900 hours.

- Phase 3: Increase the service frequency from hourly to half hourly as demand grows during the peak times, a second bus would be added to the timetable to offer half hourly frequency at certain times.

4.81 The initial bus service aimed at key shift change-over times would be in place from occupation of the first warehouse unit. Following this, the trigger points would be in line with NCC's adopted Public Transport Strategy recognising the 10% mode-share for public transport, as described at paragraph 4.75.

4.82 It is likely that triggers will be reached as the separate units are built and occupied, therefore the Sustainable Transport Working Group should aim to have services operating at the point of occupation to maximise attractiveness.

4.83 New bus stops and laybys would be created on the A508 either side of the new site access roundabout, as shown on DCO **Highway Plans 2.4C**, and a controlled crossing provided on the northern A508 arm of the roundabout to provide direct and safe access to the southbound bus stop. This would provide access to the X4 and X7 bus services that provided an hourly service in each direction between Milton Keynes and Northampton.

4.84 By offering regular and reliable services, at appropriate times, public transport becomes a viable alternative to the private car from the point of first occupation. In combination with promotion through the site Travel Plan, this will maximise the potential for use by employees as the site grows.

Travel Plan

4.85 Full details regarding objectives, targets, expected outcomes and implementation and management of the Travel Plan are provided at the FTP document (**Appendix 1**). This includes the appointment of a Travel Plan Co-ordinator (TPC) and a Sustainable Transport Working Group. The Travel Plan is secured via a mechanism in the DCO.

4.86 The Travel Plan aims to enhance and promote the sustainable travel facilities at the SRFI. It will focus upon providing information regarding walking, cycling, public transport and car sharing to the site, with the aim of making these forms of transport an attractive and affordable alternative (compared to travelling to the site by car).

4.87 The high level aims of the Travel Plan are to ensure that SRFI site is well served by sustainable travel from the first stage of development and that staff have a reasonable alternative to the private car for their journey to work.

4.88 Supporting objectives and SMART targets are put in place to help achieve this aim with a specific target of achieving a 20% reduction in single occupancy car journeys, from 92% in the baseline to 74% by 2031. Table 3 of the FTP sets the Travel Plan objectives, SMART targets and indicators, including the target modal split summarised at **Table 5.6**.

4.89 Travel Plan implementation will commence prior to the occupation of each commercial unit and continue for a total of 10 years.

4.90 Section 5 of the FTP details the management strategy for the Travel Plan. This includes the appointment of the area-wide TPC. The responsibilities of the area-wide TPC will be two-fold:

- they will strategically manage travel plan activity at a site-level, which includes liaising with the occupiers of the commercial units to gain their support and commitment to the Travel Plan; and
- they will monitor the success of the Travel Plan in achieving its aims. The TPC will provide summary reports to the Local Authority, key stakeholders, and partners annually.

4.91 It will be the future occupiers responsibility to develop a unit Travel Plan, based around the principles set out in the FTP. The unit Travel Plans should be prepared after employers have undertaken a baseline travel survey (within 3 months of initial occupation). Each occupier will be required to nominate a unit TPC to act as the lead contact within each business. This person will take responsibility for delivering site specific travel plan measures at each employment site, and will liaise with the area-wide TPC on issues which are relevant to the site as a whole.

4.92 Section 9 of the FTP sets out the funding of the specific incentives to cover the 10-year Travel Plan period. Table 5 of the FTP outlines the approximate cost of deliver the Travel plans over this period. Table 6 of the FTP provides a breakdown of how the funding will be spent per mode of transport, plus the cost of management, marketing and monitoring.

4.93 Table 7 of the FTP sets out the specific travel plan measures that will be implemented to achieve the FTP targets and meet the overall aim of encouraging employees to commute to the site by sustainable travel.

Road Safety Audit

4.94 The proposed scheme has been the subject of a Stage 1 Road Safety Audit in accordance with HD 19/15[15]. A copy of the Audit is provided at RSA1 report (**Appendix 30**).

4.95 All recommendations identified within the RSA1 report have been considered within the Reponse Report (**Appendix 31**). All recommendations have been addressed and, where necessary, changes to the scheme have been incorporated within the drawings accompanying the DCO.

Parking Provision

4.96 Parking will be provided at the SRFI site in accordance with NCC's parking standards[16], which for B8 development are as follows:

- Car – 1 space per 120sqm;
- Cycle –1 space per 500sqm for staff plus 1 space per 1000sqm for customers;

[15] DMRB, Volume 5, Section 2, Part 2, HD 19/15 Road Safety Audit
[16] Northamptonshire Parking Standard, September 2016

- Powered Two Wheeler (PTW) – 1 space plus 1 per 20 car spaces (for 1st 100 car spaces) then 1 space per 30 car spaces (over 100 car spaces);
- Disabled – 10% of total car parking spaces; and
- HGV – 1 loading bay per 800sqm plus waiting space at each bay for 1 additional vehicle of the largest type likely to be used.

4.97 The **Illustrative Masterplan**[11] demonstrates that compliance with these parking standards can be achieved for the illustrative scheme and is summarised at **Table 4.1** to provide context to the likely levels of parking.

Table 4.1: Parking provision (Illustrative Masterplan)

Unit No.	Total sqm	Proposed Parking						
		Car	Cycle	PTW	Accessible	HGV (loading)	HGV (waiting)	HGV (total)
1	49239	406	98	16	41	108	75	183
2	50632	422	101	17	42	90	71	161
3	63453	529	127	20	53	108	88	196
4	77109	643	154	24	65	54	110	164
5	64475	424	102	17	42	44	65	109
6	50911	538	129	21	53	69	86	155
7	110647	907	220	33	91	64	126	190
Freight Terminal	1858	40	0	0	2	0	75	75
Total	**468324**	**3909**	**931**	**148**	**389**	**537**	**696**	**1233**

4.98 Accessible (including disabled) car parking will be provided at 10% of the total car parking.

4.99 Additional HGV parking will also be provided in the form of a secure, dedicated HGV parking area of approximately 120 spaces. This will include driver welfare facilities to meet the needs of HGV drivers visiting the site or intermodal terminal.

4.100 As part of the FTP (**Appendix 1**) car sharing will be actively promoted and to encourage this 8% of the total car parking spaces would be marked for those car sharing. These spaces would be split between the units and located next to the entrance to the buildings.

4.101 To encourage the use of electric vehicles 5% of the total car parking spaces provided will include electric charging points, with passive provision provided for a further 5% of the total provision.

Development phasing and delivery of infrastructure works

4.102 The development would be phased over a number of years. The intermodal rail freight terminal and aggregates terminal would be operational prior to first occupation of the

proposed development, with capacity to serve up to 4 trains per day and mainline links to the Northampton Loop Line to both the north and south.

4.103 Roxhill (Junction 15) Ltd have indicated a potential for a first phase of warehousing development of around 1 million sqft (92,903sqm) warehousing and distribution units to open with up to 1/3 mezzanine space, with an anticipated build out period for the warehousing of five years, which equates to a build out rate of around 1 million sqft per year.

4.104 For the purposes of assessment an opening year of 2021 has been assumed for development, which would be supported by the following 'Phase 1' infrastructure:

- the SRFI access roundabout onto the A508, and the dualling of the A508 between the SRFI access and M1 Junction 15;
- the M1 Junction 15 and A45 major upgrade, including the signalisation of the C67 Watering Lane junction; and
- the first phase of the public transport strategy.

4.105 The suitably of the 'Phase 1' highway infrastructure to accommodate the traffic movements associated with the proposed development of around 1 million sqft and intermodal rail terminal and aggregate terminal operating at 4 trains per day is demonstrated at **Chapter 11.0** of this TA.

4.106 The opening of the Roade Bypass is the principal trigger for the remaining 'Phase 2' highway mitigation measures as it releases the bottleneck through Roade and is responsible for drawing traffic away from local routes and back onto the A508. This triggers the need for the A508 corridor route upgrade works.

4.107 The A508 Roade Bypass would be delivered as soon as is practicable and will be open within 2 years following first occupation of the site. However, due to the construction time necessary for the Bypass, and timing restrictions associated with installing the bridge over the WCML railway, it is would not be in place prior to the opening of the development.

4.108 **Table 4.2** therefore summarises the proposed phasing of the highway mitigation measures.

Table 4.2: Phasing of highway mitigation works

Mitigation phase	Stage of development	Highway mitigation measures
Phase 1	to be completed prior to the occupation of the first warehouse to be occupied	A508 SRFI access and dualling
		M1 Junction 15 & A45 major upgrade
		Environmental weight restrictions along the unnamed road between the A508 and Quinton
		Environmental weight restrictions in Wootton & East Hunsbury
Phase 2	to be completed within two years of occupation of the first warehouse to be occupied	A508 Roade Bypass
	to be completed prior to the opening to traffic of the A508 Roade Bypass	M1 Junction 15A
		Environmental weight restrictions throughout Roade
		Environmental weight restrictions along Blisworth Road
		Environmental weight restrictions along throughout Stoke Bruerne and Shutlanger
		A508 Blisworth Road junction improvement including footway/cycleway
		A508 / C26 Rookery Lane / C26 Ashton Road junction improvement
		A508 / C85 Pury Road junction improvement
		Knock Lane / Blisworth Road improvements
		A508 Grafton Regis improvements

5.0 TRIP GENERATION, TRIP DISTRIBUTION AND MODAL SPLIT

Introduction

5.1 This section of the TA describes the development trip types and summarises the forecast person trip generation and modal split for proposed Northampton Gateway SRFI. The methodology for calculating the vehicle trip distribution is also presented.

5.2 TN2 and TN2A (**Appendices 5 and 6**) set out the trip generation for the proposed development. TN3 (**Appendix 7**) sets out the HGV trip distribution and WSPTN1 (**Appendix 8**) sets of the light vehicle trip distribution for the proposed development. The modal split for the proposed development once operational is presented at the FTP (**Appendix 1**).

5.3 The following sections therefore provide a summary only and reference to relevant technical notes and FTP should be made for the full detail.

Modal shift from road freight to rail freight

5.4 The proposed SRFI, comprising both the warehousing and distribution units and the rail terminal, would generate the following type of trips:

1. Employee trips to and from work at both the B8 units and the rail terminal.
2. Visitor and delivery trips to both the B8 units and the rail terminal.
3. HGV traffic to and from the B8 units.
4. HGV traffic to and from the rail terminal.
5. HGV (or tug) traffic between the rail terminal and the B8 units.
6. Rail trips.

5.5 Only trip types 1 to 4 would use the off-site highway network. Trip type 5 would be on the internal road network, between the rail terminal and warehousing area. Trip type 6 would be on the rail network only, and the capacity of the rail network to accommodate these trips is demonstrated in the Rail Capacity Report[3].

5.6 This TA (and TN2 & TN2A) therefore focuses on trip types 1 to 4, as the TA is ultimately concerned with the impact of the development on the highway network. However, it is recognised that the number of HGVs generated (trip types 3, 4 and 5) will be related to the number of rail trips (trip type 6) and the size of the containers/type of goods. Furthermore, the amount of external HGV trips (trip types 3 and 4) will be related to the number of internal trips (type 5) and the operation and interaction between the rail terminal and the on-site warehousing.

5.7 The above dependencies and interactions are examined in detailed at Sections 5, 6 and 7 of TN2 and are included within the trip generation calculations. Once the rail facilities at Northampton Gateway are fully operational they could accommodate an average maximum through-put of around 1384 containers a day. This is a mode shift from road freight to rail freight equivalent to 969 HGV loads or 1,938 two-way HGV movements per day. **Appendix 34** includes an example of how this could translate to a modal shift from road freight to rail freight. The example demonstrates that, annually, the proposed development could remove over 92 million HGV miles per year from the highway network. This equates to over £50 million per year in monetised environmental benefits as calculated using the methodology set out in the DfT Guide to Mode Shift Revenue Support Scheme[17].

5.8 Taken together the above reduction in overall HGV mileage on the road network demonstrate how the proposed Northampton Gateway SRFI would comply with Government's objectives, as set out in the NPSNN, to achieve a modal shift from road freight to rail.

5.9 It is important to understand that many of the remaining HGV trips forecast to be generated by the proposed SRFI development would already be present on the highway network. This is because many of the HGV trips would be associated with the delivery of goods to meet existing business demand in the locality. Such HGV movements would already exist locally to those businesses, and the development of the SRFI would not add additional HGV traffic in these areas. Rather, it will provide a distribution hub, meaning that journey distances will be reduced, reducing overall HGV mileage on the road network as described above.

5.10 Nevertheless, to ensure that the full impact of the proposed development is modelled in the vicinity of the site, the transport modelling has assumed that all HGV trips would be new trips to the highway network. For the reasons given above, this results in a robust assessment of the traffic impacts as it means that there is some double counting of HGV traffic, particularly on the main links to and from the existing urban and industrial areas, for example Brackmills Industrial Estate, located off the A45.

[17] DfT Guide to Mode Shift Revenue Support (MSRS) Scheme, April 2015

Person trip generation

5.11 To quantify the impact of a proposed development on the local transport system, the number of person trips for all modes of transport that are likely to be generated by the development should be calculated. This section therefore describes the methodology for calculating the forecast trip generation for the Northampton Gateway SRFI.

5.12 Given the size and nature of the proposed development it is not appropriate to use the TRICS database to calculate the trip rates and traffic generation for the SRFI. This is because there are no comparative rail served sites within the database.

5.13 Therefore, reference was made to the work undertaken by the Applicant for the East Midlands Gateway SRFI at M1 Junction 24 in Leicestershire. The trip generation for the East Midlands Gateway SRFI was calculated using a first principles approach, combined with existing data from similar sites. The calculation methodology and resulting trip generations were agreed by the Transport Working Group for the East Midlands Gateway SRFI, which comprised Highways England and five local highway authorities. The trip generation was accepted by the Examining Authority as part of the DCO submission for the East Midlands Gateway scheme.

5.14 This approach was therefore adopted as a starting point for the Northampton Gateway SRFI development. A detailed description of the analysis process and the trip calculations themselves are given at TN2 (**Appendix 5**) for the full development, and at TN2A for the first phase of development in the opening year (**Appendix 6**). TN2 and TN2A were approved by the Transport Working Group on 23 February 2017 and 28 March 2017, respectively.

Fully operational development

5.15 The external person trip generations for the fully operational SRFI development as calculated in TN2 (**Appendix 5**) are summarised at **Table 5.1**.

Table 5.1: Off-site person trips

period	arrivals	departures	two-way
0800 to 0900 hrs	899	213	1,111
1700 to 1800 hrs	389	1,004	1,393
daily	8,850	8,807	17,657

5.16 **Table 5.2** summarises the total vehicle trip generations used in this TA, which are the agreed trip generations presented in TN2. **Table 5.3** provides a breakdown of the off-site light vehicle trips and **Table 5.4** provides the off-site HGV trips.

Table 5.2: Off-site vehicle trips (not accounting for Travel Plan)

period	arrivals	departures	two-way
0800 to 0900 hrs	838	206	1,044
1700 to 1800 hrs	369	934	1,303
daily	8,311	8,220	16,531

Table 5.3: Off-site light vehicle trips (not accounting for Travel Plan)

period	arrivals	departures	two-way
0800 to 0900 hrs	700	75	775
1700 to 1800 hrs	230	804	1,035
daily	6,191	6,095	12,286

Table 5.4: Off-site HGV trips

period	arrivals	departures	two-way
0800 to 0900 hrs	138	131	269
1700 to 1800 hrs	138	130	268
daily	2,120	2,125	4,245

5.17 The peak hour strategic modelling undertaken using the NSTM2 (see **Chapter 8.06.0**) uses a passenger car unit (pcu) ratio of 2.3 to 1 HGV to present HGV traffic and a pcu ratio of 1 to 1 to present light vehicle trips. Therefore, applying these factors to the vehicle trip generations give **Table 5.3** and **Table 5.4** gives the total off-site trip generation for the SRFI development in pcus shown in **Table 5.5**.

Table 5.5: Off-site vehicle trip generation in pcus (not accounting for Travel Plan)

period	arrivals	departures	two-way
0800 to 0900 hrs	1,017	376	1,393
1700 to 1800 hrs	547	1,103	1,650

5.18 It is important to note that the vehicle trip generations assume a single occupancy vehicle (SOV) rate of 92%. Whilst this provides a robust position for assessment of the highway capacity, it is not representative of the likely modal share that would be achieved by the

proposed development once the sustainable transport initiatives presented in the FTP (**Appendix 1**) and the PTS (**Appendix 2**) are considered.

5.19 The employee (light) vehicles trips presented at **Table 5.3** do not therefore represent the expected public transport, walking and cycling modal share, or the potential for car sharing that would reduce SOV trips to and from the SRFI.

5.20 Table 3 of the FTP (**Appendix 1**) sets out the modal shift targets for employees of the proposed development. The modal share targets have been extracted from the FTP and are given at **Table 5.6**.

Table 5.6 Modal share targets (from Table 3 of FTP)

mode	Year 1 baseline	Year 3 Interim Target	Year 5 Target
SOV	92%	85%	74%
car share	5%	7%	12%
public transport	3%	6%	10%
walking & cycling	0%	2%	4%

5.21 **Table 5.7** summarises the resulting off-site vehicle trip generation considering the above SOV modal share target for employees.

Table 5.7: Off-site vehicle trips accounting for the Travel Plan (Year 5 FTP target)

period	arrivals	departures	two-way
0800 to 0900 hrs	698	191	889
1700 to 1800 hrs	323	773	1,096
daily	7,073	7,043	14,116

5.22 The resulted expected two-way person trips (combined arrival and departure) by transport mode based on the 5 year FTP targets are summarised at **Table 5.8**. HGV trips are not subject to modal share targets as the purpose of a HGV movement is the transportation of its cargo. Therefore, HGV driver trips do not undergo modal shift.

Table 5.8: Two-way person trips by mode (Year 5 FTP target)

mode	AM peak hour	PM peak hour	Daily
SOV (lights)	620	828	9,871
car share	101	135	1,609
public transport	84	113	1,341
walking & cycling	34	45	536

5.23 Notwithstanding the above, the Transport Working Group requested that the assessment of the highway impacts be undertaken using the vehicle trip generations present at **Table 5.2**, without considering the effect of the FTP or PTS. Therefore, whilst this approach was undertaken in accordance with the requirements of the Transport Working Group, it presents a worst case, as it does not include for the required 20% reduction in SOV journeys to and from the SRFI site that is the target identified in the FTP. With the PTS and Travel Plan operational, trip generation would be reduced in comparison to the worse-case scenario assessed and the residual traffic impacts presented in **Chapters 8.0 and 10.0** would also be reduced.

Opening year

5.24 The external person trip generations for the opening year as detailed in TN2A (**Appendix 6**) are summarised at **Table 5.9**.

Table 5.9: Off-site person trips opening year

period	arrivals	departures	two-way
0800 to 0900 hrs	186	49	235
1700 to 1800 hrs	85	207	292
daily	1,858	1,850	3,708

5.25 Total vehicle trip generations in the opening year are summarised at **Table 5.10**, which are the agreed trip generations presented in TN2A. **Table 5.11** provides a breakdown of the off-site light vehicle trips and **Table 5.12** provides the off-site HGV trips.

Table 5.10: Off-site vehicle trips in opening year

period	arrivals	departures	two-way
0800 to 0900 hrs	174	48	221
1700 to 1800 hrs	81	193	274
daily	1,751	1,732	3,483

Table 5.11: Off-site light vehicle trips in opening year

period	arrivals	departures	two-way
0800 to 0900 hrs	138	15	154
1700 to 1800 hrs	46	160	206
daily	1,228	1,209	2,437

Table 5.12: Off-site HGV trips in opening year

period	arrivals	departures	two-way
0800 to 0900 hrs	35	33	67
1700 to 1800 hrs	35	33	68
daily	81	193	274

5.26 The total off-site peak hour trip generations for the SRFI development in pcus in the opening year is shown in **Table 5.13**.

Table 5.13: Peak hour off-site vehicle trip generation in pcus in opening year

period	arrivals	departures	two-way
0800 to 0900 hrs	219	91	310
1700 to 1800 hrs	126	236	362

Vehicle Trip distribution

Light vehicle trips

5.27 In advance of the NSTM2 being available for use, the light vehicle trip distribution (effectively the employee trip distribution) was estimated based on outputs provided by WSP from the NSTM (i.e. the original model prior to its recent update). This assessment is provided at **Appendix 38** and was used in the initial highway impact assessment work that is presented in **Chapter 7.0** of this TA. It forecast that approximately 90% of light trips would travel to and from the north of the SRFI via M1 Junction 15.

5.28 Once available for use, the NSTM2 was used to calculate the light vehicle trip distribution, based on the attractiveness of the proposed development. The attractiveness of the proposed SRFI diminishes as the distance from the site increases. However, the distributed produced by the NSTM2 show a significant shortfall in trips using the M1 south. This was investigated by WSP and a correction was applied to the distribution based on the 2011 Journey to Work (JTW) Census data thereby improving upon the M1 south distribution. The JTW data was benchmarked using nearby large-scale employment sites. This is explained in WSPTN1 (**Appendix 8**).

5.29 The resulting light vehicle trip distribution is summarised at Table 7 of WSPTN1 for trips to (origin) and from (destination) the SRFI site. Appling the respective arrival and departure trip weighting to these distributions gives the resulted overall average peak hour distribution for the light vehicle trips presented at **Table 5.14**. WSPTN1 and the resultant distribution was approved by the Transport Working Group.

Table 5.14: Representation of light vehicle trip distribution

	A45	M1 South	M1 North	A508 South
Average peak	45.1%	20.5%	19.5%	15.1%

HGV trips

5.30 The distribution of HGV traffic was derived from the detailed assessment undertaken in TN3 (**Appendix 7**).

5.31 The distribution of regional HGV trips was based on workplace population Census data and covers a 25-mile catchment area. The distribution of HGV trips on the SRN (i.e. national level) is based on the proportion of HGVs trips associated with the top 10 busiest ports.

5.32 The resulting HGV distribution was sense checked using the traffic count data for M1 Junction 15 and 15A. The HGV distribution was found to compare well to existing traffic data and was therefore appropriate for assessment purposes. TN3 was approved by the Transport Working Group on 23 February 2017.

5.33 The agreed HGV trip distribution for the proposed development was coded into the NSTM2 by WSP.

6.0 TRANSPORT MODELLING METHODOLOGY AND STUDY AREA

Assessment methodology

6.1 The transport modelling for the Northampton Gateway SRFI scheme has comprised the following assessment methodology:

i) 'manual' assessment to identify development traffic impacts and establish the initial highway mitigation proposals in response to those impacts ready for testing in the NSTM2;

ii) strategic transport modelling using the NSTM2, to allow traffic reassignment effects associated with the development and the highway mitigation proposals to be understood, and impacts warranting further detailed assessment to be identified;

iii) detailed junction modelling, using traffic data from the NSTM2, to develop, refine and confirm the suitability of the proposed highway mitigation measures for incorporation back into the NSTM2; and

iv) detailed modelling, using micro-simulation and other industry standard assessment tools, of the study area junctions to demonstrate satisfactory operation of the highway network and confirm the acceptability of the residual highway impacts using the final NSTM2 outputs.

6.2 The stage i) work is presented at **Chapter 7.0** of this TA.

6.3 The stage ii) modelling found that the highway mitigation proposals resulted in significant background traffic reassignment, particularly along the A508. This is because the proposed improvements provided by the SRFI development provide additional capacity at existing bottlenecks on the highway network, which once released is forecast to positively alter the pattern of existing traffic flows surrounding the SRFI. It was therefore important that, prior to assessment of the residual highway impacts of the scheme on the wider study area, all re-assignment effects were appropriately represented in the NSTM2 modelling.

6.4 This led to an iterative impact and assessment process using the NSTM2, resulting in several iterations of stages ii) and iii), using progressive NSTM2 traffic flows sets. The results of this assessment work are presented at **Chapter 8.0** of this TA.

6.5 The stage iv) assessment work, confirming the acceptability of the proposed highway mitigation using the final assessment traffic flows (see **Chapter 9.0**), is presented at **Chapter 10.0** of this TA.

Assessment scenarios

6.6 It was agreed with the Transport Working Group that the following assessment years be examined:

- 2021 opening year; and
- 2031 future assessment year, consistent with the end of the Local Plan period.

6.7 Two scenarios were required for the 2021 opening year:

- DfT Circular 02/2013[18] compliant scenario for assessment of the traffic impacts on the SRN; and
- opening year scenario, for assessment of the environmental impacts of the proposed development in the opening year.

6.8 In accordance with DfT Circular 02/2013 it was agreed with Highways England that the 2031 future assessment year is also the 'forward planning' assessment year for the SRN.

6.9 The environmental assessment 'opening year' scenario is used within this TA to confirm that that proposed highway works that would accompany the first phase of the development are suitable. This assessment work is presented at **Chapter 11.0**.

6.10 To examine the traffic impacts of the proposed development and the effectiveness of the highway mitigation in the above assessment years the following scenarios are considered:

- Reference Case – background traffic flows without the proposed Northampton Gateway SRFI;
- Development Case no highway mitigation – Reference Case + proposed Northampton Gateway SRFI; and

[18] See paragraph 2.23

- Development Case with highway mitigation – Reference Case + proposed Northampton Gateway SRFI + proposed highway mitigation.

6.11 By considering the differences between the above three scenarios the impact of the proposed development traffic on the highway network can be determined along with the corresponding study area and need for highway mitigation measures. The impact and effectiveness of the proposed highway mitigation can then be confirmed.

6.12 A summary of the resulting Reference Case scenarios is provided at **Table 6.1**. A summary of the resulting Development Case scenarios, without and with highway mitigation is given at **Table 6.2** and **Table 6.3**, respectively.

Table 6.1: Reference Case assessment scenarios

	ID	scenario	year	reference case parameters	development and highway mitigation parameters	to be used for
Reference Case	B1	Opening Year	2021	all committed and allocated development and infrastructure in place by 2021	n/a	background traffic flows in opening year for assessment of environmental effects
	C1	DfT 02/2013 Circular compliant Year	2021	100% committed development and infrastructure, no allocated development	n/a	background traffic flows for assessment of the requirement for highway mitigation on the SRN
	D1	Future Year	2031	all committed and allocated development and infrastructure in place by 2031	n/a	background traffic flows for assessment of the requirement for highway mitigation on the County road network; assessment of environmental effects in the future year; and the forward planning year for the SRN

Table 6.2: Development Case no highway mitigation assessment scenarios

	ID	scenario	year	reference case parameters	development and highway mitigation parameters	to be used for
Development Case no highway mitigation	E1	Opening Year	2021	all committed and allocated development and infrastructure in place by 2021	intermodal rail terminal operating at up to 4 trains per day + 1 million sqft of warehousing with up to 1/3 mezzanine space; SRFI access including A508 dualling between access and M1J15; and no off-site highway improvements	opening year traffic flows for assessment of the requirement for highway mitigation for first phase of development
	F1	DfT 02/2013 Circular compliant Year	2021	100% committed development and infrastructure, no allocated development	100% of development; SRFI access including A508 dualling between access and M1J15; and no off-site highway improvements	assessment of the requirement for highway mitigation on the SRN
	G1	Future Year	2031	all committed and allocated development and infrastructure in place by 2031	100% of development; SRFI access including A508 dualling between access and M1J15; and no off-site highway improvements	assessment of the requirement for highway mitigation on County roads; and assessment of development traffic impacts in the forward planning year on the SRN

Table 6.3: Development Case with highway mitigation assessment scenarios

	ID	scenario	year	reference case parameters	development and highway mitigation parameters	to be used for
Development Case with highway mitigation	H1	Opening Year	2021	all committed and allocated development and infrastructure in place by 2021	intermodal rail terminal operating at up to 4 trains per day + 1 million sqft of warehousing with up to 1/3 mezzanine space; SRFI access including A508 dualling between access and M1J15; and M1 Junction 15 & A45 major upgrade	opening year traffic flows for assessment of environmental effects
	I1	DfT 02/2013 Circular compliant Year	2021	100% committed development and infrastructure, no allocated development	100% of development; SRFI access including A508 dualling between access and M1J15; and all highway mitigation	total traffic flows for design of SRN highway mitigation, where a requirement for mitigation is identified; and assessment of residual impacts on the SRN once any reassignment effects are considered
	J1	Future Year	2031	all committed and allocated development and infrastructure in place by 2031	100% of development; SRFI access including A508 dualling between access and M1J15; and all highway mitigation	future year traffic flows for assessment of environmental effects; design of County road highway mitigation, where a requirement for mitigation is identified; and assessment of residual impacts on County road network once any reassignment effects are considered

Study area

6.13 The evolution of the highway mitigation strategy has followed an iterative process of impact assessment, mitigation design using detailed junction modelling tools, and the re-evaluation of the effects of the proposed highway mitigation on overall network performance by modelling the proposed mitigation within the NSTM2. This was undertaken based on assessment of the forecast morning and evening peak hour traffic conditions in the 2031 future year scenario.

6.14 2031 is the future assessment year required by NCC for the County Road network and the forward planning year required by Highways England for the SRN. Use of the 2031 future year scenario is a robust position to adopt for the assessment of the highway impact, as it includes the greater traffic growth and therefore represents when the highway network capacity is lowest and when the development has the greatest potential to impact upon its operation.

6.15 An iterative assessment process was required as it was found that progressive elements of the proposed highway mitigation resulted in background traffic reassignment of sufficient magnitude to require representing in the NSTM2. This is because the proposed improvements release existing bottlenecks on the highway network. It was important that all reassignment effects were appropriately represented in the NSTM2 at each incremental stage in the evolution of the highway mitigation, and prior to the residual highway impacts of the scheme on the wider study area being assessed.

6.16 Therefore, areas local to the development, where impacts would be greatest were first considered:

- the SRFI access;
- M1 Junction 15, and
- the village of Roade;

6.17 Then, as traffic reassignment effects were understood and modelled in the NSTM2, areas moving outwards were assessed:

- M1 Junction 15A;
- the A508 corridor;
- impacts north of the M1 including the A45; and
- the A5076 corridor.

6.18 The iterative transport modelling assessment process has resulted in a significant body of work that was presented as Technical Notes which have been considered by, and agreed with, the Transport Working Group, as follows:

- TN5 - M1 Junction 15 (including A45 improvements) (**Appendix 10**)
- Roade Bypass Options Report (**Appendix 20**)
- TN6 - M1 Junction 15A (**Appendix 11**)
- TN7 - A45 Queen Eleanor Gyratory and Wootton Interchange (**Appendix 12**)
- TN8 - A508 Corridor (**Appendix 13**)
- TN9 - Layby Surveys (**Appendix 14**)
- TN10 - Impacts north of the M1 including the A45 corridor (**Appendix 15**)
- TN10 Addendum - Impacts north of the M1 including the A45 corridor (**Appendix 16**)
- TN11 - Impacts at junctions along the A5076 corridor (**Appendix 17**).

6.19 Collectively, this body of work has identified the study area comprising the following 27 junctions (note that where applicable the letter shown in brackets is the junction reference used in TN10 and TN10A). **Figure 6.1** shows the location of the study area junctions.

1. M1 Junction 15 (M)
2. M1 Junction 15A (N)
3. A508/SRFI access
4. A45/C67 Watering Lane priority-controlled T-junction
5. A508/Blisworth Road (Courteenhall) priority-controlled T-junction
6. A508 Northampton Road/Roade Bypass roundabout
7. Blisworth Road/Knock Lane/Roade Bypass roundabout
8. A508 Stratford Road/Roade Bypass roundabout
9. A508/C26 Rookery Lane/C26 Ashton Road staggered crossroads
10. A508/C85 Pury Road ghost island priority-controlled T-junction
11. C27 Stoke Road/Knock Lane priority-controlled T-junction
12. A45 Wootton Interchange (L)
13. A45 Queen Eleanor Interchange (A)
14. A45 Brackmills Interchange (B)
15. A45 Barnes Meadow Interchange (C)
16. A45/A43 Lumbertubs Interchange (D)
17. A45 Great Billing Interchange (E)
18. A5076 Danes Camp Way/A5076 Mere Way/Towcester Road gyratory (F)

19. A5076 Danes Camp Way/Hunsbury Hill Avenue/Hunsbarrow Road/Hunsbury Hill Road roundabout (G)
20. A5076 Danes Camp way/A5123 Upton Valley Way/A5076 Upton Way gyratory (H)
21. A4500 Weedon Road/A5076 Upton Valley Way/Tollgate road gyratory (I)
22. A5123 St Peters Way/A508 Bridge Street/A5123 Victoria Promenade gyratory (K)
23. A5123 St Peters Way/A4500 St Peters Way/A508 Horseshoe Street/ /Towcester Road gyratory (J)
24. A508/Northampton Road (in Roade)
25. A508/Hyde Road (in Roade)
26. A508/High Street mini roundabout (in Roade)
27. High Street/Courteenhall Road/Northampton Road (in Blisworth)

6.20 In addition, the forecast traffic flow changes on Knock Lane and Blisworth Road (Roade), and on the A508 adjacent to Grafton Regis are also considered.

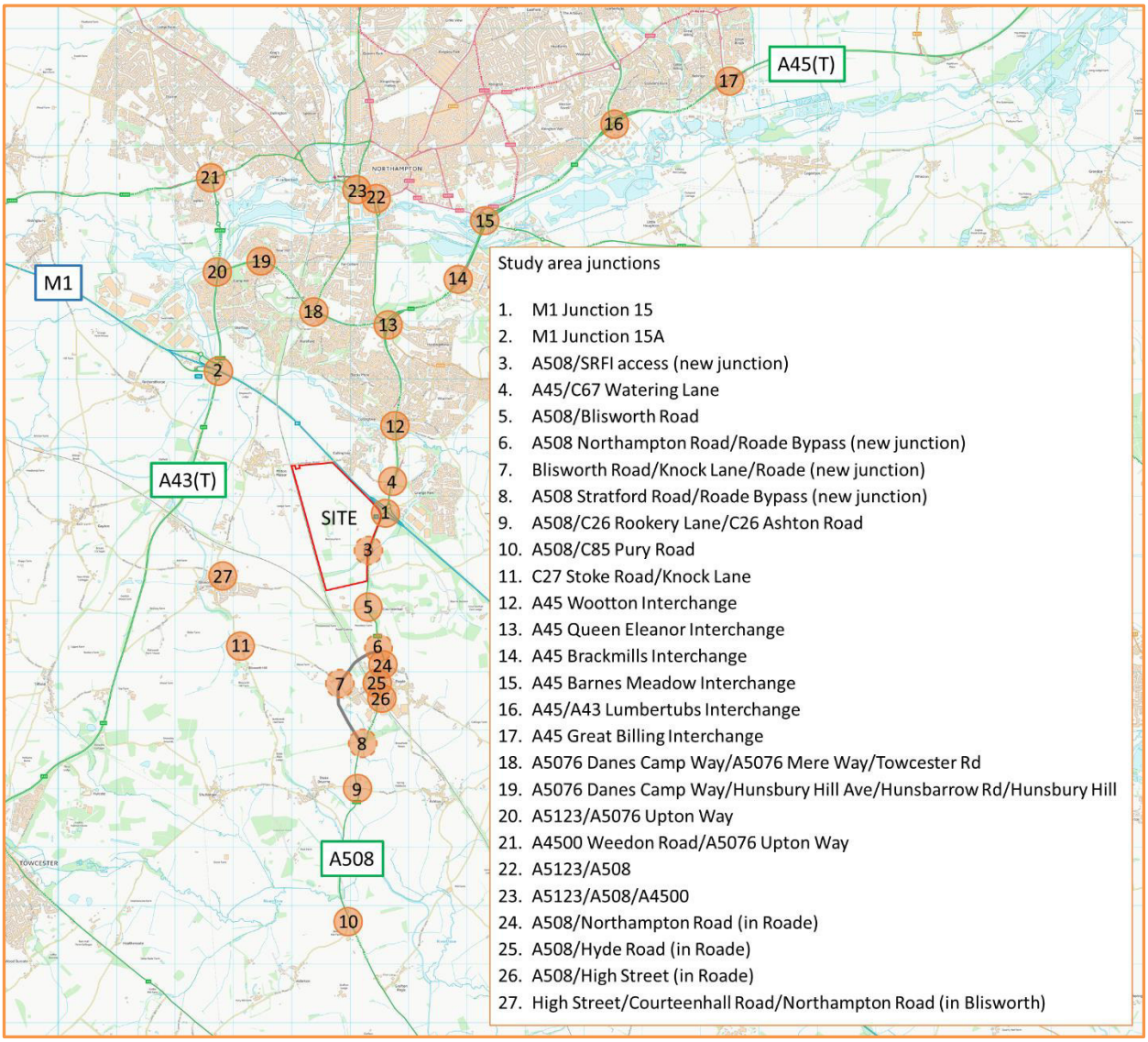


Figure 6.1: Northampton Gateway SRFI identified study area

7.0 ESTABLISHING THE HIGHWAY MITIGATION STRATEGY

Introduction

7.1 At the Transport Working Group meeting of 7 July 2016, NCC confirmed that they required the transport impacts of the proposed development be assessed using the NSTM. Highways England also confirmed this approach. However, at that time the NSTM was undergoing a major model update (to become NSTM2). NCC also advised that the NSTM would require further calibration and re-validation to the areas to the south of the M1 to ensure that it was fit for the purposes of assessing the proposed development impact. The NSTM was not available for use at this time, and the timescales for the conclusion of the necessary model update and additional calibration and re-validation work would mean that the NSTM2 would not be available until at least Q2 of 2017.

7.2 It was agreed with the Transport Working Group that the impact of the development would be assessed using the NSTM2, and that this assessment would await that updated and re-validated model. However, in advance of the NSTM2 being available for use, it was also agreed that initial work to assess and quantify the transport impacts of the scheme be undertaken using standard (manual) assessment methodologies, based on forecast traffic flow data derived from traffic counts and development trip generations and distributions agreed with the Transport Working Group (TN1, **Appendix 4**). The objective of this approach was to allow the initial highway mitigation proposals to be developed ready for testing once the NSTM2 was available for use.

7.3 The development impacts were therefore initially modelled using traditional assessment techniques based upon:

- the agreed trip generation (TN2);
- the initial estimate of the light vehicle trip distribution obtained from the NSTM;
- the agreed HGV trip distribution (TN3); and
- traffic counts growth to assessment year's levels using TEMPro.

7.4 The following sections of this TA present the initial development impact assessment work undertaken with regard to:

- the A508 between the SRFI access and M1 Junction 15;
- M1 Junction 15; and
- A508 through Roade.

A508 between the SRFI access and M1 Junction 15

7.5 As described at paragraph 4.23 vehicle access to the SRFI site would be provided from the A508 via a new roundabout junction. The initial assessment work identified that approximately 90%[19] [20] of development traffic would seek to access the development to and from the north of the site access, via M1 Junction 15. Therefore, ensuring good access to the M1 via the A508 is a priority for the proposed development.

7.6 Based on the robust vehicle trip generation given at **Table 5.3**, **Table 7.1** summarises the additional development traffic movements that it was calculated the A508 between the site access and M1 Junction 15 could be required to accommodate, based on the initial vehicle trip distribution assessment.

Table 7.1: Initial assessment of peak hour development traffic demand on the A508 between SRFI access and M1 Junction 15

development traffic	total flow in vehicles (of which HGVs)	
	A508 northbound	A508 southbound
AM peak 0800 to 0900 hrs	185 (118)	754 (124)
PM peak 1700 to 1800 hrs	841 (117)	332 (124)

7.7 The 2014 observed traffic flows on the A508 to the south of M1 Junction 15[21] recorded that the A508 carried the traffic flows shown in **Table 7.2** during the morning and evening weekday peak hours. The table includes all heaving duty vehicles (HDV), which include HGVs and buses. As noted at paragraph 3.13, morning and evening peak hour queues of 240 metres and 420 metres, respectively, were observed on the northbound approach to M1 Junction 15. Therefore, the actual northbound traffic flow demand will exceed the observed flow as some traffic will have been held in the queue and hence will not be represented in **Table 7.2**.

[19] See paragraph 5.27 and **Appendix 38**
[20] TN3 Figure 4, page 9 **Appendix 7**
[21] Weekday Average peak hour flow from ATC on A508 undertaken between 1 and 7 May 2014, **Appendix 37**.

Table 7.2: Observed 2014 peak hour traffic flows on A508 between SRFI access and M1 Junction 15

2014 observed traffic	total flow in vehicles (of which HDVs)	
	A508 northbound	A508 southbound
AM peak 0800 to 0900 hrs	697 (61)	788 (47)
PM peak 1700 to 1800 hrs	833 (69)	854 (31)

7.8 The 2014 observed traffic flows were factored to 2031 assessment year levels using TEMPro (version 6.2, dataset 62), as adjusted by the National Traffic Modal. The TEMPro output is provided at **Appendix 39** and the growth rates were as follows:

- 2014 to 2031 (AM peak) 1.32
- 2014 to 2031 (PM peak) 1.33

7.9 The resultant estimated 2031 background traffic flows on the A508 to the south of M1 Junction 15 are provided at **Table 7.3**.

Table 7.3: Estimated 2031 background traffic flows on the A508 to south of M1 Junction 15

2031 background traffic	total flow in vehicles (of which HDVs)	
	A508 northbound	A508 southbound
AM peak 0800 to 0900 hrs	912 (81)	1,040 (62)
PM peak 1700 to 1800 hrs	1,108 (92)	1,136 (41)

7.10 The development traffic flows in **Table 7.1** and the 2031 background traffic flows in **Table 7.3** were added together (**Table 7.4**) to provide an estimate of the traffic demand on the A508 between the site access and M1 Junction 15 in the 2031 assessment year.

Table 7.4: Estimated total traffic demand on the A508 between the SRFI access and M1 Junction 15 in 2031 assessment year with the development in place

2031 total traffic	total flow in vehicles (of which HDVs)	
	A508 northbound	A508 southbound
AM peak 0800 to 0900 hrs	1,097 (199)	1,794 (186)
PM peak 1700 to 1800 hrs	1,949 (209)	1,468 (165)

7.11 A single carriageway principal 'A' road such as the A508 typically has a link capacity of 1,600 vehicles in each direction. Based on the assessment summarised at **Table 7.4** it was established that traffic flow demand on the A508 between the site access and the M1

Junction 15 would exceed the existing southbound link capacity in the morning peak hour (when there is a high arrival flow to the development), and northbound during the evening peak hour (when there is a high departure flow from the development).

7.12 Therefore, notwithstanding any other highway mitigation requirements, dualling of the approximately 500 metres section of the A508 between M1 Junction 15 and the SRFI access roundabout was identified as a requirement to ensure appropriate access for the scheme. The SRFI access and dualling of this section of the A508 was therefore included as part of the SRFI site proposals, and in all NSTM2 scenarios, as part of the site access strategy. To facilitate the segregated left turn from the site access roundabout, the design provides three lanes northbound, and two lanes southbound between the site access and M1 Junction 15.

7.13 This requirement for dualling was later confirmed by the strategic transport modelling using the NSTM2. **Table 7.5** summarises the NSTM2 2031 total traffic flows in the G1 scenario, with the development in place but without any highway mitigation (other than the site access roundabout and A508 dualling). **Table 7.6** summarises the NSTM2 2031 total traffic flows in the J1d scenario, with the development in place and all proposed mitigation measures.

Table 7.5: 2031 Development Case no highway mitigation (NSTM2 scenario G1) total traffic flows on the A508 between site access and M1 Junction 15

2031 NSTM2 Development Case no highway mitigation (Scenario G1)	total flow in vehicles (of which HDVs)	
	A508 northbound	A508 southbound
AM peak 0800 to 0900 hrs	864 (143)	1,292 (114)
PM peak 1700 to 1800 hrs	1,555 (131)	1,175 (155)

Table 7.6: 2031 Development Case with highway mitigation (NSTM2 scenario J1d) total traffic flows on the A508 between site access and M1 Junction 15

2031 NSTM2 Development Case with highway mitigation (Scenario J1d)	total flow in vehicles (of which HDVs)	
	A508 northbound	A508 southbound
AM peak 0800 to 0900 hrs	1,383 (182)	2,033 (170)
PM peak 1700 to 1800 hrs	2,115 (173)	1,767 (175)

7.14 In the 2031 development case no highway mitigation scenario (G1), **Table 7.5** shows that the total traffic flows on the A508 between the site access and M1 Junction 15 are lower

than the estimated demand given at **Table 7.4**. As discussed in **Chapter 8.0**, this is a result of background traffic and some development traffic re-assigning away from the A508 corridor due to congestion at the unmitigated M1 Junction 15.

7.15 In the 2031 development case with all highway mitigation measures scenario (J1d), **Table 7.6** demonstrates that the total traffic flows on the A508 between the site access and M1 Junction 15 are forecast to exceed the estimated demand given at **Table 7.4**. As discussed in **Chapter 8.0**, this is an indicator of the beneficial impact of the combined highway improvement measures, which result in background traffic being drawn back onto the SRN and principal road network, particularly the A508.

M1 Junction 15 & A45 major upgrade

7.16 As described in **Chapter 3.0**, M1 Junction 15 is acknowledged to currently operate over capacity during the morning and evening peak hour periods with queues forming on the A45 and A508.

7.17 This was also informed by the findings of a withdrawn planning application in 2014 on part of the site for a development of just under 2.7 million sqft of B8 warehouse and distribution uses. As part of the TA undertaken to support that scheme, an existing capacity constraint was identified at M1 Junction 15. The Northampton Gateway SRFI proposals comprise a significantly greater volume of floor space, along with the intermodal rail terminal facility. Therefore, the deficiencies associated with the existing M1 Junction 15 layout would also act as a barrier to the proposed SRFI development.

7.18 To confirm the above, as part of the work included in TN5 (**Appendix 10**), a LinSig model of the existing M1 Junction 15 layout was built using the 2014 surveyed traffic count data. This base model was validated against the surveyed queue data and shown to provide a suitable representation of the junction operation.

7.19 **Table 7.7** presents the results of that assessment and shows the junction operating with a negative practical reserve capacity (PRC) in both peak periods, indicating that the junction does not have sufficient capacity to handle the current (2014) traffic demand, with one or more links over 90% saturated.

Table 7.7: Summary of 2014 M1 Junction 15 LinSig model results[22]

scenario		base model	
		PRC (%)	delay (pcuHr)
2014	AM	-16.1%	111.25
	PM	-35.6%	204.67

7.20 As explained at paragraph 3.16, the NGMS contains only limited proposals for improving M1 Junction 15, and Highways England advised that there is no certainty when that improvement would be delivered. As a result, and the exclusion of any improvements to M1 Junction 15 from the Smart Motorway Project, M1 Junction 15 will inevitably become more congested in the future.

7.21 The impact of the proposed development on the operation of M1 Junction 15 in the future assessment years was therefore examined and this is reported within TN5 (**Appendix 10**).

7.22 To enable option testing at M1 Junction 15 in advance of traffic flow data from the NSTM2 being available, assessment work was undertaken using assessment year traffic flows for the junction derived from the 2014 surveyed traffic flows. The 2014 surveyed flows were factored to the 2021 DfT 02/2013 Circular compliant assessment and 2031 future assessment years using TEMPro. Traffic flow sets corresponding to the 2021 and 2031 assessment years without the development and with the development were derived and added to the LinSig model for the existing junction. The results are reported at Table 3 of TN5, which is reproduced at **Table 7.8** below.

7.23 The results showed that the junction would not have sufficient capacity to cater for the future background traffic demand and would operate with significant congestion in all modelled scenarios. The assessment also showed that the development would have a significant impact on the performance of M1 Junction 15, with considerable deterioration of PRC and total delay in the 2021 and 2031 assessment years for both peak periods. It was found that in all modelled scenarios, the A45, M1 northbound off-slip and the A508 approaches would experience the greatest congestion.

[22] Reproduced from Table 2 of TN5 (**Appendix 10**)

Table 7.8: Summary of M1 Junction 15 operation in 2021 and 2031 assessment years (based on manually calculated traffic flows)

scenario		Reference Case existing layout, no development		Development Case with development, no mitigation	
		PRC (%)	delay (pcuHr)	PRC (%)	delay (pcuHr)
2021	AM	-32.7%	350	-99.0%	1218
	PM	-46.5%	470	-104.2%	1458
2031	AM	-54.4%	745	-104.3%	1737
	PM	-90.8%	1005	-137.4%	1998

7.24 This finding was subsequently confirmed using traffic data from the NSTM2 when it became available and was reported in TN5[23]. The finding has also been reconfirmed using the final NSTM2 datasets and is reported at **Table 10.3** and **Table 10.4** of **Chapter 10.0** for the 2031 Future Year and 2021 DfT 02/2013 Circular compliant assessment years.

7.25 Comparing the results shown in **Table 7.8** and **Table 10.3** and **Table 10.4** shows that the predicted performance of the junction differs between the modelling with manually calculated traffic flows and the modelling with NSTM2 traffic flows. This is due to the ability of the NSTM2 to represent traffic reassignment effects across the network. However, the development has a significant impact when assessed under both methodologies, with the same arms, the A45, M1 southbound off-slip and A508, shown to experience the greatest congestion in all assessment scenarios.

7.26 Understanding that M1 Junction 15 is an existing constraint on growth in the area, the need for a significant and comprehensive enlargement and reconfiguration of the junction was therefore acknowledged at an early stage in the project and mitigation options were examined. This work is reported at Section 4 of TN5, with further detail provided at the M1 Junction 15 Summary of Highway Options report (**Appendix 21**).

7.27 Following consultation with NCC and Highways England, a preferred mitigation arrangement for the junction was identified (Option A in TN5) that would provide the

[23] TN5, paragraphs 3.8 to 3.10

required capacity and operational improvements, whilst minimising junction complexity and allowing appropriate maintenance and traffic management strategies to be adopted.

7.28 The preferred mitigation arrangement adopted for M1 Junction 15 is as generally shown in **Figure 7.1**, which is an extract of the preliminary junction arrangement provided at drawing NGW-BWB-GEN-SK-D-SK02-S3-P6 within TN5.

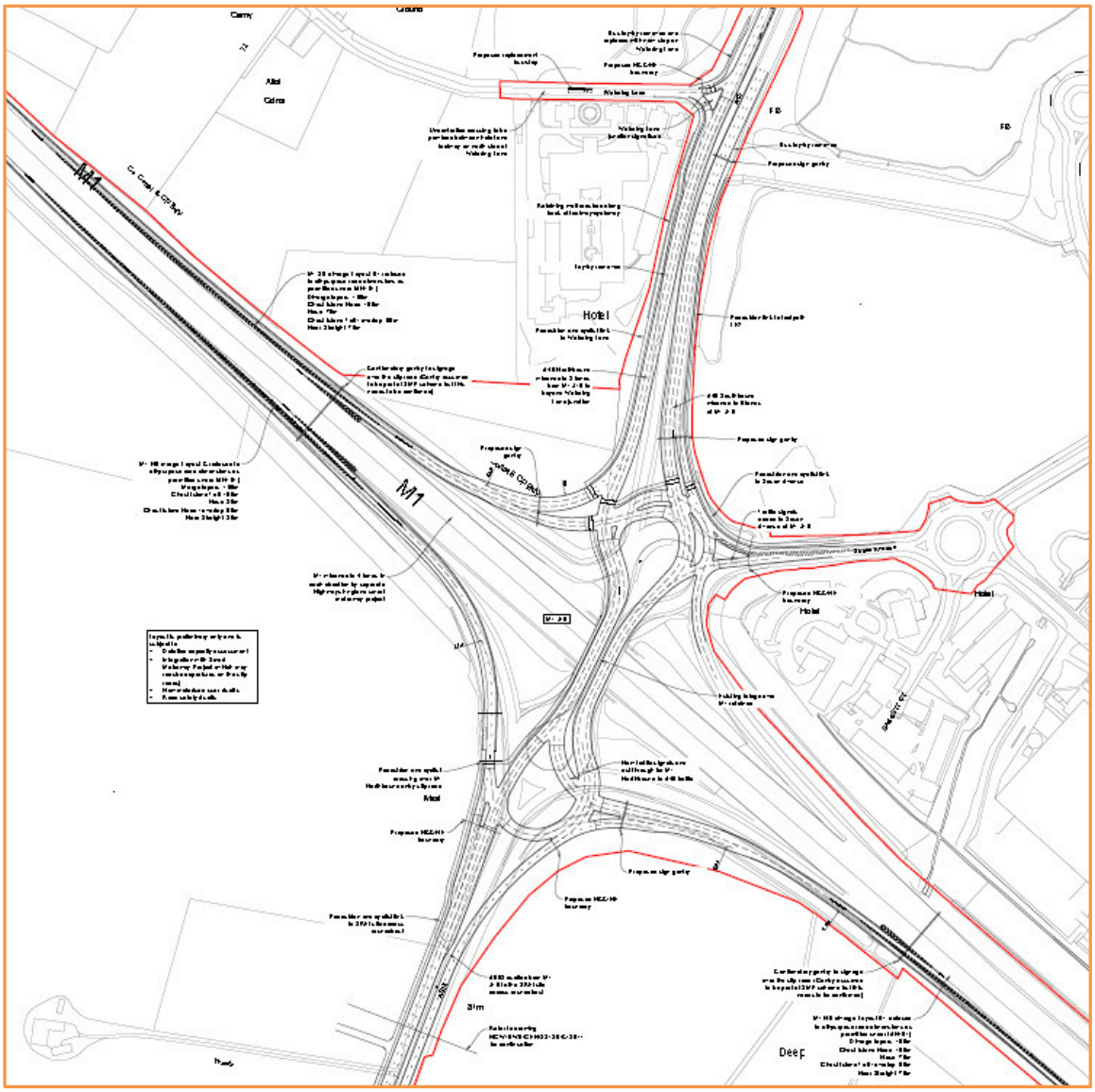


Figure 7.1: Proposed M1 Junction 15 & A45 improvements (extract of drawing NGW-BWB-GEN-SK-D-SK02-S3-P6)

7.29 The geometric design of the scheme was further developed as detailed in the GDSR1 (**Appendix 28**) as is shown on the Highway Plans referred to in paragraph 4.26.

7.30 The arrangement comprises the conversion of the dumbbell roundabouts to larger signalised gyratories, with a cut-through for the M1 northbound to A45 traffic movement

at the southern roundabout, together with widening and realignment of the M1 exit slip roads. The proposed layout reflects the changed mainline diverge configuration arising under the Smart Motorway Project design, and adjustment of the M1 northbound merge slip road.

7.31 To accommodate the enlarged junction and alterations to the A45 requires the closure and removal of an existing northbound layby on the A45. The layby is located approximately 170 metres north of the M1 Junction 15, south of the junction with Watering Lane. The implications of this are examined in TN9 (**Appendix 14**).

7.32 TN9 concludes the layby cannot be replaced at the same location as it would not be compliant with standards, and that there is no suitable locations compliant with standards elsewhere on the A45 between M1 Junction 15 and the next layby facility that is provided on the A45 northbound. However, the displaced demand created by the closure of the M1 Junction 15 layby can be accommodated by the nearby laybys on the SRN and motorway service areas. Therefore, there is no requirement to replace the layby as part of the M1 Junction 15 improvement works.

7.33 The performance of the junction with the mitigation scheme and development traffic in place was modelled using LinSig and the 2021 and 2031 manually calculated assessment year traffic flows. This was compared to the equivalent reference case (**Table 7.8**) and is reported at Table 5 of TN5, which is reproduced at **Table 7.9** below.

Table 7.9: Comparison of M1 Junction 15 performance in the Reference Case (no development) with the performance in the Development Case (with mitigation case with development) in 2021 and 2031 assessment years (manually calculated traffic flows)

scenario		Reference Case existing layout, no development		Development Case with mitigation, with development	
		PRC (%)	delay (pcuHr)	PRC (%)	delay (pcuHr)
2021	AM	-32.7%	350	5.6%	127
	PM	-46.5%	470	0.3%	171
2031	AM	-54.4%	745	-9.7%	188
	PM	-90.8%	1005	-23%	364

7.34 The results showed that the proposed mitigation scheme would provide a significant betterment in the performance of the junction, with all internal queueing accommodated and no significant queueing on the M1 slip roads.

7.35 The scheme was therefore taken forward for modelling in the NSTM2, and the suitability of the mitigation scheme subsequently confirmed using the 2031 assessment year traffic data from the NSTM2 when it became available. This was also reported at Table 5 of TN5.

7.36 However, as noted at paragraph 5.19 of TN5, it would be important to confirm the improvement in junction performance, once the final NSTM2 traffic data was available, following further iterations of the NSTM2 modelling and taking into account all reassignment effects associated with the overall highway mitigation measures. The suitability of the improvement scheme based on the DfT 02/2013 Circular compliant assessment scenario would also be required following the availability of traffic data for this scenario from the NSTM2.

7.37 It was also agreed with the Transport Working Group that the appropriateness of the mitigation scheme at M1 Junction 15 be demonstrated through VISSIM micro-simulation testing.

7.38 This work was undertaken and further detail and presentation of the assessment findings that confirm the appropriateness of the mitigation scheme based on the final NSTM2 datasets and the VISSIM modelling work is provided at **Chapter 10.0** of this TA.

A508 through Roade

7.39 The initial trip distribution assessment suggested that around 10% of the development light vehicle trips[19] and around 9% of the development HGV trips[20] would use the A508 to travel to and from the south of the SRFI site. In doing so, some of this traffic would pass through the village of Roade.

7.40 Based on this distribution, **Table 7.10** summarises the potential daily development traffic that would use the A508 and pass through Roade compared to the 2015 recorded DfT daily traffic flow for A508 in Roade.

Table 7.10: Initial estimate of development traffic arriving from and departing to the south of the SRFI site via the A508, expressed as a percentage of current daily traffic

	two-way traffic flow in vehicles	
	total	HGV
daily development flow	1611	382
2015 ADDT flow[24]	16062	1083
% of background flow	10%	35%

7.41 This initial assessment suggested that the development could lead to a 10% increase in traffic passing through Roade, with a potential to increase the daily number of HGVs passing through the village by some 35%. This increase in HGVs would represent, on average, approximately one additional HGV trip through the village every 3.75 minutes and would increase the instances of HGVs having to give way on the narrow railway bridge, adding to congestion in the village.

7.42 Given the existing congestion observed during the morning and evening peak hours at the A508/High Street mini-roundabout (see paragraphs 3.33), the operation of the junction was tested using 2031 assessment year traffic flows derived from the morning and evening peak hour traffic survey data at the junction.

7.43 To derive suitable traffic flows to undertake this assessment, the 2016 observed traffic flows were factored to 2031 assessment year levels using TEMPro as adjusted by the National Traffic Modal. The TEMPro output is provided at **Appendix 39** and the growth rates are as follows:

- 2016 to 2031 (AM peak) 1.18
- 2016 to 2031 (PM peak) 1.18

7.44 The development traffic was assigned to the road network using the initial trip distribution assumptions described at paragraph 7.39, and added to the background traffic flows. The resultant 2031 background and 2031 with development traffic flows are provided at **Appendix 40**.

[24] DfT Count Point Id 57251 https://www.dft.gov.uk/traffic-counts/cp.php?la=Northamptonshire#57251

7.45 An ARCADY model of the mini-roundabout was built using Junctions 8 and the performance of the junction tested using the 2031 background and with development traffic flows. The results are summarised at **Table 7.11** and the ARCADY geometries and output file are provided at **Appendix 40**.

Table 7.11: Summary of A508/High Street mini roundabout operation in 2031 assessment year (based on manually calculated traffic flows)

	AM			PM		
	Queue (Veh)	Delay (s)	RFC	Queue (Veh)	Delay (s)	RFC
	Traffic Flows - 2031 Background					
Arm 1	360.33	2059.87	1.66	143.78	773.02	1.33
Arm 2	1.59	28.27	0.62	1.00	20.77	0.50
Arm 3	115.10	528.24	1.25	204.85	856.44	1.37
	Traffic Flows - 2031 With Development					
Arm 1	393.30	2253.52	1.71	247.73	1388.98	1.49
Arm 2	1.61	28.54	0.63	1.01	21.03	0.51
Arm 3	195.71	859.31	1.37	247.46	1067.01	1.43

Arm 1 = A508 North, Arm 2 = High Street, Arm 3 = A508 South

7.46 The results presented at **Table 7.11** indicated that in the 2031 assessment year both the A508 arms of the mini-roundabout would operate significantly overcapacity, with long queues and significant delays forecast for drivers travelling on the A508. It is therefore likely that drivers would avoid using the A508 and seek alternative routes using the local roads, adding to increased traffic flows through some of the other surrounding villages. As noted in **Chapter 8.0** at paragraphs 8.41 to 8.50, this was confirmed by the NSTM2 modelling which shows that traffic growth on the A508 between the 2015 Base and 2031 Reference Case years is constrained and significantly less than it would be expected to accommodate as a principal 'A' road.

7.47 The addition of the development traffic would exacerbate these issues and would likely further encourage drivers to seek alternative routes to the A508.

7.48 Due to the conditions at Roade, with the A508 bisecting the village, the existing and forecast congestion issues at the mini-roundabout, and the narrow railway bridge, it was considered that the impact of the development traffic on the A508 through the village would not be acceptable. Therefore, in consultation with NCC, an early concept for the highway mitigation strategy was the inclusion of a Roade Bypass to take through-traffic, particularly HGVs, out of the village.

7.49 It was considered a Roade Bypass would also be important in drawing existing and potential SRFI traffic back onto the A508, and away from local routes that would be increasingly likely to be used by drivers as an alternative to the A508 to avoid congestion within the village.

7.50 The principle for providing the Roade Bypass was established and initial route options were considered to the east and west of Roade. This work, which included consideration of the areas of assessment that would be expected to arise in an Environmental Assessment process, is reported in Sections 3 and 4 of the Roade Bypass Options Report (**Appendix 20**). As described in that report, two alignments for the route of a bypass as shown in **Figure 7.2**, a Green route, and Blue route, both to the west of Roade, were taken forward to the Stage 1 Public Consultation that was held in December 2016 over the afternoons and early evenings of the 12, 13 and 14 of the month.

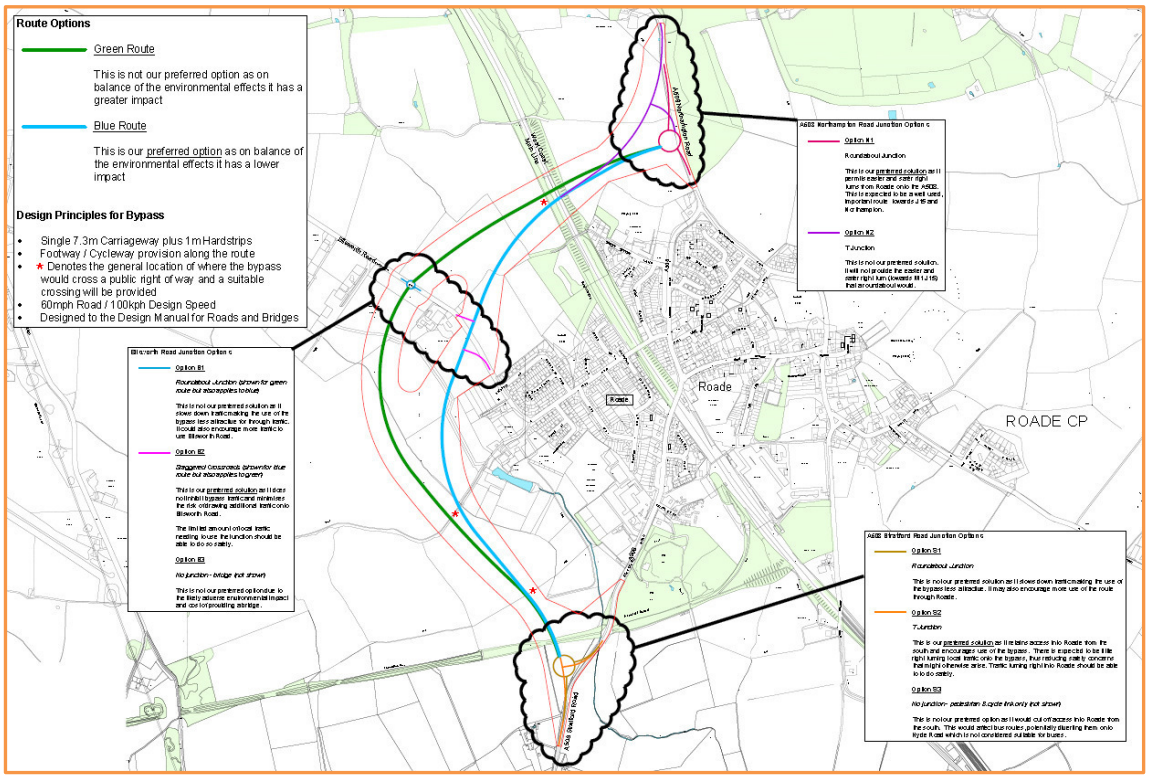


Figure 7.2: Roade Bypass options presented at Stage 1 Consultation

7.51 The technical and environmental assessment summarised in the Roade Bypass Options Report showed that when comparing the Blue and Green routes, the preference for either is not strong across most of the assessment areas. There was however a strong presumption in favour of the Blue route on nature and ecology conservation grounds. In addition, the Blue route is marginally shorter than the Green route which would make it more effective in taking through traffic out of the village, whilst at the same time making it more economical to construct.

7.52 The Blue route would also restrict the potential for 'infill' development on the northern and western sides of Roade, something that was noted as a concern from the Stage 1 Public Consultation.

7.53 For these reasons, the Blue route was selected as the preferred option to be taken forward for further assessment and design development.

7.54 Assessment of the bypass junction options is detailed in Section 5 of the Roade Bypass Options Report, which were determined taking into consideration:

- environment impact;
- connectivity into and out of Roade for vehicles including public transport;
- traffic analysis and junction capacity; and
- road safety.

7.55 As part of that work the preferred bypass alignment was modelled in the NSTM2 (when it became available), which was used to assist in determining the most appropriate junction solutions, and to provided traffic data for capacity assessment purposes. The conclusion of that element of work, reported at Section 5 and Appendix D of the Roade Bypass Options Report, was that both an eastern and western connection from Blisworth Road (Roade) to the bypass should be provided. This is to reduce congestion at other local junctions and to facilitate access to Blisworth from the A508 once the proposed left-in, left-out arrangement at the A508/Blisworth Road (Courteenhall) junction is in place.

7.56 The assessment concluded that roundabouts should be provided where the Bypass meets the existing A508 Northampton Road, Blisworth Road and the A508 Stratford Road.

7.57 **Figure 7.3** shows the resulting proposed alignment and junction configuration for the A508 Roade Bypass.

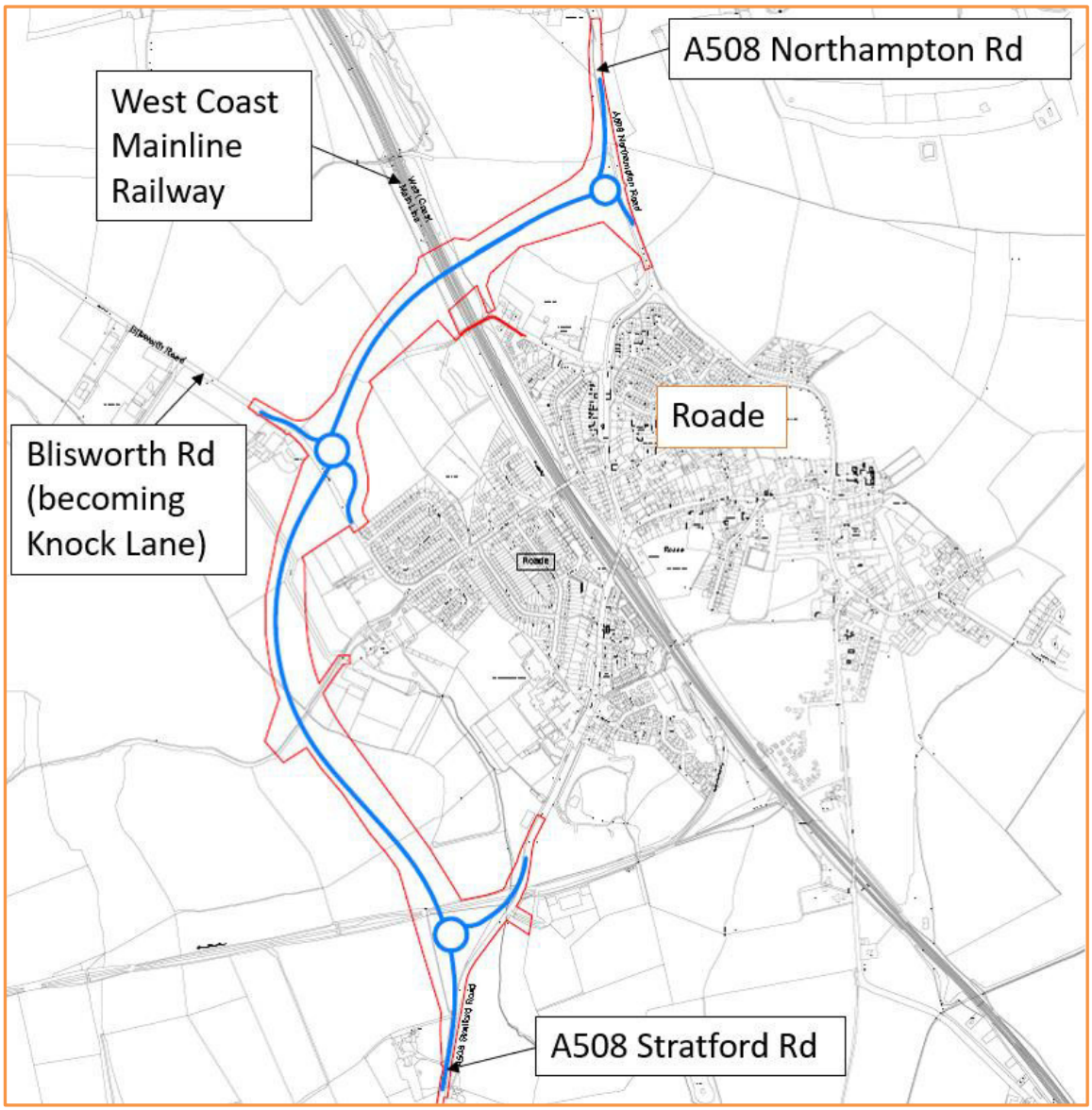


Figure 7.3: Preferred A508 Roade Bypass alignment (extract of drawing NGW-BWB-GEN-XX-SK-C-SK05-S2-P2 provided at Appendix C of the Roade Bypass Options Report)

7.58 As part of the inputs to the NSTM2 modelling the trip distribution for the development was refined and the manual assignment of the development traffic impact on traffic conditions through Roade that is presented at **Table 7.10** was updated to:

- reflect the 15% light vehicle development trip distribution determined as part of the NSTM2 modelling and as report at **Table 5.14** rather than the initially assumed 10%; and
- account for the proposed configuration of the site access that would prevent HGVs departing the development from travelling south on the A508.

7.59 **Table 7.12** summarises the updated assessment, which suggested that with the updated trip distribution the proposed development could increase total daily traffic levels in Roade

by around 13%, with increases in the daily number of HGVs passing through the village increasing by some 17%, or around 190 daily HGV trips. This increase in HGVs would represent, on average, approximately one additional northbound HGV trip through the village every eight minutes.

Table 7.12: Updated estimate of development traffic arriving from and departing to the south of the SRFI site via the A508, expressed as a percentage of current daily traffic

	two-way traffic flow in vehicles	
	total	HGV
daily development flow	2034	190 (arrivals only)
2015 ADDT flow[24]	16062	1083
% of background flow	13%	17%

7.60 This updated assessment was presented in the draft Environmental Statement (paragraphs 12.6.5 to 12.6.7) submitted as part of the Stage 2 Consultation in October 2017. With reference to this assessment South Northamptonshire Council, in their response to the Stage 2 Consultation[25] stated: *"The ES states that the proposed development could increase daily traffic levels in Roade by 13%. This would be unacceptable as it would have a further detrimental impact on the settlement and community. The proposed bypass is required to take traffic out of the village centre and around the settlement."*

7.61 NCC in their Stage 2 consultation response[26] confirm that "*The LHA is supportive of the principle of a Roade Bypass, and the preferred route chosen*".

Summary

7.62 Based on the initial highway impact assessment work, the SRFI access roundabout on the A508 and dualling for the A508 between the access and M1 Junction 15 were incorporated in to the SRFI site proposals, and the highway mitigation strategy comprising a large scale improvement to M1 Junction 15 and the provision of a A508 Roade Bypass were taken forward for further strategic assessment using the NSTM2.

[25] Paragraph 20, South Northamptonshire Council response to Statutory Consolation under Part 42 of the Planning Act 2008 (Ref S/2017/2514/NIC)
[26] Page 3 of Local Highway Authority Response to Stage 2 Statutory Public Consultation Pursuant to Section 42 of the Planning Act 2008 and Regulation 11 of the Infrastructure Planning (EIA) Regulations 2009

8.0 EVOLUTION OF THE HIGHWAY MITIGATION STRATEGY

Introduction

8.1 This chapter presents the evolution of the highway mitigation strategy from the starting point described in **Chapter 7.0** through to the complete strategy that is described in **Chapter 4.0** of this TA. This chapter sets out stages ii) and iii) of the assessment methodology described at **Chapter 6.0**, based upon assessment work undertaken using the NSTM2.

Northamptonshire Strategic Transport Model (NSTM2)

8.2 The NSTM is operated and maintained on NCC's behalf by WSP Ltd. It was recently revised at part of NCC's major model update (to become NSTM2), to an updated 2015 base year and was subject to an extensive revalidation exercise. Prior to use of the model on the Northampton Gateway SRFI project, WSP undertook further calibration and re-validation of the model to the areas to the south of the M1 to ensure that it was fit for the purposes of assessing the proposed development impact.

8.3 Updated traffic count data comprising the 39 two-week ATCs and the other traffic surveys described at paragraph 3.76 were provided to WSP, who then undertook the model calibration and re-validation work.

NSTM2 base model

8.4 WSP completed the NSTM model update, calibration and re-validation work in March 2017. They produced a Local Model Validation Report (LVMR1), provided at **Appendix 22**, specific to the NSTM2 for the Northampton Gateway SRFI development.

8.5 Section 1.2 of the LMVR1 states that:

"The 2015 Northamptonshire Strategic Transport Model (NSTM) consists of a:

- *SATURN (Simulation and Assignment of Traffic in Urban Road Networks) suite: used to build the observed highway model; and*
- *EMME3: used to build the Demand Model and the Public Transport Model.*

The 2015 NSTM, developed by WSP Ltd, offers an integrated system for a range of transport modes, representing private and public transport as well as modal interchange behaviour. The NSTM has the ability to quantify the benefits of a policy change or new transport infrastructure in Northamptonshire, enabling the assessment of future transport

proposals and developments (including those which developer led) in an efficient, consistent and evidentially based manner.

The NSTM model specification was developed in accordance with current Department for Transport (DfT) guidelines detailed in DfT Transport Analysis Guidance (TAG). The TAG website provides information on the role of transport modelling and appraisal to assist in the provision of a consistent and reputable approach for the development of transport models."

8.6 It was agreed with the Transport Working Group that the multi-modal facility of the NSTM2 would not be used. Instead the separate public transport strategy, as present at the PTS (**Appendix 2**) of this TA was developed in consultation with NCC and the bus operator.

8.7 The LMVR1 demonstrates that the base case NSTM2 is fit for the purpose of assessing the development highway impact.

8.8 The periods assessed in the NSTM2 are:

- 0800 to 0900 hours = AM peak hour
- 1700 to 1800 hours = PM peak hour

8.9 These assessment periods were agreed with the Transport Working Group as appropriate for the TA, as these are the periods when the existing highway network is busiest and there is least spare capacity, and hence the impact of the development traffic would be greatest.

NSTM2 forecast scenarios

8.10 The NSTM2 was approved by the Transport Working Group to be used as the appropriate base model from which the Reference Case and Development Case forecast year scenarios were developed for use in the assessment of the development traffic impacts.

Reference Case – Scenarios B1, C1, and D1

8.11 The modelling parameters for the Reference Case scenarios are summarised at **Table 6.1**. Details of the committed and allocated future developments and highway infrastructure improvements included in the Reference Case scenarios B1, C1 and D1 are set out in the Reference Case Forecast Report (**Appendix 23**) prepared by WSP.

8.12 Table 4 of the Reference Case Forecast Report summarises the housing growth included in the three NSTM2 Reference Case scenarios, as follows:

- 2021 opening (B1) scenario = 35,454 dwellings
- DfT Circular compliant (C1) scenario = 43,675 dwellings
- 2031 future year (D1) scenario = 78,927 dwellings

8.13 Table 7 of the Reference Case Forecast Report summarises the employment growth included in the three NSTM2 Reference Case scenarios for the large committed and/or allocated developments, as follows:

- 2021 opening (B1) scenario = 9,688 jobs
- DfT Circular compliant (C1) scenario = 9,964 jobs
- 2031 future year (D1) scenario = 17,826 jobs

8.14 The main infrastructure schemes that are included in the NSTM2 are described at Section 2.9 of the Reference Case Forecast Report, and summarised at Table 8 of that report.

8.15 A detailed breakdown of all known and planned development and infrastructure schemes included in the NSTM2 Reference Case scenarios is provided at **Appendix 36**.

8.16 The committed schemes include the Hardingstone SUE and Daventry International Rail Freight Terminal (DIRFT), as requested by Northampton Borough Council in their Scoping Opinion response[27]. The inclusion of the proposed development at Mere Lane (reference 15/01531/OUT), the third site noted by Northampton Borough Council, was discussed with the Transport Working Group. It was agreed that this would be accounted for via TEMPro traffic growth, as it was too remote from the proposed development site to require site specific modelling.

8.17 NCC required that growth in the NSTM2 is not constrained to the TEMPro/Regional Traffic Forecast. Therefore, as explained at paragraph 2.10.2 of the Reference Case Forecast Report, traffic growth in some areas of the NSTM2 exceeds the TEMPro/Regional Traffic Forecast estimates. However, the areas forecast in the NSTM2 to exhibit greatest growth

[27] Appendix 3 of PINS Scoping Opinion report (Ref TR050006)

are Corby and Daventry, which are remote from the site and do not form part of the study area.

8.18 A comparison of the of the 2015 to 2021 and 2015 to 2031 NSTM2 forecast growth to the equivalent TEMPro growth (version 7.2, dataset 72), as adjusted by the National Traffic Modal, for Northamptonshire as a County, Northampton Borough Council and South Northamptonshire District Council was undertaken and is presented at **Table 8.1**. The TEMPro outputs are provided at **Appendix 39.**

Table 8.1: Comparison of NSMT2 growth to TEMPro growth

peak	year (scenario)	forecast traffic growth factors		
		NSTM2 (average of origin/destination)	TEMPro (all roads)	difference (NSTM2 vs TEMPro)
Northamptonshire				
AM	2015 to 2021 (B1)	1.10	1.11	-0.01
	2015 to 2021 (C1)	1.12		+0.01
	2015 to 2031 (D1)	1.26	1.24	+0.02
PM	2015 to 2031 (B1)	1.08	1.11	-0.03
	2015 to 2021 (C1)	1.11		no difference
	2015 to 2031 (D1)	1.24	1.24	no difference
Northampton				
AM	2015 to 2021 (B1)	1.07	1.11	-0.04
	2015 to 2021 (C1)	1.10		+0.01
	2015 to 2031 (D1)	1.24	1.26	-0.02
PM	2015 to 2031 (B1)	1.07	1.11	-0.04
	2015 to 2021 (C1)	1.10		+0.01
	2015 to 2031 (D1)	1.22	1.25	-0.03
South Northamptonshire				
AM	2015 to 2021 (B1)	1.12	1.10	+0.02
	2015 to 2021 (C1)	1.16		+0.04
	2015 to 2031 (D1)	1.36	1.22	+0.14
PM	2015 to 2031 (B1)	1.11	1.10	+0.01
	2015 to 2021 (C1)	1.12		+0.02
	2015 to 2031 (D1)	1.28	1.23	+0.05

8.19 **Table 8.1** shows that at a County level, there is very little difference between the unconstrained NSTM2 forecast traffic growth and the equivalent traffic growth forecast by TEMPro. Differences in growth factors for the Northampton Borough Council area and the 2021 forecast years for South Northamptonshire are also small and confined to 4% or less. The 2031 growth factor for South Northamptonshire show a larger difference of 14% in the morning peak hour and 5% in the evening peak hour.

8.20 The resulting NSTM2 forecast Reference Case scenarios are therefore considered to represent a robust basis on which to examine the development traffic impacts.

Development Case no highway mitigation – Scenarios E1, F1, and G1

8.21 The forecast year scenarios for the 'Development Case no highway mitigation' were generated by adding the relevant development trip generations into the NSTM2, which were assigned to the highway network using the agreed development distribution as presented in **Chapter 5.0** of this TA. The modelling inputs for the 'Development Case no highway mitigation' scenarios are summarised at **Table 6.2**.

8.22 This modelling process and the resultant NSTM2 outputs are described in the Development Case Forecast Report, prepared by WSP and provided at **Appendix 24**.

Development Case with highway mitigation – Scenarios H1, I1, and J1d

8.23 The modelling inputs for the Development Case with highway mitigation scenarios are summarised at **Table 6.3**.

8.24 To ensure that all the reassignment effects of the proposed highway mitigation measures were taken into account, several iterations of stages ii) and iii) of the assessment methodology were required, resulting in a series of incremental '2031 Development Case with highway mitigation' scenarios and corresponding progressive NSTM2 traffic data sets for the J1 scenario.

8.25 The resulting incremental '2031 Development Case with highway mitigation' scenarios are summarised at **Table 8.2**, along with the final 'with highway mitigation' scenario.

Table 8.2: Incremental and final 2031 (J1) Development Case with highway mitigation scenarios modelled using the NSTM2

scenario	ID	description of highway mitigation
Incremental 'Development Case with highway mitigation' scenarios	J1	SRFI access A508 dualling between access and M1 J15 Junction 15 & A45 major upgrade A508 Roade Bypass
	J0	as J1, without A508 Roade Bypass
	J1a	as J1 + Right turn ban for HGV departing site
	J1b	as J1a + M1 Junction 15A improvement
	J1c	as J1b + A508/Blisworth Road left-in, left-out
Final 'Development Case with all highway mitigation' scenario	J1d	all highway mitigation (as J1c + all A508 corridor upgrade works)

Corrections to NSTM2 forecast scenarios

8.26 Between April 2017 and June 2017 outputs from the NSTM2 were provided by WSP for the D1, G1, J1, J0 and J1a modelling scenarios. However, in June 2017 WSP identified a modelling issue with the NSTM2 Reference Case forecast models, the result of which meant that background HGV traffic was not accurately represented. This issue affected only HGV traffic flows in the forecast models, principally the HGV flows on the M1 and A14. WSP therefore updated the forecast models to correct this issue.

8.27 To understand the significance of this issue on the modelling undertaken to that date, WSP provided NSTM2 outputs comparing the corrected vs uncorrected forecast models. These are provided at **Appendix 41**. This confirmed that although the HGV correction resulted in changes to the magnitude of the actual HGV traffic flows, except for HGV flows on the M1, in most cases the change in HGV flows were small. Also, because the correction was made to the Reference Case and Development Case scenarios, the relative difference between the Reference Case and Development Case scenarios was not significant. Importantly the correction did not alter the conclusions drawn from the analysis undertaken to that date, which were also supported by the stage i) assessment work that is presented in **Chapter 7.0**.

8.28 Nevertheless, the 2031 Reference Case (D1) and 2031 J1, J0 and J1a Development Case with highway mitigation scenarios undertaken to that date were rerun, and all subsequent NSTM2 modelling was undertaken using the corrected forecast models.

8.29 By October 2017 all the NSTM2 modelling of the 'Incremental 2031 Development Case with highway mitigation' scenarios given in **Table 8.2** had been completed and the need for the further highway mitigation associated with the A508 corridor route upgrade had been identified (scenario J1d).

8.30 However, in November 2017, and prior to modelling the J1d scenario in the NSTM2, a localised error in the NSTM2 forecast models was identified by WSP. This concerned the way a model loading point in Roade was coded and affected the assignment of a small number of background traffic trips associated with background traffic movements to and from Roade. WSP corrected this coding error and again provided NSMT2 outputs comparing the corrected vs uncorrected forecast models. These outputs are provided at **Appendix 41.** To understand the impact of the correction on the modelling undertaken to that date, the J1c scenario given at **Table 8.2** was also rerun and the difference between the outputs compared. This is also provided at **Appendix 41**. This comparison confirmed that the loading point correction was found to have only a localised issue affecting traffic flows within Roade.

8.31 The 2031 Reference Case (D1) and 2031 Development Case no highway mitigation (G1) scenarios were rerun using the corrected NSTM2 forecast models. Scenario J1d (2031 Development Case with all highway mitigation) had not been run at this time and therefore was also run using the corrected NSTM2 forecast models.

8.32 The correction was demonstrated to be localised to traffic flows within Roade, which are substantially reduced because of the Roade Bypass in any case. As a result, it was not necessary to rerun the 'Incremental 2031 Development Case with highway mitigation' scenarios give in **Table 8.2**.

8.33 Accordingly, due to their chronology, some of the Technical Notes (TN5, TN6, TN7, and TN8) concerned with the evolution of the highway mitigation strategy include NSTM2 outputs that were later superseded. Although as presented at **Chapter 10.0**, all mitigation was subsequently confirmed using the final NSTM2 data.

NSTM2 outputs

8.34 In addition to turning count data, the NSTM2 also provides various outputs, included with the Reference Case and Development Case Forecast Reports to assist with determining the impact of the proposed development and the effectiveness of the highway mitigation strategy. The principal outputs used in this TA are:

- Actual Flow Difference Plots – the overall change in traffic flow on a road link once the highway mitigation and development are in place; and
- Reassignment Plots – the reassignment of non-development traffic to alternative routes.

8.35 The NSTM2 uses passenger car units (pcus), which is a way of standardising different vehicle types. In the NSTM2 1 car is equivalent to 1 pcu. 1 HGV is equivalent to 2.3 pcus.

8.36 V/C (volume/capacity) plots and V/C difference plots were also provided by WSP. These show the ratio of the volume of traffic using a junction, to the junction capacity. However, it should be noted that the V/C ratio in NSTM2 relates to only the worse performing arm of the junction, which can alter between assessment scenarios and is not therefore always a direct comparison of junction performance. It should also be noted that junctions with high V/C ratios have not necessarily been caused by the proposed development. This is because existing capacity constraints at these points or growth from other developments could be the source of these problems.

8.37 Outputs from the NSTM2 for the 2031 future assessment year scenarios were used to quantify the impacts on the highway network due to the development, with suitable mitigation proposals identified where required. The NSTM2 modelling incorporated the developing highway mitigation strategy in an incremental process, so that reassignment effects on the study area junctions were considered. In doing so, the following assessment scenarios were considered:

- 2031 Reference Case (D1 scenario);
- 2031 Development Case no highway mitigation (G1 scenario);
- 2031 Development Case with incremental highway mitigation (J1, J0, J1a, J1b, J1c scenarios); and
- 2031 Development Case with all highway mitigation (J1d scenario).

2031 Reference Case (D1 scenario)

8.38 Prior to considering the impact of the development traffic on the highway network in the forecast years, it is appropriate to consider the forecast change in the operation of the highway network between the base year scenario and the forecast year scenarios.

8.39 The NSTM2 outputs referred in this section are from the final NSTM2 Reference Case forecast models.

8.40 The Reference Case Forecast Report (**Appendix 23**) presents the following NSTM2 outputs for the three Reference Case forecast scenarios listed at **Table 6.1**:

- Actual flow difference plots between the Reference Case and Base scenarios (Appendix B of report);
- Actual flows plots in pcus (Appendix C of the report);
- V/C plots (Appendix D of the report); and
- V/C difference plots.

8.41 In this section the 2031 Reference Case (D1 scenario) is considered. The 'D1 vs Base' morning peak and evening peak actual flow difference plots provided at Figures 10 and 11 and at Appendix B of the Reference Case Forecast Report, show how the traffic flows on the highway network are forecast to change between the 2015 base year and the 2031 Reference Case. Extracts of these plots are provided at **Figure 8.1** and **Figure 8.2** for the AM and PM peak hours. Road links with increases in actual traffic flows are shown in red/orange and links with decreases in actual traffic flow are shown in green, all relative to the 2015 Base scenario.

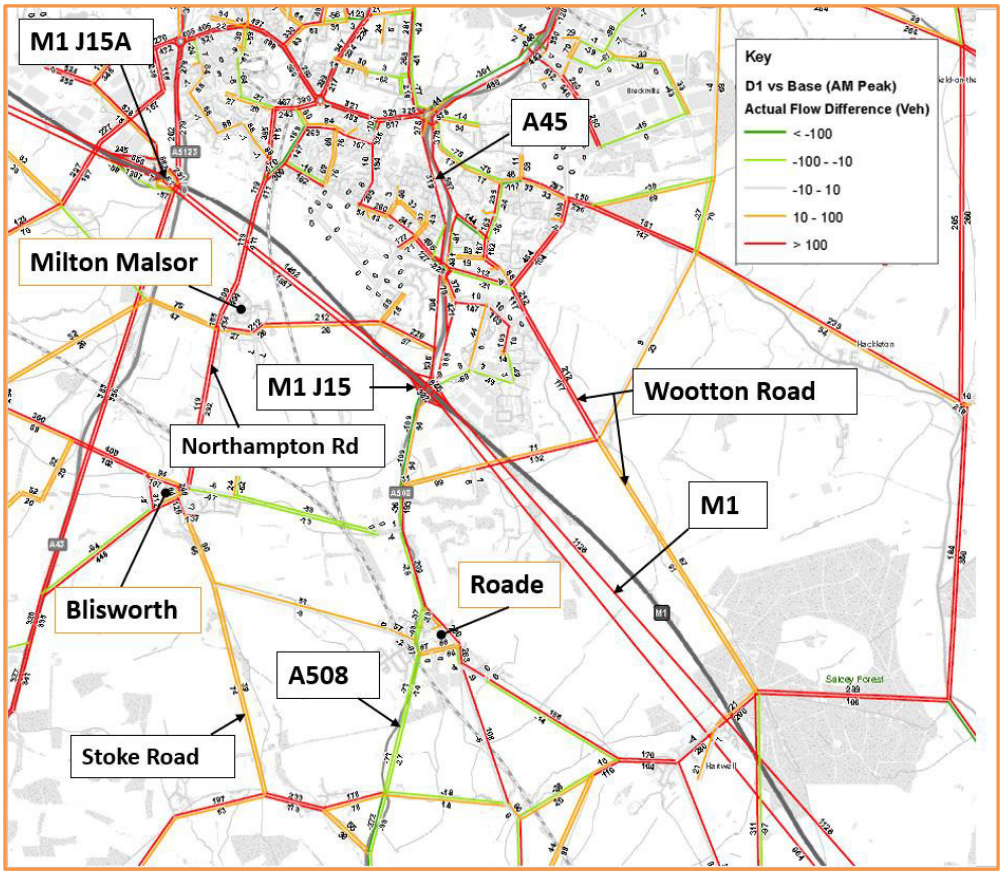


Figure 8.1: AM peak actual flow difference plot between 2031 Reference Case (D1) and 2015 Base (in vehicles)

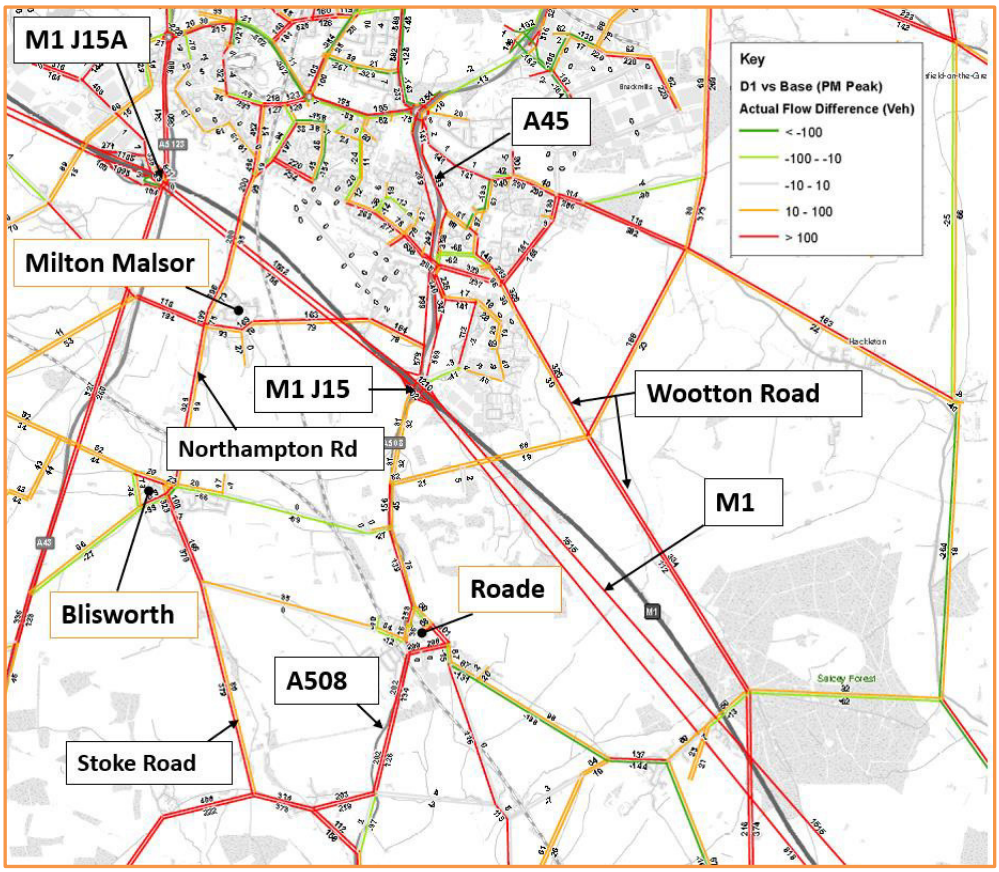


Figure 8.2: PM peak actual flow difference plot between 2031 Reference Case (D1) and 2015 Base (in vehicles)

8.42 Flow difference plots of the other scenarios are shown at Figures 6 to 9 of the Reference Case Forecast Report and a comparison of the actual link flows is provided at Table 12 and paragraphs 4.2.5 to 4.2.10 of the Reference Case Forecast Report.

8.43 The flow differences plots extracts in **Figure 8.1** and **Figure 8.2** illustrate how peak hour growth in background traffic between 2015 and 2031 due to the committed and allocated development will be distributed across the highway network. The plots show that most of the highway network is forecast to see significant traffic growth.

8.44 However, a reduction in traffic using the A508 northbound, to the north of Roade, and in each direction to the south of Roade, is forecast during the morning peak hour. In the evening peak hour, although traffic increases are forecast on the A508, the traffic growth accommodated on the A508 between Roade and M1 Junction 15 is much lower than seen other A roads, and nearby local roads.

8.45 It is notable that adjacent routes to the A508, on the local roads such as Stoke Road, Northampton Road and Towcester Road to the west, and Wootton Road to the east, are forecast to see significant increases in traffic, for example the parallel route of Towcester

Road is forecast to see average traffic growth of around 38% (Table 12 of Reference Case Forecast Report). This exceeds both the forecast average NSTM2 and TEMPro growth.

8.46 The traffic flows summarised at Table 12 of the Reference Case Forecast Report also show that the strategic roads of the M1, A45 and A43 are forecast to attract average growth across the peak hours of around 28%, 25% and 21%, respectively. This is consistent with the overall growth forecasts presented at **Table 8.1** for the D1 scenario. The higher growth on the M1 is associated with the M1 J13 to J16 Smart Motorway Project, which will add a fourth lane in each direction to the M1, and therefore the additional road capacity is drawing in additional traffic.

8.47 **Table 8.3** presents a comparison of the forecast growth between the 2015 Base and 2031 Reference Case on the road links serving M1 Junction 15. As described above, there is forecast growth of between 20% to 30% on the A45, and 24% to 35% M1. However, very little growth is forecast on the A508, with the forecast growth restricted to between 1% and 5%, in the morning and evening peak periods, respectively.

8.48 Contrasting the restricted traffic growth on the A508 with the traffic growth on the nearby local and major roads, it is evident that the A508 is not able to accommodate its share of the traffic growth. It is concluded that the existing congestion at M1 Junction 15 and through Roade act as bottlenecks, resulting in traffic using alternative routes on local roads to travel to and from the northeast and southwest of the M1.

Table 8.3: Comparison showing growth in forecast background traffic between 2015 and 2031 on principal road links serving M1 Junction 15 (using data from Table 12 of Reference Case Forecast Report).

link ID*	description	direction	traffic flows in pcus							
			2015 Base		2031 Reference Case (D1 scenario)		flow difference		growth as % 2015 to 2031	
			AM	PM	AM	PM	AM	PM	AM	PM
1	M1J14 to M1J15	NB	4109	4854	5149	5738	1040	884	25%	18%
	M1J15 to M1J14	SB	4436	4398	5637	5950	1201	1552	27%	35%
		two-way	**8545**	**9252**	**10786**	**11688**	**2241**	**2436**	**26%**	**26%**
2	A45 (north of M1J15)	NB	2716	2721	3319	3321	603	600	22%	22%
	A45 (north of M1J15)	SB	2622	2897	3606	3427	984	530	38%	18%
		two-way	**5338**	**5618**	**6925**	**6748**	**1587**	**1130**	**30%**	**20%**
3	M1J15 to M1J15A	NB	4087	5103	5677	6310	1590	1207	39%	24%
	M1J15A to M1J15	SB	4966	4693	6552	5798	1586	1105	32%	24%
		two-way	**9053**	**9796**	**12229**	**12108**	**3176**	**2312**	**35%**	**24%**
4	A508 (south of M1J15)	NB	897	876	835	964	-62	88	-7%	10%
	A508 (south of M1J15)	SB	1149	1229	1229	1241	80	12	7%	1%
		two-way	**2046**	**2105**	**2064**	**2205**	**18**	**100**	**1%**	**5%**

*see Figure 12 Reference Case Forecast Report (**Appendix 23**)

8.49 The V/C difference plots provided at Appendix E of the Reference Case Forecast Report and summarised at Table 14 of that report indicated that many of the junctions surrounding the SRFI site would be subject to congestion in the peak hour periods

8.50 Overall, the 2031 Reference Case NSTM2 modelling supports the conclusions drawn from the manual assessment work, that existing congestion at M1 Junction 15 and along the A508 will worsen in the future due to background traffic growth.

2031 Development Case no highway mitigation (G1 scenario)

8.51 Once the NSTM2 was available, it was used to model the impact of the development traffic for the 2031 (G1) Development Case no highway mitigation scenario described in **Table 6.2**. This scenario includes full build out of the SRFI, with the SRFI access and A508 dualling in place, but no other highway mitigation measures.

8.52 The initial NSTM2 flow difference and VC plots for the G1 scenario are provided at Appendix B of TN6 (**Appendix 11**). The final NSTM2 outputs for the G1 scenario are provided at Appendix B of the Development Case Forecast Report, including the flow difference and traffic reassignment plots for the G1 scenario.

8.53 Both the initial and final NSTM2 modelling showed similar development impacts, and therefore this section focuses on the final NSTM outputs. Extracts of the traffic reassignment plots for the final NSTM2 modelling are provided at **Figure 8.3** and **Figure 8.4**.

8.54 The reassignment plots show that as a result of the development traffic there is a notable reassignment of background traffic in the morning peak hour away from routes that pass near to the development and M1 Junction 15. The key routes affected are the A508 and A45, along with the M1 to the south of Junction 15, which see two-way traffic reassignment of around 505 vehicles, 446 vehicles and 121 vehicles, respectively, away from these routes.

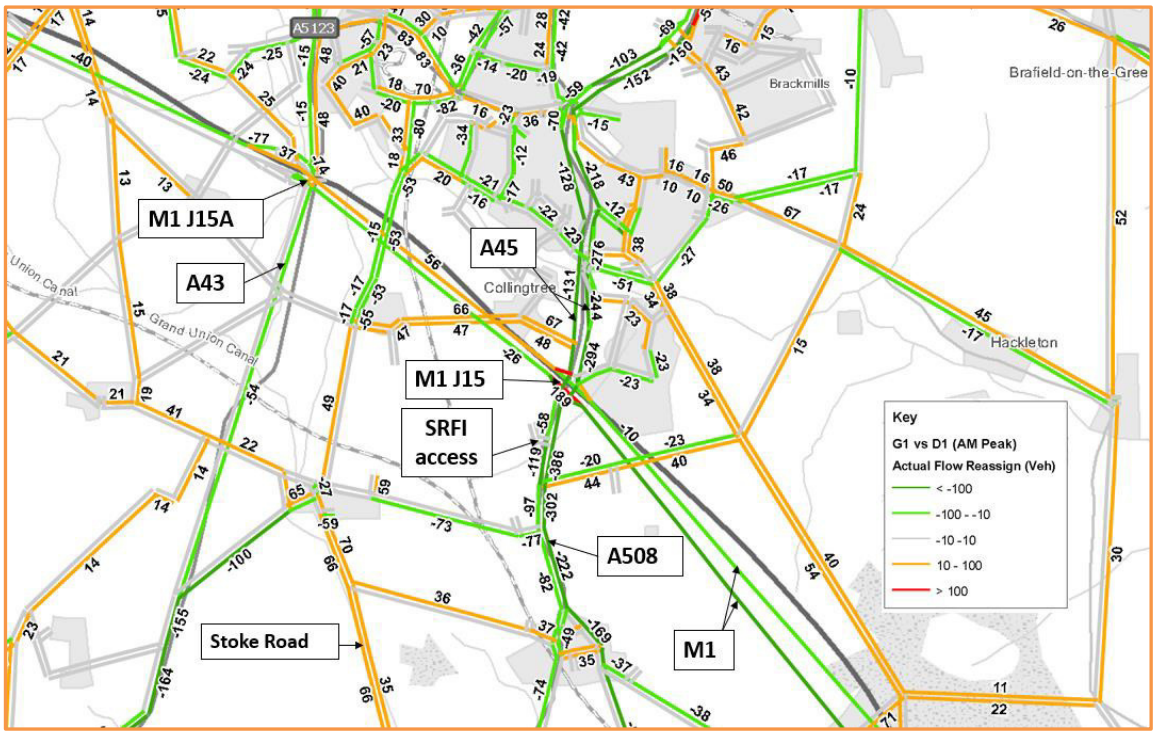


Figure 8.3: AM peak hour background traffic reassignment in 2031 Development Case no highway mitigation (G1 scenario) compared to 2031 Reference Case (D1 scenario)

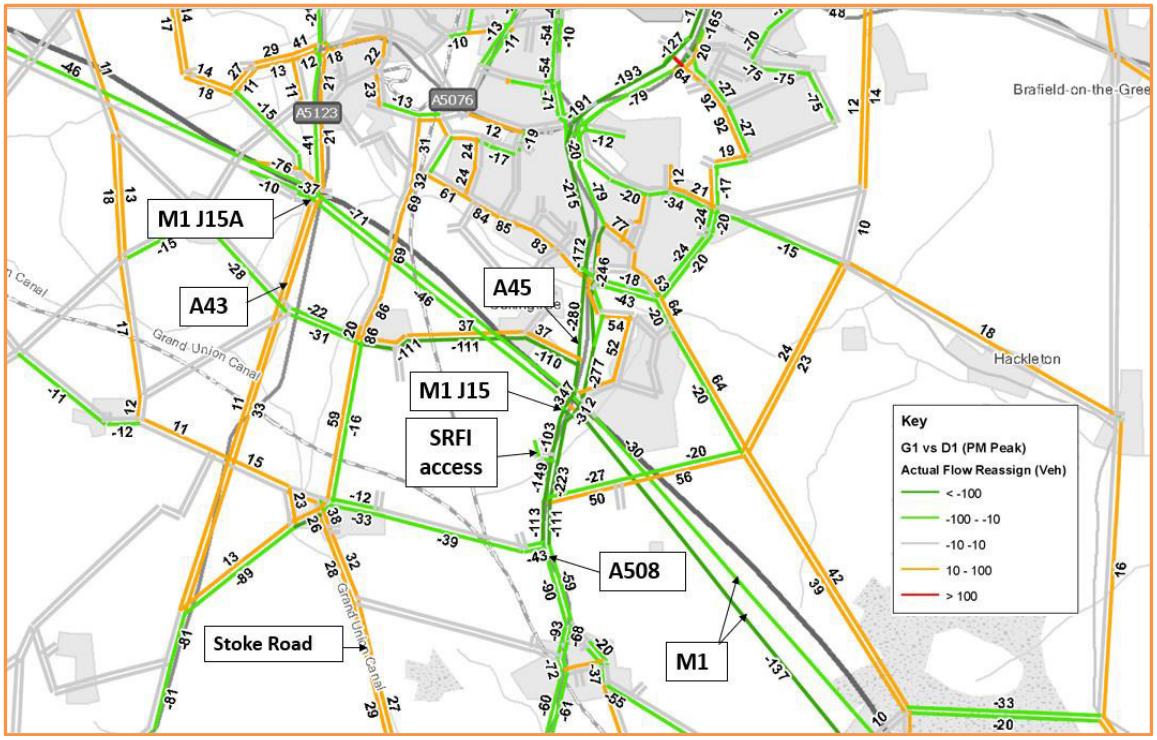


Figure 8.4: PM peak hour background traffic reassignment in 2031 Development Case no highway mitigation (G1 scenario) compared to 2031 Reference Case (D1 scenario)

8.55 Similar impacts are forecast in the evening peak hour, with background traffic reassigning away from the A508 and M1 Junction 15. Reductions of around 372 vehicles, 705 vehicles, and 167 vehicles in two-way traffic flows on the A508, A45 and M1 are forecast.

8.56 Background traffic is being dispersed across a variety of other local routes to avoid the A45, A508 and M1 Junction 15.

8.57 As described at paragraphs 7.24 and 7.25 of **Chapter 7.0**, the initial NSTM2 turning count data for M1 Junction 15 for the G1 scenario was used to examine the impact of the development traffic at M1 Junction 15 compared to the 2031 Reference Case (D1 scenario). This demonstrated that, unmitigated, the development traffic would have a significant impact of the performance of M1 Junction 15, with considerable deterioration of practical reserve capacity (PRC) and total delay in 2031 for both the morning and evening peak hours.

8.58 These findings were subsequently reconfirmed using the final NSTM2 G1 and D1 datasets as presented at **Table 10.3** in **Chapter 10.0** of this TA. The LinSig model of the existing junction was updated to include the final NSTM2 flow sets for the 2031 (D1) Reference Case and 2031 (G1) Development Case no highway mitigation scenarios. The model results show that the junction would operate above its maximum capacity in both the Reference Case and Development Case no highway mitigation scenario; PRC values are negative indicating that one or more links are operating above 90% of their capacity.

8.59 **Table 10.3** shows that without highway mitigation, the performance of the junction deteriorates by 31.9% in the morning peak hour (-100.1% vs -132.0%) and by 38.3% in the evening peak hour (-54.7% vs -93.0%) due to the development. Therefore, as identified in TN5, the development would have a significant impact on performance with considerable deterioration of PRC and total delay in the 2031 assessment year for both the morning and evening peak hours.

8.60 The assignment of the development traffic to the unmitigated highway network is shown in the select link analysis (SLA) NSTM2 plots provided at **Appendix 43**. The SLA plots are broken down into morning and evening peak hour with plots showing arrivals and departures in pcus.

8.61 The SLA demonstrate that the majority of the development traffic travels to and from the north of the SRFI, via M1 Junction 15. However, without highway mitigation some of the development traffic would use nearby alternative routes to avoid M1 Junction 15 instead of travelling to and from M1 Junction via the A508.

8.62 A comparison of the change in V/C ratios between D1 and G1 scenario is provided at Tables 9 and 10 of the Development Case Forecast Report for the morning and evening

peak hour periods. This shows that most junctions in the study area would already be at or approaching capacity in the 2031 Reference Case (D1 scenario). In the G1 scenario the development traffic would lead to a deterioration in performance at M1 Junction 15, A508 Rookery Lane/Ashton Road junction and the A508/Northampton Road junction in Roade.

8.63 Extracts of the NSTM2 HGV traffic flow plots (**Appendix 43**) showing the forecast HGV traffic flows in the 2031 Reference Case (scenario D1) and the 2031 Development Case no highway mitigation (scenario G1) are provided at **Figure 8.5** for the area to the south of the SRFI site for the morning peak hour period. The equivalent evening peak hour comparison is provided at **Figure 8.6**.

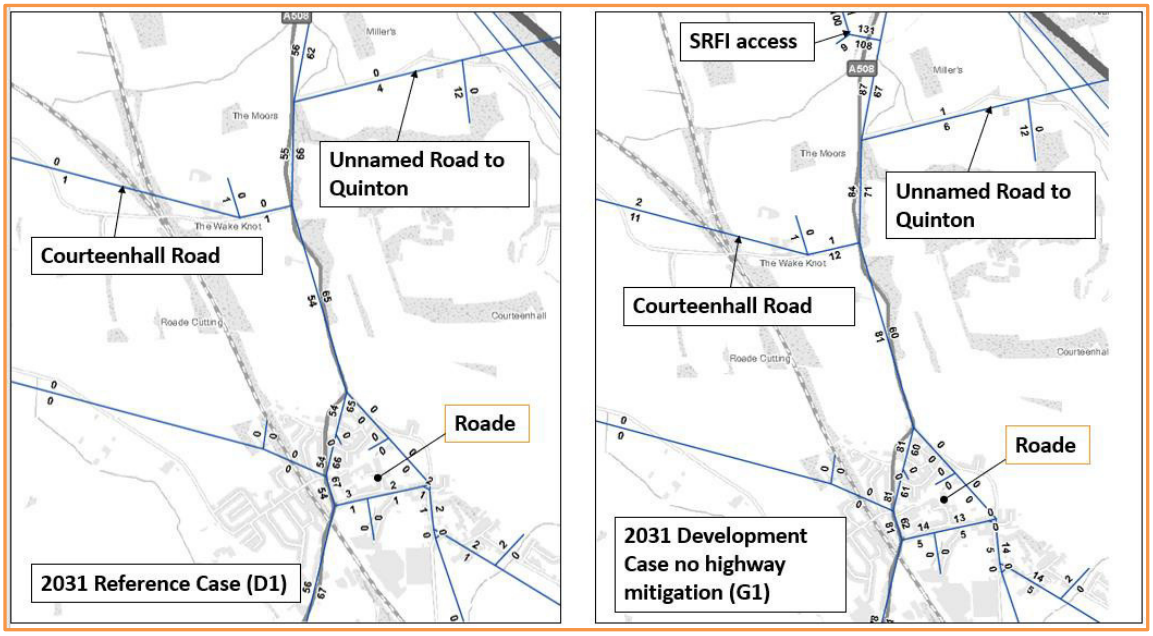


Figure 8.5: 2031 Reference Case (D1 scenario) HGV traffic flows compared to 2031 Development Case no highway mitigation (G1 scenario) HGV traffic flows (in vehicles) – AM peak hour (final datasets)

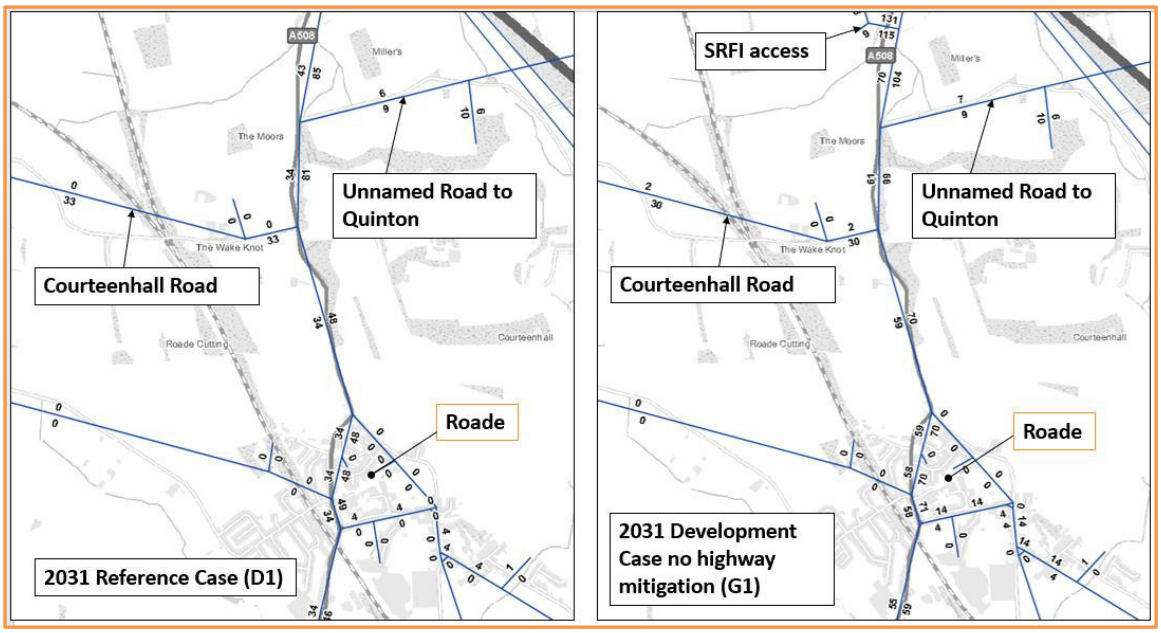


Figure 8.6: 2031 Reference Case (D1 scenario) HGV traffic flows compared to 2031 Development Case no highway mitigation (G1 scenario) HGV traffic flows (in vehicles) – PM peak hour (final dataset)

8.64 **Table 8.4** summarises the forecast change in two-way HGVs movements on the A508 and High Street through Roade and on Blisworth Road (Courteenhall) and the unnamed road between the A508 and Quinton with the development in place but no highway mitigation. The table shows that there would be increases in HGV traffic flows compared to the Reference Case through Roade and on Blisworth Road in the morning peak hour, when some departing development HGVs are forecast to use this route to access the A43, passing through Blisworth village.

Table 8.4: Summary of forecast change in two-way HGV traffic flows to the south of the SRFI site in the 2031 Development Case no highway mitigation (G1 scenario), relative to 2031 Reference Case (D1 scenario)

peak	link	two-way HGV traffic flow in vehicles		
		D1 scenario (final dataset)	G1 scenario (final dataset)	difference (% change)
AM	A508 through Roade	121	143	+22 (18%)
	High Street in Roade	4	19	+15 (375%)
	Blisworth Road(Courteenhall)	1	13	+12 (830%)
	Unnamed Road to Quinton	4	7	+3 (75%)
PM	A508 through Roade	83	129	+46 (55%)
	High Street in Roade	4	18	+14 (286%)
	Blisworth Road(Courteenhall)	33	32	-1 (-3%)
	Unnamed Road to Quinton	15	16	+1 (7%)

8.65 The following conclusions were drawn from the findings of the 2031 Reference Case (D1 scenario) and the 2031 Development Case no highway mitigation (G1 scenario) NSTM2 modelling work:

- the addition of the development traffic would exacerbate congestion at M1 Junction 15 leading to a considerable deterioration of PRC and total delay in 2031 for both the morning and evening peak hours;
- M1 Junction 15 in its present form is a constraint on growth in the area;
- this, combined with the constraints on the A508 through Roade would lead to the displacement of background traffic from the A508 and A45 to use alternative routes on local roads to avoid the A508 and M1 Junction 15;
- unmitigated the development has potential to increase the number of HGV passing through Roade on the A508; and
- unmitigated some departing SRFI HGV traffic may use Blisworth Road (Courteenhall) to access the A43, and in doing so pass through Blisworth village.

8.66 These findings supported the conclusion of the initial manual assessment work that an appropriate strategy for the highway mitigation would be to provide a major improvement at M1 Junction 15 and a bypass for Roade, with the aim of drawing the identified displaced traffic back to the A508 and SRN and away from less suitable alternative routes.

8.67 The findings also suggested that a scheme of HGV management measures to control and restrict HGV movements on the local roads to the south of the SRFI site, in combination with the proposed A508 Roade Bypass, would be beneficial.

2031 Development Case with incremental highway mitigation

Incremental highway mitigation J1, J1a and J0 scenarios

8.68 The M1 Junction 15 and A45 major upgrade and A508 Roade Bypass schemes that were identified as part of the manual assessment work reported in **Chapter 7.0** were coded into the NSTM2 and the impact of those highway mitigation works on development and background traffic assignment was considered as part of the J1 scenario modelling.

8.69 In addition, in response to local concerns regarding potential HGV impacts to the south of the SRFI and the initial findings regarding the potential for some departing development HGV traffic to use Blisworth Road (Courteenhall), the design of proposed SRFI access was amended to require HGVs departing the site to travel north to M1 Junction 15. The

design of the amended SRFI access is described at paragraph 4.23 to 4.25 of this TA. The amended SRFI access was coded into the NSTM2 and this became Scenario J1a.

8.70 The 2031 J1 and J1a scenarios are described in **Table 6.3** and **Table 8.2**. The scenarios include full build out of the SRFI, with the SRFI access and A508 dualling in place, and the following highway mitigation measures:

- Junction 15 and A45 major upgrade;
- A508 Roade Bypass; and
- Right turn ban for HGVs departing the SRFI (J1a scenario only).

8.71 It should be noted, that whilst WSP modelled the right turn ban for development HGV traffic departing the SRFI, WSP did not model the ANPR camera enforcement. Therefore, the NSTM2 outputs include some departing HGV traffic U-turning at M1 Junction 15 and then travelling southbound on the A508, rather than travelling south on the M1 or via Junction 15A and the A43. For capacity assessment purposes these U-turning HGVs have not been removed as their inclusion represents a worst-case assessment. However, in reality the HGV routeing strategy described at paragraphs 4.38 to 4.41 of this TA, which would include the ANPR camera enforcement regime and new 7.5T environmental weight restrictions that would complement existing restrictions, will restrict SRFI HGV traffic from accessing local roads and passing through the surrounding villages.

8.72 The resulting J1 and J1a flow difference plots[28], relative to the 2031 Reference Case (D1 scenario) are provided in Appendix C of the Development Case Forecast Report **Appendix 24**. There is little difference between the J1 and J1a flow difference plots, which is to be expected because only 14% of the departing HGV development traffic is affected by the right turn ban, and overall the proportion of HGV traffic to other user classes is relatively low. Extracts of the 'D1 vs J1a' flow difference plots for the AM and PM peak hours are shown at **Figure 8.7** and **Figure 8.8**, respectively.

[28] The NSTM2 outputs presented are from the post HGV correction work that is described at paragraphs 8.26 to 8.28. The initial outputs are provided at Appendix B of TN6.

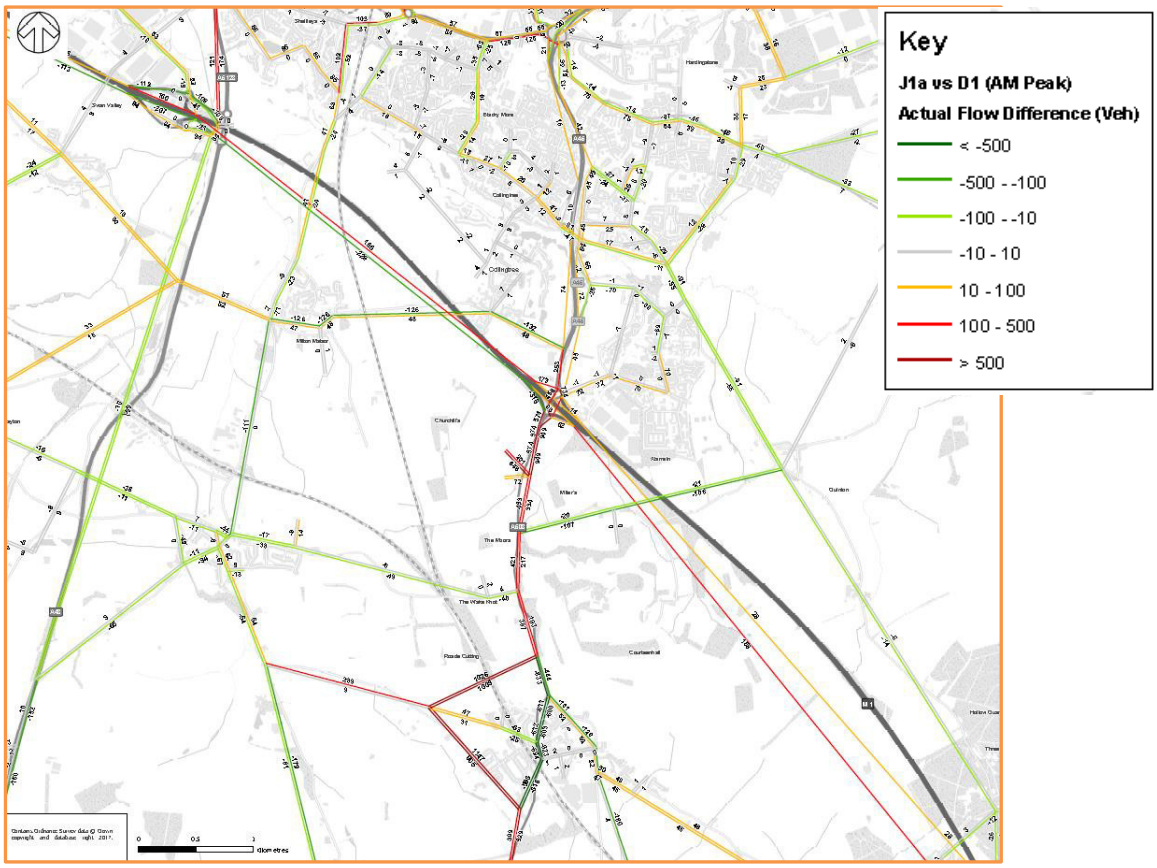


Figure 8.7: AM peak actual flow difference plot in 2031 Development Case with incremental highway mitigation (J1a) compared to 2031 Reference Case

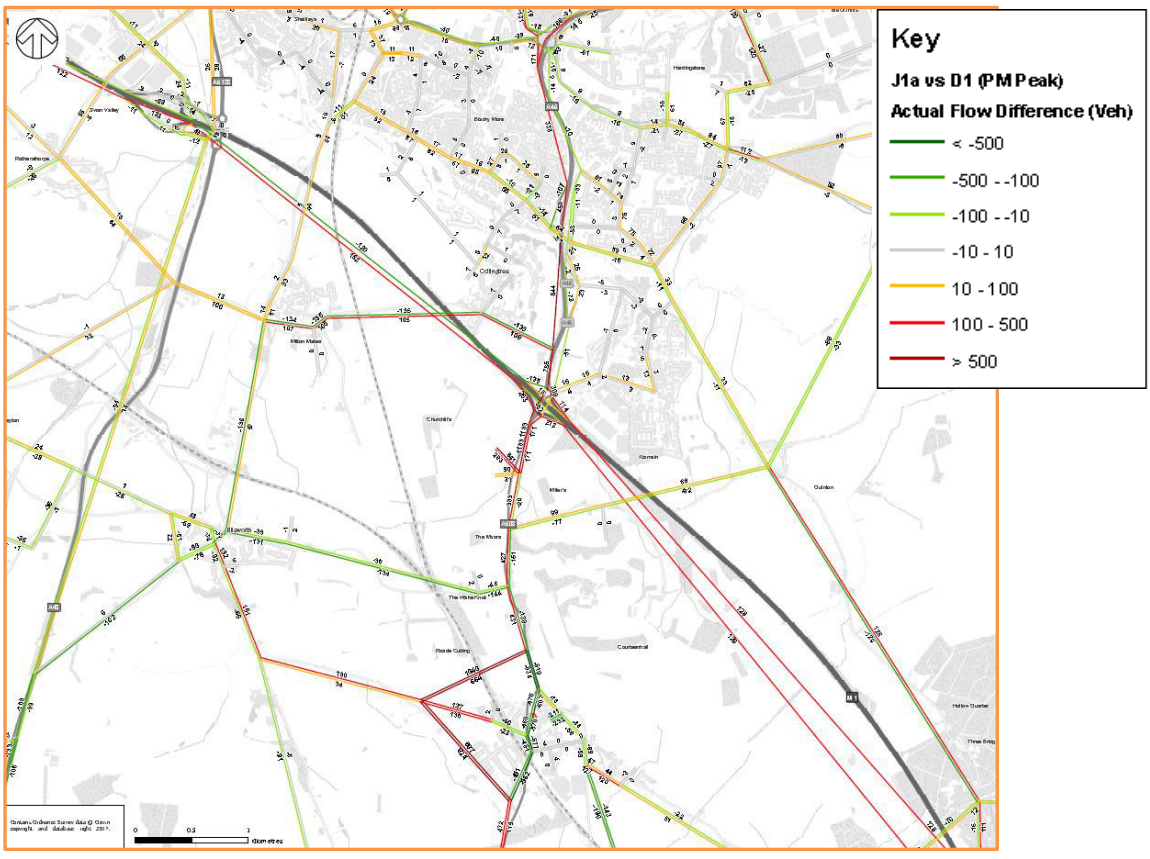


Figure 8.8: PM peak actual flow difference plot in 2031 Development Case with incremental highway mitigation (J1a) compared to 2031 Reference Case

8.73 With the identified mitigation in place, the flow difference plots for J1a scenarios show significant increases in northbound and southbound traffic flows on the A508 in the morning peak hour and significant increases on the A508 northbound in the evening peak hour, compared to the 2031 Reference Case (D1). This is because the proposed highway improvements at M1 Junction 15 and the Roade Bypass release existing constraints on the A508 and draw background traffic back onto this route.

8.74 Corresponding reductions in traffic flows are forecast on the surrounding roads, including significant reductions in traffic flows in the order of 1,200 two-way vehicles in the morning peak hour and 1,000 two-way vehicles in the evening peak hour on the A508 through Roade due to Roade Bypass. A reduction in traffic flow on the A43 was also forecast, in part because the A508 is now able to accommodate more of the background traffic growth.

8.75 It was noted however that a decrease in traffic is forecast on the A508 south of the SRFI access in the vicinity of the A508 / Blisworth Road (Courteenhall) junction. It was considered that this was related to increased delay for vehicles turning right from the A508 into Blisworth Road, leading to additional delay for A508 southbound traffic. This is considered further at paragraphs 8.101 to 8.111 of this chapter, as part of the A508 corridor route upgrade.

8.76 Traffic increases are also observed on the A45 and M1 in both peak hours that (except for the A45 southbound) were consistent with SRFI traffic arriving and departing the SRFI site.

8.77 **Figure 8.7** and **Figure 8.8** show that there would be a consequential reduction in traffic flows on many of the local roads surrounding the SRFI.

8.78 In the morning peak hour, reductions in traffic flows are forecast on Stoke Road, Blisworth Road (Courteenhall), Towcester Road, Northampton Road, Collingtree Road, the unnamed road between the A508 and Quinton, and Wootton Road. Traffic increases are forecast on Knock Lane, due to background traffic switching from Stoke Road to Knock Lane to access the A508 via the new bypass.

8.79 In the evening peak hour, reductions are similar for traffic travelling northbound on the local roads. However, increases in southbound traffic are seen on some of the roads, particularly Wootton Road and Northampton Road. It was considered that this was linked

to the increased delay for southbound A508 traffic at the A508 / Blisworth Road (Courteenhall) junction referred to above.

8.80 In the evening peak hour an increase in westbound traffic was also forecast on Watering Lane and Collingtree Road, passing through Collingtree and Milton Malsor. Although, this is accompanied by a greater forecast reduction in traffic travelling eastbound along this route, it was noted for further analysis.

8.81 As part of the initial NSTM2 assessment work an additional scenario (J0) was also modelled. This was the same as the J1 scenario, but without the Roade Bypass. It included full build out of the SRFI, with the SRFI access and A508 dualling in place and the M1 Junction 15 and A45 major upgrade.

8.82 The 'D1 vs J0' flow difference plots are provided at Appendix C of the Development Case Forecast Report (**Appendix 24**) along with the V/C plots. These show that with the M1 Junction 15 and A45 major upgrade in place congestion at M1 Junction 15 is relieved and traffic flows increase along A45 and A508, as traffic is drawn back onto these roads in the vicinity of the junction. However, without the Roade Bypass, the constraint through Roade is not released and traffic increases are forecast on routes that run parallel to A508, particularly through Aston and Blisworth, to access the improved M1 Junction 15. There is increased congestion through Roade as shown on the V/C plots, particularly in the morning peak hour, and HGV impacts on the A508 through Roade are not addressed.

8.83 The findings for the J1, J1a and J0 scenarios were presented to the Transport Working Group at the meeting on 22 June 2017, along with the findings of the initial VISSIM micro-simulation modelling work using VISSIM cordons extracted from the NSTM2 2031 Reference Case (D1 scenario) morning and evening peak hour datasets. As reported in more detail in the following section, the VISSIM work identified an existing congestion issue at M1 Junction 15A in the 2031 Reference Case (D1 scenario) that would be exacerbated by development traffic using the M1 mainline. It was considered that this was resulting in background traffic reassigning way from the M1 northbound between J15 and J15A to use the C67 Watering Lane through Collingtree and the local roads around Milton Malsor as noted at paragraph 0.

8.84 It was agreed with the Transport Working Group that the mitigation strategy should include the M1 Junction 15 and A45 major upgrade and A508 Roade Bypass, and that work should be undertaken to identify an improvement scheme to address the existing congestion issue identified at M1 Junction 15A.

Incremental highway mitigation Scenario J1b

8.85 This section summaries the development of the highway mitigation scheme at M1 Junction 15A. Full details of the need and development of the proposed highway mitigation at M1 Junction 15A are provided at Technical Note 6 (**Appendix 11**). Therefore, only a summary is provided below, and reference should be made to the TN6 for further detail.

8.86 The impact of the proposed development at M1 Junction 15A was assessed in TN6 using the initial NSTM2 turning counts for the 2031 Reference Case (D1 scenario) and 2031 Development Case with incremental highway mitigation (J1a scenario). Using Junctions 8, an ARCADY model of the existing junction layout was constructed and agreed with the Transport Working Group so that is could be used as the assessment tool.

8.87 The results of the assessment are summarised at Table 2 of TN6 (and provided in full at Appendix D of TN6). These show that both the northern and southern roundabouts at M1 Junction 15A would operate over capacity in the morning and evening peak hours, with the M1 northbound off-slip approach to the southern roundabout suffering from significant delay and queueing in the 2031 Reference Case (D1 scenario). Table 2 of TN6 shows that the impact of the development in the 2031 Development Case with incremental highway mitigation (J1a scenario) on the performance of the junction is not significant, although queueing and delay on the M1 northbound off slip would increase, particularly in the evening peak hour.

8.88 As part of the assessment process the approved VISSIM micro-simulation model of M1 Junction 15 & 15A network (see **Chapter 10.0**) was also used as an assessment tool.

8.89 The VISSIM model was originally run with traffic flows extracted from NSTM2 for the initial 2031 Reference Case (D1 scenario)[29] to establish the baseline line conditions at M1 Junction 15 for the future year. However, the VISSIM model revealed a future congestion issue at M1 Junction 15A, as the modelling showed queues begin to develop on the M1 northbound and M1 southbound approaches to M1 Junction 15A in the 2031 Reference Case scenario. Similar issues are also observed in the 2021 DfT 02/2013 Circular compliant Reference Case (C1 scenario). The queues quickly propagate back to the mainline, causing significant delay in both peak hours, but especially in the evening peak hour. Screenshots from the 2031 Reference Case (D1 scenario) VISSIM model clearly

[29] Based on the pre-HGV correction NSTM outputs, as described at paragraphs 8.26 to 8.28.

demonstrate this issue and these are presented at Appendix C of TN6. These findings were later confirmed using the final NSTM2 outputs including for all highway mitigation and are reported at **Chapter 10.0** of this TA.

8.90 The queueing issue at M1 Junction 15A is not caused by the proposed development as it is evident in the DfT 02/2013 Circular compliant (C1 scenario) and 2031 Future Year Reference Case (D1 scenario) VISSIM models. However, as discussed in TN6, the large queues on the M1 mainline and the presence of development traffic was seen to interfere with the operation of M1 Junction 15.

8.91 The development adds traffic to the M1 northbound between J15 and J15A, however as shown at the flow difference and reassignment plots provided at Appendix B of TN6 for the initial 'D1 vs J1a' peak hours, up to 248 vehicles reassign away from this section of the M1, as they are displaced by development traffic. The development would therefore exacerbate existing congestion issue at M1 Junction 15A, resulting in reassignment of background traffic onto inappropriate routes, leading to impacts at other locations, such as Collingtree. Based on this evidence, it was concluded that a mitigation scheme should be developed at M1 Junction 15A to remove the requirement for traffic to reassign away from the M1.

8.92 The proposed highway improvement scheme at M1 Junction 15A is described in detail in TN6 and the resulting preliminary junction arrangement is shown on drawing NGW-BWB-GEN-XX-SK-C-SK20-S3-P2 that is included in TN6. The improvement comprises alterations to both the southern and northern roundabouts, including widening and signalisation of the A43 and M1 northbound off-slip approaches to the southern roundabout, widening of the A5123 approach and signalisation of the A43 northbound approach to the northern roundabout. The geometric design of the scheme was further developed as detailed in the GDSR1 (**Appendix 28**) and is shown on the DCO **Highway Plans 2.4F**.

8.93 The performance of the junction with the proposed mitigation scheme was modelled using the initial 2031 Development Case NSTM2 turning counts (J1a scenario), in the peak hour periods, using LinSig and the results are provided at Table 5 of TN6. This demonstrated that the mitigation scheme would provide significant betterment in the performance of the junction when compared to the 2031 Future Year Reference Case (D1 scenario). The improvement scheme was therefore taken forward for modelling in the NSTM2, which became scenario J1b.

8.94 The NSTM2 outputs for Scenario J1b are included at Appendix C of the Development Case Forecast Report (**Appendix 24**). With the Junction 15A improvement in place, the pattern of traffic flow changes around the A508 and M1 Junction 15 remain consistent with the previous incremental scenarios. However, in addition there are also traffic flow increases in the vicinity of M1 Junction 15A, relative to the Reference Case, as the improvements to the junction increase capacity and in turn attract background trips from the surrounding area.

8.95 As noted at paragraph 4.21 of TN6, it would be important to confirm the improvement in junction performance once the final NSTM2 traffic data was available, following further iterations of the NSTM2 modelling and taking into account all reassignment effects associated with the overall highway mitigation measures. The suitability of the improvement scheme based on the DfT 02/2013 Circular compliant assessment scenario would also be required following the availability of traffic data for this scenario from the NSTM2.

8.96 This been reconfirmed using the final NSTM2 datasets and is reported at paragraphs 10.63 to 10.67 and **Table 10.5** and **Table 10.7** of this TA for the 2031 Future Year scenario and at **Table 10.6** and **Table 10.8** for the DfT 02/2013 Circular compliant assessment scenario.

Incremental highway mitigation Scenario J1c

8.97 Having identified the need, and developed appropriate improvement works at M1 Junction 15, 15A and the A508 Roade Bypass, it was evident that the combined impact of the development traffic and the proposed highway works is a significant reassignment of background traffic onto the A508. This is a desirable outcome as the A508 is an important primary route, part of NCC's Strategic Freight Road Network and has been identified in the DfT consultation as part of the proposed Major Road Network (see paragraph 3.28). The highway mitigation proposals release the existing constraints that allow M1 Junction 15 the A508 to accommodate the development traffic and additional background traffic. This leads to a consequential reduction in traffic on many of the local roads and villages surrounding the SRFI.

8.98 The capacity of the A508 to accommodate the reassigned background traffic was confirmed as described at paragraph 2.7 of TN8 (**Appendix 13**). This was subsequently updated and reconfirmed using the final NSTM2 (J1d scenario) traffic flows as included at **Appendix 42**.

8.99 However, the changes to traffic flows have the potential to adversely impact on the operation of key junctions along the A508. Therefore, the NSTM2 outputs were interrogated to determine the scale, location and cause of any impacts due to the combination of the proposed development and the associated highway mitigation works.

8.100 That assessment is also presented in TN8, and for the reasons explained in that report, it was identified that improvement works were warranted at the following locations:

- A508 / Blisworth Road (Courteenhall) simple T-junction (study area junction 5);
- A508 / C26 Rookery Lane / C26 Ashton Road junction staggered crossroads (study area junction 9);
- A508 / C85 Pury Road ghost island T-junction (study area junction 10); and
- C27 Stoke Road / Knock Lane simple T-junction (study area junction 11).

A508 / Blisworth Road (Courteenhall) simple T-junction – study area junction 5

8.101 The impact of the proposed development at A508/Blisworth Road (formally referred to as Courteenhall Road in TN8) was considered in TN8 (**Appendix 13**) using the initial NSTM2 for the 2031 Reference Case (D1 scenario) and 2031 Development Case with incremental highway mitigation (J1a scenario)[30]. A detailed model of the existing junction was constructed using the PICADY module of Junctions 8 software so that it could be used as the assessment tool.

8.102 The results presented at the table at paragraph 3.9 of TN8 demonstrate that in the 2031 D1 Reference Case the junction is forecast to operate significantly over capacity. The high through flows on the A508 would mean there would be insufficient gaps in the mainline traffic flow for drivers to exit Blisworth Road, and there would be delays of nearly 5 minutes for traffic turning right into Blisworth Road. Further, since there is no provision for vehicles waiting to turn right into Blisworth Road to wait off-line, southbound traffic on the A508 also experiences significant delay.

8.103 The model results presented in TN8 show that the effect of the development proposals, which would draw existing traffic back to the A508 and increase northbound flow on the A508, would be to exacerbate these problems, with the operation of the junction forecast

[30] Based on the post-HGV correction NSTM outputs, as described at paragraphs 8.26 to 8.33.

to worsen within the 2031 Development Case (J1a scenario), leading to the reduction in southbound traffic using the A508, as reported at paragraph 8.75.

8.104 Options to improve the operation of the junction were considered, including a ghost island right-turn facility, traffic signals, and a left-in, left-out arrangement as discussed at paragraphs 3.10 to 3.14 of TN8. The left-in, left-out arrangement was selected as the most appropriate solution as shown at drawing NGW-BWB-GEN-XX-SK-C-SK23-S3-P1 included within TN8.

8.105 The geometric design of the scheme was further developed as detailed in the GDSR2 (**Appendix 29**) and is shown on the **Highway Plans 2.4C**.

8.106 The proposed arrangement provides a channelising island on Blisworth Road (Courteenhall) and a central island on the A508 to prevent drivers turning right into or out of Blisworth Road. The A508 in the northbound and southbound direction would provide a 4m wide carriageway with 1m hard strips, providing a clearance of 6m each side of the central island. This would provide sufficient room for one vehicle to pass another in the event of a breakdown. The existing bus stop layby and bus stop to the south of the junction would be relocated approximately 70 metres further south. A small right turn harbourage facility would also be provided for the Courteenhall Estate access. The prohibited turns are included on the DCO **Traffic Regulation Plans 2.6A**.

8.107 To understand the impact of the proposed scheme on traffic flows, the proposed left-in, left-out arrangement was modelled in the NSTM2, becoming the 2031 Development Case with incremental highway mitigation J1c scenario. The J1c scenario NSTM2 outputs are provided at Appendix A of TN8. The impact of the proposed scheme on traffic flows, compared to the J1b scenario, is described at paragraphs 3.15 to 3.18 of TN8.

8.108 In the morning peak hour, the proposed left-in, left-out arrangement was found to have a relatively localised impact. The delay at the existing junction associated with right turning traffic from the A508 to Blisworth Road is greater in the evening peak hour. Therefore, in removing that delay a more widespread impact on traffic flows was forecast in the evening peak hour. In the evening peak hour background traffic is forecast to reassign to the A508 southbound, away from local roads, particularly Wootton Road to the east of the M1, which was noted in paragraph 8.79 as being subject to an increase in traffic. The southbound traffic flow on the A508 was forecast to increase by nearly 500 pcus. The proposed junction would also deter the drivers from ‘rat running’ between the A508 and the A43 through Blisworth, which is a concern of residents as noted at paragraph 3.31.

8.109 The operation of the left-in, left out junction was modelled in PICADY using the J1c NSTM2 traffic flows as described at paragraphs 3.19 to 3.21 of TN8. This demonstrated that the junction would operation within 100% of capacity in each peak hour, and with a very significant reduction in queueing and delay as compared to the 2031 Reference Case (D1 scenario).

8.110 The scheme would significantly reduce the delay for southbound traffic on the A508 and overcome the problem of right turning traffic exiting Blisworth Road from blocking left turning traffic. The scheme was taken forward as part of the Stage 2 Statutory Consultation undertaken in October to November 2017. NCC confirmed in their consultation response that the principle of the left-in, left-out junction arrangement was accepted.

8.111 The findings are confirmed using the final NSTM2 data at **Chapter 10.0**, as described at paragraphs 10.76 to 10.78 and **Table 10.10**.

A508 / C26 Rookery Lane / C26 Ashton Road junction staggered crossroads - study area junction 9

8.112 Section 5 of the TN8 (**Appendix 13**) sets out the requirement for an improvement scheme at the A508/C26 Rookery Lane/C26 Ashton Road junction. The PICADY assessment of the junction presented at paragraph 5.7 of TN8 demonstrates that in the 2031 Reference Case (D1 scenario) the junction is forecast to be approaching capacity, with average delays of up to 88 seconds the Rookery Lane arm. In the 2031 Development Case with incremental highway mitigation (J1c) scenario, there would be higher northbound and southbound through flows as traffic reassigns onto the A508 due to the proposed highway improvements. This leads to a worsening in the performance of the junction. In addition, because the existing arrangement does not provide storage for right turning traffic, there are increased delays for A508 traffic. This is particularly the case for southbound traffic, due to the right turn movements from the A508 to the C26 Rookery Lane, a movement that is forecast to increase as a result of the development proposals.

8.113 In addition to the capacity considerations, the PIA assessment as referred to at paragraphs 3.69 to 3.74 of this TA and TNA (**Appendix 3**) shows that 11 accidents had been recorded in the area immediately south of the junction, including a cluster of four PIAs on the bend and one PIA that resulted in a fatality.

8.114 Analysis of the PIA data concludes that there is a trend of drivers losing control in the adverse road conditions, exacerbated by the horizontal and vertical alignment of the A508

in this location. The development proposals would increase traffic flows on this section of the A508, which could lead to an increase in the frequency of PIAs at this location. Therefore, given the capacity performance of the junction in the 2031 J1c Development Case scenario and the poor road safety record to the south of the junction, TN8 concluded that it would be appropriate to mitigate the development impact of the development.

8.115 TN8 proposed to realign and upgrade the junction to provide a staggered crossroads with ghost island harbourage facilities for right turning traffic from the A508. The scheme would improve the visibility for the minor arms, and the realignment works would remove the tight bend to the south of the junction, which is the location of the identified PIA cluster. The proposal was modelled in PICADY and the results, presented at paragraph 5.21 of TN8, demonstrated that the junction would operate acceptably in the 2031 J1c Development Case scenario, although the delay for traffic existing the side road would increase compared to the 2031 Reference Case (D1 scenario).

8.116 The then proposed mitigation scheme is shown at drawing NGW-BWB-GEN-SK-C-SK19-S3-P2 included in TN8 and was taken forward as part of the Stage 2 Statutory Consultation. Feedback on the junction design revealed that many residents who live close to the junction, and travel between Rookery Lane and Ashton Road, were concerned that the proposed ghost island arrangement could make it more difficult to cross the A508 when travelling between these two roads. Residents were also concerned that it would be more difficult to turn right out of the minor arms at the junction. Residents explained that currently these movements were made when right turning traffic slowed or stopped the ahead traffic on the A508, and there was concern the that proposed junction, which would remove the delay for right turners, would remove this opportunity. Local residents living in the properties just to the east of the junction also raised existing concerns regarding the lack of pedestrian and cyclist facilities, and the increased difficulties that could be associated with crossing the road to access the local facilities in Stoke Bruerne due to the increased traffic flow on the A508.

8.117 To address these concerns the junction proposal was amended to provide a large central island with right turn harbourages (known as single lane dualling). This will enable drivers turning right out of the minor roads, or going straight on, to make the turn in two moves, i.e. crossing during a gap in traffic from the right and then turning or crossing during a gap in traffic from the left. A pedestrian and cycle crossing point on the A508, making use of the large central island, and a footway on the east side of the A508 along the frontage of the properties are also proposed. The improvements include the realignment of the A508 to the south of the junction to improve road safety.

8.118 The resulting arrangement is as shown on the **Highway Plans 2.4E**. The junction improvement is included in the final NSTM2 2031 Development Case with highway mitigation (J1d scenario) and the satisfactory operation of junction arrangement is confirmed at **Chapter 10.0**, as described at paragraphs 10.85 to 10.87 and **Table 10.14**.

8.119 The updated scheme was included in the further consultation undertaken in December 2017 to February 2018.

A508 / C85 Pury Road ghost island T-junction – study area junction 10

8.120 The results presented at Section 6 of TN8 (**Appendix 13**) demonstrate that in the 2031 Reference Case (D1 scenario) the junction is forecast to be over capacity in the morning peak hour, with queueing and delay for the right-turn movement into C85 Pury Road. The junction would operate acceptably in the 2031 Reference Case (D1 scenario) in the evening peak hour.

8.121 In the 2031 Development Case with incremental highway mitigation (J1c scenario), the results presented at paragraph 6.2 in TN8 show that there would be a significant increase in the delay for right turning traffic exiting Pury Road. Although the volume of right-turning vehicles out of Pury Road is very low, the increased delay is due to the increase in A508 northbound and southbound traffic through the junction.

8.122 The results of the PICADY assessment in TN8 also showed that due to the high volume of vehicles turning right onto Pury Road, the queue would exceed the ghost-island storage capacity in the 2031 Reference Case (D1 scenario), which could lead to delay on the A508 southbound carriageway and create a possible road safety hazard due to the queueing traffic. TN8 showed that this queueing issue would be exacerbated in the 2031 J1c Development Case scenario.

8.123 Without fundamentally altering the junction layout, there are limited options to address the above identified deterioration in junction performance. Whilst upgrading the junction to a roundabout or a single lane dualling arrangement may better serve the right-turn movement from Pury Road, these options would encourage more traffic to use Pury Road as a cut through to the A5, which is not a desirable outcome.

8.124 Therefore, TN8 proposed to extend the length of the right-turn lane into Pury Road, providing additional storage to accommodate the forecast increased right turn queue. The proposed junction arrangement is as shown on the DCO Highway Plans referred to in

paragraph 4.35. The improvement would also include widening to the northbound and southbound A508 carriageway to provide 3.65m through lanes and a 3.5m right turn lane.

8.125 The proposal was modelled in PICADY and the results indicated that whilst the improvement scheme would not achieve a nil detriment improvement, it would provide significant reductions in delays as compared to the existing layout with the J1c traffic flow set. The proposed improvement was therefore taken forward to the Stage 2 Statutory Consultation.

8.126 The junction improvement is shown on **Highway Plans 2.4F**. It was included in the final NSTM2 2031 Development Case with highway mitigation (J1d scenario) modelling, and the operation of junction arrangement is presented at **Chapter 10.0** as described at paragraphs 10.88 to 10.92 and **Table 10.15**.

C27 Stoke Road / Knock Lane simple T-junction – study area junction 11

8.127 Section 4 of TN8 (**Appendix 13**) assesses the impact of the forecast traffic flow changes in the 2031 Development Case with incremental highway mitigation (J1c scenario) on Knock Lane and Blisworth Road (Roade). It was concluded that traffic flows on Knock Lane and Blisworth Road would increase as a result of background traffic switching to use this route to access the A508 via the new bypass, and also due to some additional traffic reassigning to use Knock Lane and Blisworth Road to access Blisworth due to the proposed left-in, left-out at the A508/Blisworth Road (Courteenhall) junction. However, whilst there is a high percentage increase (due to the very low background flows), total traffic using the route remains low, at around 285 vehicles two-way with a tidal nature consistent with arrival and departures from Blisworth in the peak hours. The review of the PIA data on Knock Lane and Blisworth Road (**Appendix 3**) and as summarised at paragraphs 4.6 to 4.9 of TN8 did not identify an existing accident problem that would be exacerbated by the increased traffic using the routes.

8.128 Notwithstanding the above, the C27 Stoke Road/Knock Lane T-junction was observed to be in a poor state of repair, with no road markings, with evidence of an existing drainage problem and vehicles overrunning the carriageway edge. There would be an increased number of turning movements using this junction and therefore the junction improvement shown at drawing NGW-BWB-GEN-XX-SK-C-SK29-S3-P2 provided in TN8 was proposed. This comprised widening Knock Lane to 5.5m on the approach to the Stoke Road junction, new road markings and improvements to drainage.

8.129 That scheme was taken forward to the Stage 2 Statutory Consultation. NCC in their response to the Stage 2 Statutory Consultation and via the Transport Working Group requested further localised widening at the C27 Stoke Road/Knock Lane junction and widening on the bend.

8.130 The widening of Knock Lane on the approach to the Stoke Road junction was therefore increased to 6 metres, and the kerb radius at the junction increased, to further mitigate against vehicles overrunning the carriageway at this location. The proposed scheme was also amended to widen the road to 5.5 metres around the bend between the two long straight sections of the road. This was to enable vehicles to pass more comfortably than present at this point where the visibility is reduced due to the bend. The proposed junction arrangement is as shown on the **Highway Plans 2.4F**.

8.131 The updated scheme was included in the further consultation undertaken in December 2017 to February 2018.

8.132 The residual impacts along Knock Land and Blisworth Road with the final NSTM2 traffic data are considered at **Chapter 10.0**, at paragraphs 10.93 and 10.104 of this TA. As part of that work in was agreed with NCC that the development would also provide a 'Knock Lane and Blisworth Road maintenance and minor works' fund, to be used by NCC in the event that the increased use of the road should advance the need for maintenance or other remedial works.

A508 Grafton Regis

8.133 Only a small amount of the development traffic (less than 30 two-way vehicles) would route along the A508 adjacent to Grafton Regis. However, as shown on the D1 vs J1c flow difference plots and flow reassignment plots provided at Appendix A of TN8 (**Appendix 13**), the traffic flows on this section of the A508 are forecast to increase by 284 two-way vehicles in the morning peak hour and 228 two-way vehicles in the evening peak hour. As shown by the flow reassignment plots, most of this traffic, 260 two-way vehicles in the morning peak hour and 205 two-way vehicles in the evening peak hour is background traffic reassigning away from local roads to use the improved A508. For example, two-way traffic flows though Grafton Regis on Church Street are forecast to reduce by 136 vehicles in the morning peak hour and 130 vehicles in the evening peak hour because of traffic switching from using Church Lane as a rat run, to use the A508.

8.134 There are no link or junction capacity constraints identified on this section of the A508. Therefore, whilst there would be an increase in traffic flows using the short section of the

A508 that has frontage with the village, this would be free flowing, subject to the 30mph speed limit, and would be off-set by traffic reductions through other parts of the village.

8.135 Nevertheless, the additional traffic would increase the severance associated with crossing the road to access the bus stop and footpath on the western side of the A508.

8.136 The development proposals therefore include the provision of a new pedestrian crossing with a central refuge on the A508. The existing northbound bus stop and footway would be retained and amended to accommodate the pedestrian crossing, and the layby removed. The crossing will allow pedestrians to cross the road in two stages, reducing the existing and future severance of the A508.

8.137 To accommodate the pedestrian refuge, it is necessary to provide localised widening of the A508 in vicinity of Church Lane. Church Lane itself would not be widened. The widening on the A508 to accommodate the pedestrian refuge provides the opportunity to provide a right turn harbourage facility for Church Lane, allowing vehicles turning right to safely wait out of the path of traffic on the A508. The new refuge will provide a channellising effect for through traffic on the A508, reinforcing the village setting and 30mph speed limit through the village.

8.138 The PIA assessment presented at Section 9 of the TNA (**Appendix 3**), noted that there were three recorded PIAs on the A508 adjacent to Grafton Regis, two of these at the junction with Church Lane. The proposed highways works would provide a right turn harbourage facility for drivers turning from the A508 into Church Lane. This will provide a safe area for drivers to wait for an appropriate gap in traffic, thereby improving the operation and safety at this junction.

8.139 The proposed improvement scheme is as shown on the **Highway Plans 2.4F**. This was taken forward as part of the Stage 2 Statutory Consultation. As part of their response to the Stage 2 Consultation NCC noted that a controlled crossing may be required to assist in accessing the bus northbound bus stop. The need for a signal crossing is examined at **Chapter 10.0**, paragraphs 10.110 to 10.115 of this TA, using the final NSTM2 traffic data. Based on an assessment of the final traffic flows, it is concluded that a controlled crossing is not required.

A45 Queen Eleanor Interchange and A45 Wootton Interchange

8.140 The operation of the A45 Queen Eleanor Interchange and A45 Wootton Interchange junctions were initially assessed in TN7 (**Appendix 12**) using the 2031 Development Case

with incremental highway mitigation (J1c scenario) NSTM2 traffic flows, relative to the 2031 Reference Case (D1 scenario).

8.141 TN7 determined that whilst there would be a deterioration in the performance of the A45 Wootton Interchange during the morning peak hour in the Development Case with incremental highway mitigation (J1c scenario) as compared to the 2031 Reference Case (D1 scenario), the layout of the junction is constrained on most approaches and opportunities for highway improvements are very restricted. Further, improving the capacity of the Wootton Interchange could lead to traffic rat-running through traffic clamed residential areas and therefore it was concluded that it would not be appropriate to promote an improvement scheme at the junction that could attract further increases in traffic flows.

8.142 TN7 determined that the A45 Queen Eleanor Interchange would operate above its maximum capacity in both the Reference Case and Development Case scenarios.

8.143 However, unlike Wootton Interchange, the A5076 Mere Way is dual carriageway and part of the Northampton Ring Road. It provides access to the A43 and the M1 via M1 Junction 15A, which would be improved as part of the highway mitigation strategy. For these reasons, it is an appropriate route for traffic to use as an alternative to access the M1 via M1 Junction 15.

8.144 TN7 concluded that rather than promote an improvement at the A45 Wootton Interchange that risks encouraging additional rat-running, it would be appropriate for the development to promote an improvement at the A45 Queen Eleanor Interchange, which could help to draw traffic away from the Wootton Interchange and discourage any additional rat-running through residential areas.

8.145 An appropriate improvement scheme was identified and is shown at drawing ADC1475/SK03 C provided within TN7.

8.146 The scheme provides widening on the A5076 Mere Way approach to lengthen the existing flared lane and reconfigures the lane allocation on the circulating carriageway to improve efficiency at the stoplines. The LinSig modelling included within TN7 demonstrated that the proposed scheme would deliver a significant improvement to junction performance in both the morning and evening peak hours when compared to the 2031 Reference Case.

8.147 The proposed scheme would therefore mitigate the impact of the development on the A45 Queen Eleanor Interchange. Since a better than nil detriment improvement is provided by the scheme, it is likely that some traffic shown to reassign through the A45 Wootton Interchange would be drawn onto the route via Newport Pagnell Road and the A5076 Mere Way at the Queen Eleanor Interchange.

8.148 The findings of TN7 were discussed with the Transport Working Group and NCC confirmed that they were developing a more comprehensive improvement scheme at the A45 Queen Eleanor Interchange, in addition to the NGMS works. Therefore, NCC requested that a financial contribution be secured as part of the DCO, equivalent to the cost of implementing the identified improvement works is made towards the more comprehensive improvement scheme, rather than implement the identified works in isolation. Highways England confirmed this is appropriate and acceptable. The larger improvement scheme, when identified, would be expected to significantly improve the performance of the interchange, further assisting in its ability to handle the traffic due to the development. The improved junction would also then be better able to accommodate the traffic which chooses to use the A5076 Mere Way to access the M1 and A43 via the improved M1 Junction 15A.

8.149 These findings were confirmed using the final NSTM2 outputs and this work was reported in TN10 (**Appendix 15**) and is summarised later in this chapter for both the DfT Circular 02/2013 compliant and 2031 Future Year scenarios. As part of this work, further reassignment effects of background traffic along the A5076 corridor were also examined and this is reported in TN10, TN10A (**Appendix 16**) and 11 (**Appendix 17**), which are also summarised later in this chapter.

2031 Development Case with all highway mitigation (Scenario J1d)

NSTM2 outputs

8.150 To confirm the suitability of the highway mitigation and to quantify the residual impacts once all reassignment effects were considered, all the identified highway mitigation was coded into the NSTM2 to give the 2031 Development Case with all highway mitigation scenario (J1d scenario).

8.151 The 'J1d vs D1 NSTM2 flow difference plots and reassignment plots are provided at Figures 27 and 29 and Figures 28 and 30 of the Development Case Forecast Report (**Appendix 24**), for the morning and evening peak hours, respectively. Extracts from the flow difference plots are provided at **Figure 8.9** and **Figure 8.10** for the morning and evening peak hour periods.

8.152 The flow difference plots show that increases in traffic are forecast to occur near M1 Junction 15 and along the A508. It can be seen from the reassignment plots that background traffic is drawn back to the A508 and through the M1 Junction. The mitigation scheme increases the capacity of the road network in these areas, which attracts additional traffic to the routes from the surrounding area.

8.153 This leads to a consequential reduction in traffic on many of the local roads and villages surrounding the SRFI, including the A508 Northampton Road and High Street through Roade; Blisworth Road/Courteenhall Road, Towcester Road, High Street, Northampton Road, and Chapel Lane in Blisworth, Rectory Lane in Milton Malsor, and Wootton Road through Quinton.

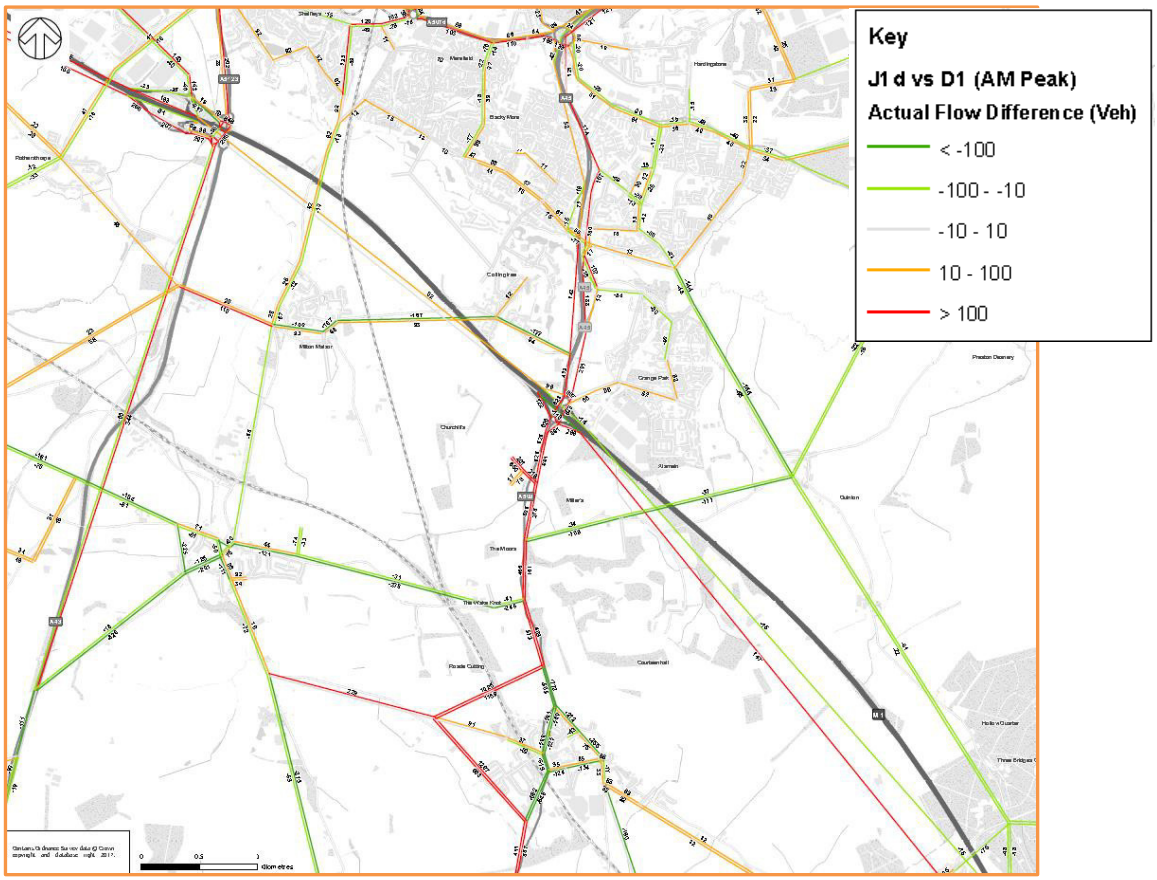


Figure 8.9: AM peak hour actual flow difference plot 2031 Development Case with highway mitigation (J1d) compared to 2031 Reference Case (D1)

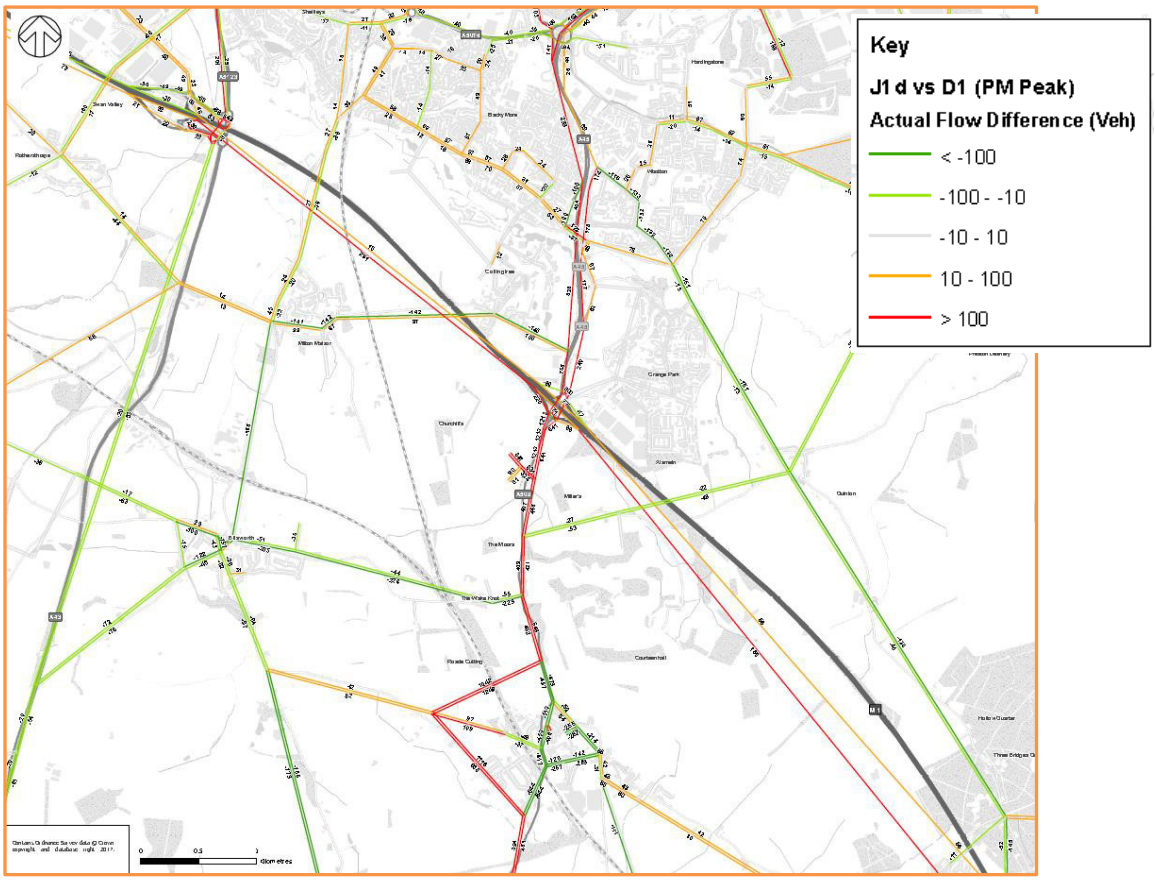


Figure 8.10: PM peak hour actual flow difference plot 2031 Development Case with highway mitigation (J1d) compared to 2031 Reference Case (D1)

8.154 The traffic flow changes observed in the 2031 Development Case with highway mitigation (J1d scenario) were consistent with the expectations from the earlier incremental highway mitigation NSTM2 outputs. Therefore, it was concluded that no further NSTM2 modelling was required as all significant reassignment effects of the highway mitigation had been captured.

8.155 The J1d NSTM2 traffic flows were therefore exported from the NSTM2 and the equivalent DfT 02/2013 Circular compliant NSTM2 model runs were completed. The resultant assessment flows are as identified at **Table 9.1** and **Table 9.2** of **Chapter 9.0**. They are used to confirm the appropriateness of the proposed highway mitigation works, as summarised at **Chapter 10.0**.

Residual impacts at study area junctions to the north of the M1, including the A45

8.156 Having accounted for the reassignment effects associated with the highway mitigation, the impact of the development proposals on the study area junctions to the north of the M1, including the A45 were assessed using the final NSTM2 outputs, followed by detailed junction modelling of the study area junctions using the traffic flows listed at **Table 9.1** for the 2031 Future Year. In addition, for those junctions that are part of the SRN, detailed

assessment was undertaken using the DfT 02/2013 Circular compliant traffic flows listed at **Table 9.2**.

8.157 That work is presented in the following technical notes and therefore only a summary is provided in the following sections and reference should be made to the technical notes for the full assessment work:

- TN10 - Impacts north of the M1 including the A45 corridor (**Appendix 15**);
- TN10 Addendum - Impacts north of the M1 including the A45 corridor (**Appendix 16**); and
- TN11 – Impacts at junctions along the A5076 corridor (**Appendix 17**).

Assessment results

8.158 The NSTM2 analysis included in TN10 demonstrate that with the development and highway mitigation in place, traffic flows at the southern end of the A45 (between M1 Junction 15 and the Queen Eleanor Interchange), generally increase in line with the development traffic assignment, with the improvement scheme at M1 Junction 15 providing additional capacity. Nevertheless, the highway improvements at M1 Junction 15A, and the proposed change to the A508/Blisworth Road junction to become left-in, left-out, combine to draw background traffic that is bound for the A43 and the M1, away from M1 Junction 15 and the southern end of the A45. Instead this traffic uses the A5076 Mere Way/Danes Camp Way Southern Ring Road route from the A45 Queen Eleanor Interchange to access the A43 and M1 via M1 Junction 15A.

8.159 North of the A45 Barnes Meadow Interchange no significant increases in traffic flows on the A45 in the Development Case with highway mitigation scenarios are forecast as compared to the Reference Case scenarios. However, analysis included within TN10 shows that development traffic is present on this section of the A45, and therefore local background traffic is reassigning away from this route. This reassignment occurs because north of the Barnes Meadow Interchange the link capacity of the A45 is forecast to be exceeded at several locations in both the DfT 02/2013 Circular compliant Reference Case (C1 scenario) and 2031 Future Year Reference Case (D1 scenario). This is due to the forecast growth in background traffic, including that associated with the committed and planned development in Northamptonshire, and is an existing problem with or without the addition of the development traffic. The displaced traffic reassigns across multiple routes and disperses across the road network.

8.160 Detailed models were constructed and used to assess the impact of the development traffic and the reassigned traffic of study area junctions 12 to 23 (as defined at paragraph 6.19 and **Figure 6.1**), which includes all relevant junctions on the A45, the A5076 Mere Way/Danes Camp Way corridor, the key junctions on the Inner Ring Road and junctions north of M1 Junction 15A. This work is reported in TN10.

8.161 After considering the detailed junction modelling, NCC identified several turning movements at junctions within the TN10 study area which they consider materially differ from single day observed turning count data. It is considered that the NSTM2 junction turning movements would be unlikely to correlate to observed turning counts in all instances for the following reasons:

- the NSTM2 has been calibrated and validated with a greater weight applied to the observed two-week ATC link count data and therefore is more representative of actual traffic flow volumes than a single day observed turning count;
- the turning proportions at study area junctions will change in the future assessment years due to committed and allocated site-specific development growth, and changes to route choices associated with this and also committed infrastructure schemes; and
- the proposed Northampton Gateway SRFI highway mitigation works releases bottlenecks on the existing highway network that alter the route choices for existing drivers using the network.

8.162 Whilst NCC accepted the above, they maintain that the differences between modelled and observed turning movements at the junctions they highlighted are significant enough to warrant further investigation and manual adjustments where appropriate. TN10A and TN11 (**Appendices 16 and 17**) therefore considers appropriate manual corrections to the anomalous turning movements highlighted by NCC and presents the findings of sensitivity capacity assessments at the effected junctions.

8.163 The junction modelling presented in TN10, TN10A and TN11 demonstrates that there would not be a severe impact the study area junctions when considering the PRC for the junctions and total delay. However, when considering the junctions in more detail, localised impacts were identified at the following locations:

- the A5076 Mere Way approach to the A45 Queen Eleanor Interchange (study area junction 13);
- the A5076 Mere Way approach to the A5076 Danes Camp Way/Mere Way/Towcester Road gyratory ((study area junction 18); and

- the A5123 approach to the A5076 Danes Camp way/A5123 Upton Valley Way/A5075 Upton Way gyratory (study area junction 20).

8.164 NCC required that highway improvement schemes capable of mitigating the impact of the development and traffic reassignment effects at these locations were developed. The following highway improvement schemes are therefore identified, copies of which are included at **Appendix 57**.

- **Drawing ADC1475/SK03 D** as previously described in paragraphs 8.140 to 8.149 presents the improvement scheme at the A45 Queen Eleanor Interchange.
- **Drawing ADC1475/SK04 A** presents the improvement scheme for the A5076 Danes Camp Way/Mere Way/Towcester Road gyratory, as described at paragraph 4.36 of TN10.
- **Drawing ADC1475/SK05 A** presents the improvement scheme for the A5076 Danes Camp Way/A5123 Upton Valley Way/A5075 Upton Way gyratory, as described at paragraph 3.16 of TN11.

8.165 As NCC are developing a comprehensive improvement scheme at the A45 Queen Eleanor Interchange, it was recognised that flexibility regarding the timing and scope of the improvement works on the A5076 Danes Camp Way corridor would also be beneficial. Therefore, it is agreed with NCC that the development would provide a financial contribution equivalent to the cost of implementing the proposed improvement works at the two identified junctions described above on the A5076 corridor, along with that previously identified for A45/Queen Eleanor interchange. The contribution is to be used to deliver the proposed improvements, or as part of a wider package of improvements at the A45 Queen Eleanor Interchange and the A5076 corridor to be delivered by NCC.

Summary

8.166 This chapter has presented the evolution of the highway mitigation strategy using an iterative assessment process based upon strategic transport modelling using the NSTM2. The need for highway interventions have been identified by comparing the modelling outputs for the 2031 future assessment year for different assessment scenarios.

8.167 An assessment of the operation of the highway network in the 2031 Reference Case (without the proposed development) demonstrates that existing congestion at M1 Junction 15 and along the A508 will worsen in the future due to background traffic growth. The strategic transport modelling demonstrates that, without intervention, the background traffic growth on the A508 would be restricted and would fall far short of the average growth

in background traffic that is forecast for the Northamptonshire area up to 2031. The constraints on the A508 mean that the surrounding local road network would be required to accommodate a greater proportion of traffic growth in the 2031 Reference Case.

8.168 An assessment of the impact of the development traffic on the unmitigated highway network has been undertaken, the 2031 Development Case no highway mitigation scenario. This confirmed that the addition of the development traffic would exacerbate congestion at M1 Junction 15, leading to further deterioration of performance of the junction in the 2031 future assessment year.

8.169 The constraints at M1 Junction 15, in combination with those on the A508 through Roade, would lead to the development traffic displacing background traffic from the A508 and A45 to use alternative routes on local roads to avoid the A508 and M1 Junction 15. Unmitigated, the development also has potential to increase the number of HGV passing through Roade on the A508 and travelling westbound on Blisworth Road (Courteenhall) from the A508 to access the A43.

8.170 The strategic modelling supports the conclusions of the initial manual assessment work that a major improvement at M1 Junction 15 and the A45, and a bypass for Roade should form part of an appropriate highway mitigation strategy for proposed development. The findings also identify the need for the proposed scheme of HGV management measures to control and restrict HGV movements on the local roads to the south of the SRFI site.

8.171 Assessment of the impact of the proposed improvement works at M1 Junction 15 and A45 and the A508 Roade Bypass using the NSTM2 demonstrate that with these mitigation measures in place, existing traffic is drawn back onto the SRN and principal road network, particularly the A508. This is a desirable outcome as the A508 is an important primary route, part of NCC's Strategic Freight Road Network and has been identified in the DfT consultation as part of the proposed Major Road Network. The highway mitigation proposals release the existing constraints that allow the A508 and M1 Junction 15 to accommodate the development traffic and additional background traffic. This leads to a consequential reduction in traffic flows on many of the local roads and villages surrounding the SRFI.

8.172 To ensure that the A508 can satisfactorily accommodate the forecast traffic increases without adversely impacting junction operation, a series of improvements are identified at key junctions along the A508 as part of the proposed A508 corridor route upgrade, along

with provision of a fund to be used by NCC, if required, for maintenance and remedial works on Knock Lane. These improvements were identified via a series of incremental NSTM2 model runs, in which each piece of highway mitigation was modelled and the effects of that mitigation on the performance of the highway network was understood prior to the need for further highway mitigation being identified. Modelling also indicated that an existing congestion problem at M1 Junction 15A would be exacerbated by development traffic travelling north of the M1 mainline, and therefore an improvement scheme at M1 Junction 15A was also developed.

8.173 Assessment of the reassignment effects resulting from the proposed development and highway mitigation works, identified impacts at the A45 Wootton and Queen Eleanor Interchanges and along the A5076 corridor. It was agreed with the Transport Working Group that an appropriate strategy to mitigate the impact at the A45 junctions is an improvement scheme at the A45 Queen Eleanor Interchange. NCC are developing a comprehensive improvement scheme for this junction. It was agreed that a financial contribution, to be used for improvements at the A45 Queen Eleanor Interchange and along the A5076 corridor, would form part of the highway mitigation strategy.

8.174 All the identified physical highway mitigation was coded into the NSTM2 and the final modelling outputs are used in the following chapters to confirm the suitability of the proposed highway mitigation.

9.0 ASSESSMENT FLOWS

NSTM2 outputs and study area traffic count data

9.1 The highway mitigation strategy, and the assessment of residual impacts of the development traffic have been assessed and confirmed using the final NSTM2 traffic flow data. The final NSTM2 outputs are presented in the following forecast reports, prepared by WSP:

- Reference Case Forecast Report (**Appendix 23**); and
- Development Case Forecast Report (**Appendix 24**).

9.2 The NSTM2 link flows and relevant traffic turning counts at each of the study area junctions were output from the NSTM2 for the final modelling scenarios. The relevant turning counts for the 2031 Future Year, DfT 02/2013 Circular compliant scenario, and 2021 Opening Year are provided in the appendices listed in **Table 9.1**, **Table 9.2**, and **Table 9.3**, respectively.

Table 9.1: 2031 Future Year traffic flows

description	ID	appendix
Reference Case	D1	**Appendix 43**
Development Case no highway mitigation	G1	
Development Case with highway mitigation	J1d	

Table 9.2: DfT 02/2013 Circular compliant Year traffic flows

description	ID	appendix
Reference Case	C1	**Appendix 44**
Development Case no highway mitigation	F1	
Development Case with highway mitigation	I1	

Table 9.3: 2021 Opening Year traffic flows

description	ID	appendix
Reference Case	B1	**Appendix 45**
Development Case no highway mitigation	E1	
Development Case with highway mitigation	H1	

NSTM2 daily traffic flows

9.3 The NSTM2 has also been used by WSP to derive Annual Average Weekday Traffic (AAWT) and Annual Average Daily Traffic (AADT) flows for use in the Environmental

Impact Assessment work (specifically for assessment of noise and air quality effects). This process used the final NSTM2 forecast models. The methodology used to calculate the environmental traffic flows is summarised at the WSP Technical Note at **Appendix 32.**

10.0 CONFIRMING THE FINAL HIGHWAY MITIGATION STRATEGY

Introduction

10.1 This chapter confirms the suitability of the proposed highway mitigation works using the final assessment traffic flows. It is structured as follows:

- Micro-simulation assessment of M1 J15, J15A, the SRFI assess and A45/Watering Lane junction is presented for the '2031 Future Year' and 'DfT 02/2013 Circular compliant' assessment scenarios; and
- Assessment of the A508 corridor route upgrade, using the '2031 Future Year' assessment flows is presented;

Micro-simulation modelling – M1J15 & A45, J15A, and SRFI access

Model development

10.2 It was agreed with the Transport Work Group that a micro-simulation model would be used to demonstrate the detailed operation of the M1 Junction 15 and A45 major upgrade, including the proposed signalisation of the Watering Lane junction and the SRFI access, and also the improvements to M1 Junction 15A (study area junctions 1 to 4). Micro-simulation was identified as the preferred assessment tool as it allows interaction between the M1 mainline and the two M1 junctions to be examined.

10.3 Highways England confirmed that Aecom had developed on their behalf a 2016 validated VISSIM micro-simulation model of the M1 Junction 15 and Junction 15A. Further detail regarding the base model is provided at LMVR2 (**Appendix 25**).

10.4 It was agreed that the VISSIM model (appropriately updated to include the A45/C67 Watering Lane junction) would be used for the detailed assessment of the proposed highway mitigation works at M1 Junction 15 and the A45, Junction 15A and the SRFI access (study area junctions 1 to 4), including the A508 dualling between the access and M1 Junction 15. Further detail regarding the base model update is provided at the Local Model Validation Report Addendum that is provided at Appendix A of the VISSIM1 technical note (**Appendix 26**).

10.5 Accordingly, the base VISSIM model was updated to represent the Reference Case position in the DfT 02/2013 Circular compliant assessment (C1 scenario) and 2031 Future Year (D1 scenario) through the inclusion of the committed infrastructure schemes. Within the model area this comprises the J13 to J16 SMP for the M1.

10.6 The 2016 VISSIM base model simulates the MOVA traffic signal control strategy at M1 Junction 15 via a link to PC MOVA. The traffic signal control strategy has been optimised as part of the work to update the base model so that the Reference Case model represents the optimal traffic conditions at M1 Junction 15. This is also explained in the Local Model Validation Report Addendum that is provided at Appendix A of the VISSIM1 technical note (**Appendix 26**).

10.7 The extent of the VISSIM micro-simulation model is shown at **Figure 10.1.**

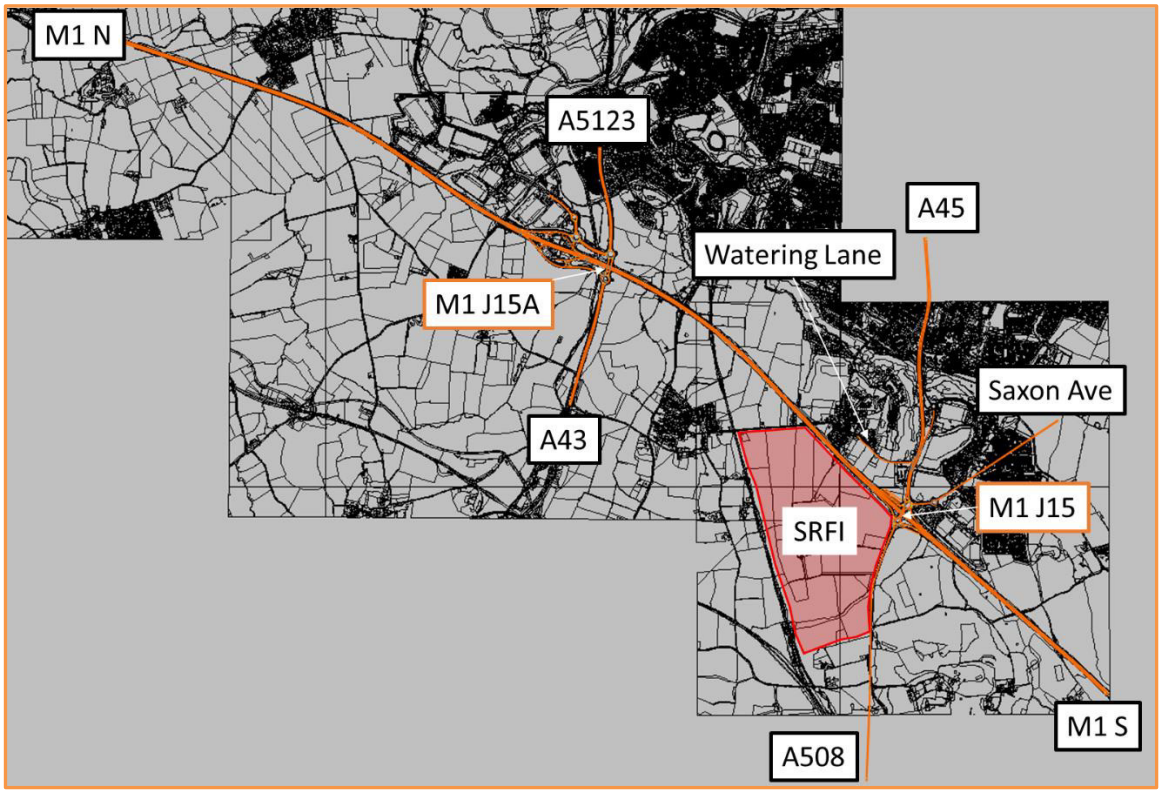


Figure 10.1: Extent of VISSIM micro-simulation model

10.8 The proposed M1 Junction 15 and A45 major upgrade highway mitigation works and SRFI access, including the A508 dualling between M1 Junction 15 and the access, along with the proposed improvements at M1 Junction 15A were coded into the VISSIM model, to represent the highway network in the Development Case, referred to in the VISSIM modelling reports as 'Mitigation Case'.

10.9 The traffic signal control strategy for the Mitigation Case model has also been optimised so that the model closely reflects the method of control and junction performance that could be delivered on-street should the proposed mitigation scheme be implemented. The MOVA design for the Mitigation Case model for M1 Junction 15, 15A and A45/Watering Lane are provided at Appendix B of the VISSIM1 technical note (**Appendix 26**).

10.10 Morning and evening peak hour traffic flows (for lights, heavies and pcus) for the following scenario have been extracted from the NSTM2 by WSP in the form of origin-destination (O-D) matrices which have been constructed to match the entry and exit zones in the VISSIM model:

- C1 scenario – 2021 DfT Circular compliant Reference Case;
- I1 scenario – 2021 DfT Circular compliant Development Case with highway mitigation;
- D1 scenario - 2031 Future Year Reference Case; and
- J1d scenario - 2031 Future Year Development Case with highway mitigation.

10.11 It should be noted that extracting the O-D matrices requires a cordon to be created in the NSTM2 and a further iteration of the model to be run. Therefore, the cordon traffic flows at M1 Junction 15, M1 Junction 15A, Watering Lane and the proposed site access roundabout do not exactly match the turning movements flows presented at **Chapter 9.0** for the individual junctions.

10.12 Further examination of the 2031 Development Case O-D matrices identified that the traffic arriving and departing the site access did not exactly match the calculated traffic generation for the morning and evening peak hours. For example, for the 2031 Development Case with highway mitigation (J1d scenario), whilst only very minor differences were identified for the morning and evening peak hour departures, it was identified that 93 lights and 14 HGVs (of 700 and 138, respectively) are shown to not arrive at the site in the morning peak hour, whilst 22 lights and 11 HGVs (of 230 and 138, respectively) do not arrive at the site in the evening peak hour. Similar was observed for the DfT 02/2013 Circular compliant Development Case with highway mitigation (I1 scenario).

10.13 Following discussions with WSP, it was concluded that the correct levels of development traffic had been released into the NSTM2 model during the morning and evening peak hours, but due to journey times on certain routes, especially along the A45 corridor from which a large proportion of the development traffic arrives, development traffic had not reached its destination by the end of the one hour period that is modelled in the NSTM2.

10.14 Since the correct amount of development traffic is present within the NSTM2 model during the morning and evening peak hours, amendments to the traffic flows were not made at majority of the study area junctions.

10.15 Drivers that need to arrive at the SRFI site during the peak hour would adjust their departure time to account for the anticipated journey time. It is also noted that the arrival trips not reaching the development in the NSTM2 in the morning peak hour (107/838 = 13%) and evening peak hour (33/369 = 9%), is less than the 20% reduction in SOV trips that is the target of the FTP and continues to provide a robust assessment in any case.

10.16 However, to demonstrate that the proposed site access roundabout and the proposed mitigation scheme at M1 Junction 15 can accommodate the full volume of peak hour development traffic, the VISSIM O-D matrices have been manually adjusted on a pro-rata basis to include all peak hour development traffic, this results in the double counting of some development traffic within the wider NSTM2 model area, but ensures a robust position is adopted for the assessment of the SRFI access and M1 Junction 15.

Summary of VISSIM micro-simulation modelling results

10.17 The following sections provide a summary of the micro-simulation model results. For full details, including the traffic flow matrices, reference should be made to the VISSIM1 and VISSIM2 technical note (**Appendices 26 and 27**). The VISSIM modelling and both VISSIM reports were agreed with the Transport Working Group, and the VISSIM model was independently reviewed by Aecom.

10.18 To assess the merits of the proposed mitigation scheme key results from both the Reference Case and Development Case with highway mitigation models have been collected and analysed for both the 2031 Future Year and the 2021 DfT Circular compliant assessment scenarios. Assessment is based upon comparison of: key network performance outputs to provide an indication of the overall model performance; journey time data on the key routes within the models; and queue data from the primary junctions within the network.

10.19 The overall conclusions of the VISSIM micro-simulation modelling is similar for the 2031 Future Year and 2021 DfT Circular compliant assessment scenarios. Therefore, this TA summarises only the 2031 Future Year results in detail. Reference should be made to the VISSIM1 technical note (**Appendix 26**) for full details of the 2021 DfT 02/2013 Circular compliant scenario assessment results.

10.20 The network performance, journey time and queue length result data has been collected from 20 model runs at different random seed values. The results have been averaged over the 20 runs to provide a reliable basis for comparison.

Network Performance – 2031 Future Year

10.21 The number of unreleased vehicles in a VISSIM model provides a good indication of congestion within a highway network. In the 2031 Reference Case (D1 scenario) model there were circa. 800 unreleased vehicles in the morning peak period and circa. 1800 unreleased vehicles in the evening peak period. The 2031 Development Case with highway mitigation (J1d scenario) model results shows that all vehicles were successfully released into the network in both the morning and evening peak periods, indicating that network performance is significantly improved with the development and mitigation proposals in place.

10.22 Excluding the SRFI development traffic, in the 2031 Development Case with highway mitigation (J1d scenario) model an additional 1,511 vehicles in the morning peak hour, and an additional 2,118 vehicles in the evening peak, can complete their journeys, when compared to the 2031 Reference Case (D1 scenario) models. This traffic also includes additional vehicles being drawn into the VISSIM network as a result of the proposed mitigation strategy.

10.23 The network performance indicators of average speed, average delay per vehicle, total delay and total travel time have been compared for each of the modelled scenarios.

10.24 **Figure 10.2** shows that in the morning peak period the average delay per vehicle would be significantly reduced, by 40% (from 141 seconds per vehicle to 84 seconds per vehicle) with the development and highway mitigation in place. **Figure 10.2** also shows that average vehicle speed would increase (from 35 mph to 37 mph), and total delay would reduce with the development and highway mitigation in place. Whilst total travel time is shown to increase, this is due to the increased number of vehicles (and the reduction in unreleased vehicles) in the 2031 Development Case with highway mitigation model, i.e. more vehicles are using the SRN and hence total travel time increases.

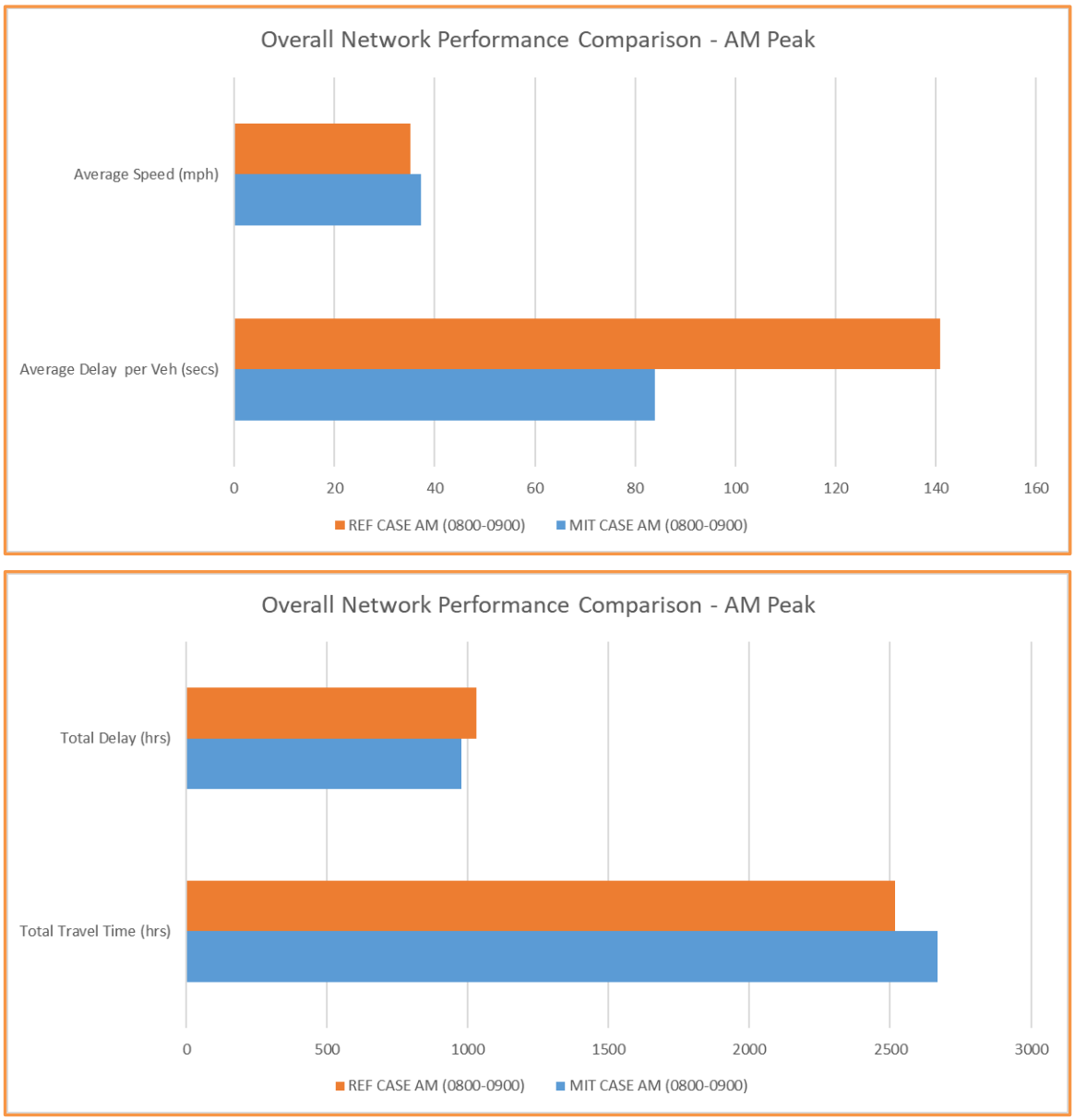


Figure 10.2: 2031 Future Year morning peak network performance comparison Reference Case (D1) and Development Case with highway mitigation (J1d)

10.25 **Figure 10.3** shows that in the evening peak period the average delay per vehicle would also be significantly reduced, by approximately 69% (from 249 seconds per vehicles to 76 seconds per vehicle) with the development and mitigation in place. **Figure 10.3** also shows that average vehicle speed would increase by 47% (from 27 mph to 39 mph) and total delay would be reduced by 52%. In the evening peak hour total travel time is shown to decrease despite the increased number of vehicles (and the reduction in unreleased vehicles) in the 2031 Development Case model. This is due to the significant queueing at M1 Junction 15A in the 2031 Reference Case scenario which causes flow break-down on the M1 mainline, significantly increasing journey time in the Reference Case.

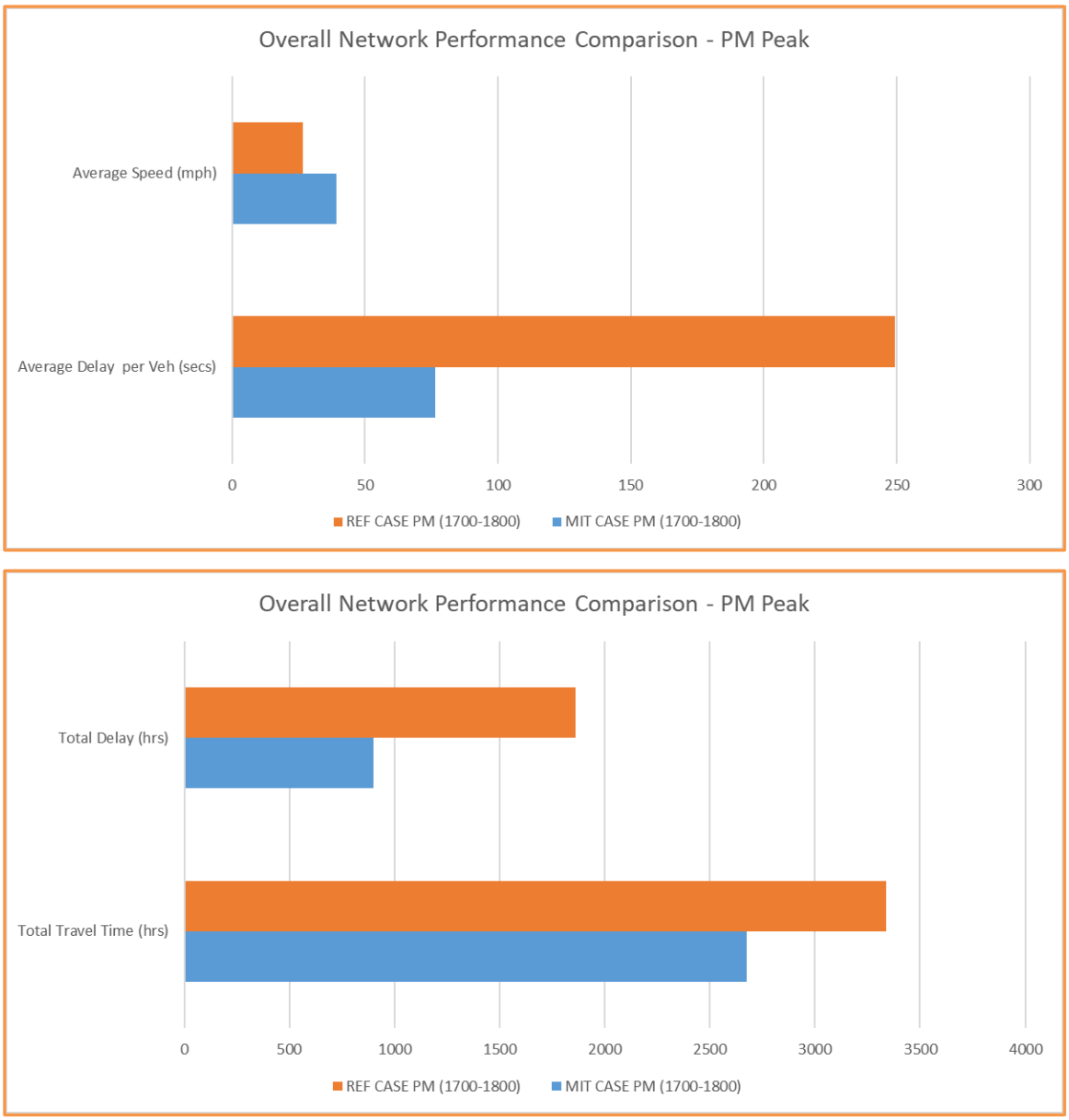


Figure 10.3: 2031 Future Year evening peak network performance comparison Reference Case (D1) and Development Case with highway mitigation (J1d)

10.26 The improvement in the morning and evening 2031 Development Case with highway mitigation (J1d scenarios) is achieved with the SRFI development traffic and the additional traffic which has been drawn into the network as a result of the highway mitigation strategy. Hence, given the scale of the improvements in network performance, it is clear that the proposed mitigation scheme delivers a significant betterment to the network as a whole.

Journey time analysis – 2031 Future Year

10.27 Tables 5 and 7 in the VISSIM1 technical note (**Appendix 26**) provide a detailed comparison of journey times for cars and HGVs, respectively, across the VISSIM model network for the 2031 Reference Case and the 2031 Development Case with highway mitigation scenarios for the morning peak period.

10.28 In general, the journey times for both cars and HGVs are reduced with the development traffic and proposed mitigation strategy in place, with an average journey time reduction of 27% for cars and 37% for HGVs when compared to the 2031 Reference Case scenario.

10.29 The positive impact of the proposed mitigation schemes at M1Junction 15 and M1 Junction 15A are particularly evident when considering the journey time comparisons on routes from the A508 (all routes), M1 South (to A43 and A5123), A45 (all routes) and the M1 North (to A43 and A5123), where the journey times are reduced by around 60% in the morning peak period when compared to the 2031 Reference Case scenario.

10.30 In the evening peak period, Tables 6 and 8 of the VISSIM1 technical note (**Appendix 26**) show that in general, the journey times for both cars and HGVs are also reduced with the development traffic and proposed mitigation strategy in place, with an average journey time reduction of 48% for cars and 55% for HGVs when compared to the 2031 Reference Case scenario.

10.31 As in the morning peak hour, in the evening peak hour the positive impact of the proposed mitigation schemes at M1 Junction 15 and M1 Junction 15A are particularly evident when considering the journey time comparisons on routes from the A508 (all routes), M1 South (to A43 and A5123), A45 (all routes) and the M1 North (to A43 and A5123), where the journey times are reduced by up to 90% in the evening peak period when compared to the 2031 Reference Case scenario.

10.32 There are three routes in the morning peak hour and two routes in the evening peak hour where journey times see a notable increase. These are from Saxon Avenue to the A45 and from Watering Lane to the A45 in both peak hours, and from Saxon Avenue to Watering Lane in the morning peak hour. Increases of 30% to 40% in journey times are forecast in the morning peak hour and increases of up to 47% are forecast in the evening peak hour.

10.33 These increases are a result of vehicles having to negotiate the larger M1 Junction 15 layout and because the improvements signalise both the Saxon Avenue and Watering Lane approaches, which adds some delay to these routes. However, when considering the overall traffic volumes, the number of vehicles undertaking these movements is low in comparison to most of the other routes, at 2.2% in the morning peak hour and 1.1% in the evening peak hour. Further queue lengths on Saxon Avenue would not be significant and would be expected to clear in each traffic signal cycle, and the individual junction assessment for the A45/Watering Lane presented at paragraphs 10.71 to 10.74,

demonstrate that this junction would also operate within capacity and maximum mean max queues of less than 10 pcus.

Queue length assessment – 2031 Future Year

10.34 The average and maximum (average) queue lengths during the morning and evening peak periods have been compared on the approaches to M1 Junction 15 and M1 Junction 15A in the modelled network for the 2031 Reference Case and 2031 Development Case with highway mitigation scenarios. A detailed analysis of the queueing results is provided at paragraphs 8.1.19 to 8.1.37, Figures 15 to 20 and Appendix F of the VISSIM1 technical note (**Appendix 26**), and a summary is set out in the following sections.

10.35 Figures 15 and 19 of the VISSIM1 technical note summarise the forecast queueing at M1 Junction 15 in the morning and evening peak hours, respectively.

10.36 During the morning peak hour, average queue lengths on the A45 approach to M1 Junction 15 are forecast to reduce from around 2.5km in the 2031 Reference Case to around 475 metres in the 2031 Development Case with highway mitigation, as shown in **Figure 10.4**. Queues on the A508 approach are forecast to reduce from around 1.6km in the 2031 Reference Case to around 15 metres in the 2031 Development Case with highway mitigation, as shown in **Figure 10.5**.

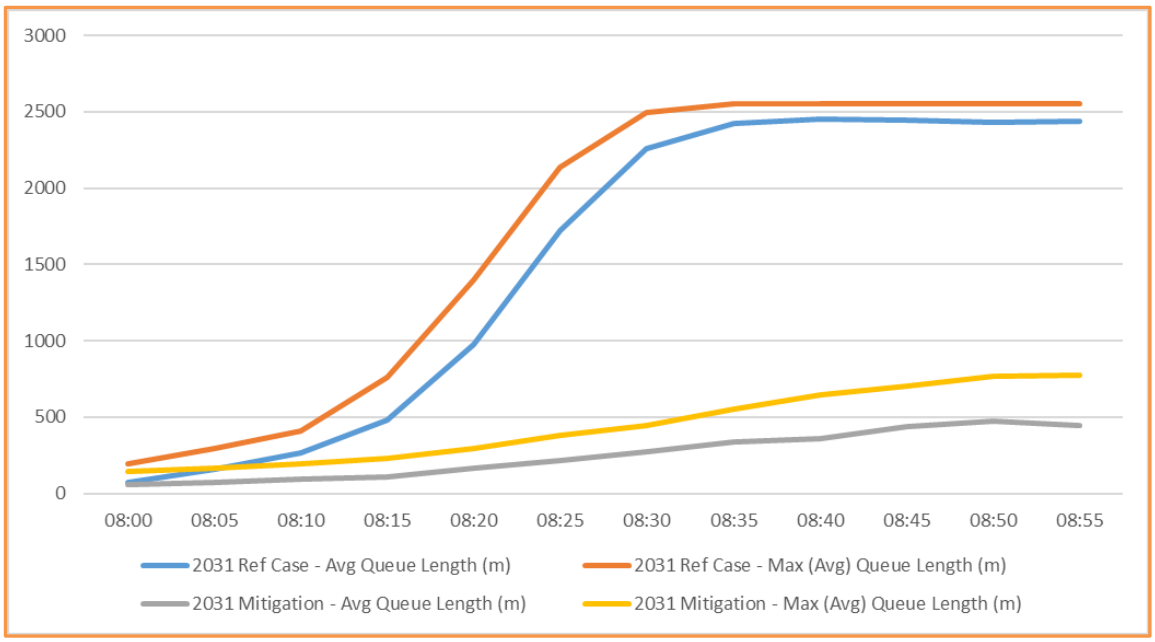


Figure 10.4: 2031 Future Year queue comparison on A45 approach to M1 Junction 15, AM peak

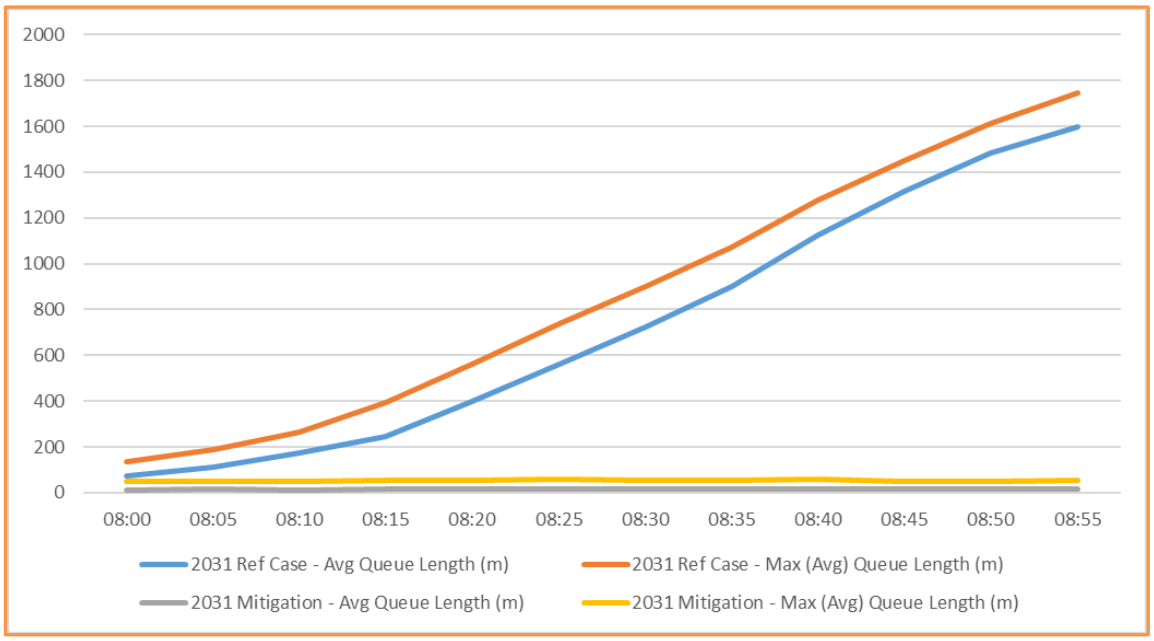


Figure 10.5: 2031 Future Year queue comparison on A508 approach to M1 Junction 15, AM peak

10.37 During the evening peak hour, queue lengths on the A45 approach to M1 Junction 15 are forecast to reduce from around 2.4km in the 2031 Reference Case to around 65 metres in the 2031 Development Case with highway mitigation. Queues on the A508 approach are forecast to reduce from around 100 metres in the 2031 Reference Case to around 25 metres in the 2031 Development Case with highway mitigation.

10.38 These significant reductions in queueing are a direct result of the improved capacity and operation of M1 Junction 15 and A45 that would be realised as part of the major upgrade works. The improvements lead to the significant journey time savings shown at **Table 10.1** and **Table 10.2** for car and HGVs, respectively, when travelling northbound and southbound between the A508 and A45. These are key movements associated with traffic travelling to and from the SRFI development, and the highway works would also improve journey times for the proposed bus service and the existing X4 and X7 bus services that would also serve the development, helping to encourage modal shift to the bus.

Table 10.1: Change in journey times A508 to A45 and A45 to A508 (cars)

Period	Journey	Journey time (hrs:mins:secs)		
		2031 Ref Case	2031 Dev Case	Saving (% change)
AM	NB (A508 to A45)	00:09:16	00:03:41	-00:05:35 (-60%)
	SB (A45 to A508)	00:05:36	00:04:16	-00:01:20 (-24%)
PM	NB (A508 to A45)	00:04:29	00:03:36	-00:00:54 (-20%)
	SB (A45 to A508)	00:06:04	00:03:22	-00:02:43 (-45%)

Table 10.2: Change in journey times A508 to A45 and A45 to A508 (HGV)

Period	Journey	Journey time (hrs:mins:secs)		
		2031 Ref Case	2031 Dev Case	Saving (% change)
AM	NB (A508 to A45)	00:09:30	00:03:53	-00:05:37 (-59%)
	SB (A45 to A508)	00:05:47	00:04:33	-00:01:14 (-21%)
PM	NB (A508 to A45)	00:04:46	00:03:50	-00:00:56 (-20%)
	SB (A45 to A508)	00:06:11	00:03:29	-00:02:42 (-44%)

10.39 Queue lengths on the Saxon Avenue approach to M1 Junction 15 would increase when compared to the 2031 Reference Case scenario, due to the signalisation of the Saxon Avenue approach. However, Figure 15 and Appendix F of the VISSIM1 technical note shows that the maximum queue length on Saxon Avenue would be between 20 and 30 metres which would equate to approximately 4-5 pcus. This is not significant and would be expected to clear every traffic signal cycle. In the evening peak hour, there is no significant difference between the queue lengths on Saxon Avenue in the 2031 Reference Case and 2031 Development Case with highway mitigation scenarios. However, there is greater peaks in average and maximum queueing in the 2031 Reference Case scenario.

10.40 Morning and evening peak hour queue length of the M1 northbound diverge at M1 Junction 15 are forecast to be comfortably stored on the slip road and would not impact on the M1 mainline in both the 2031 Reference Case of 2031 Development Case with highway mitigation scenarios.

10.41 At the M1 southbound diverge at M1 Junction 15, it is demonstrated that the forecast queue would be comfortably stored on the slip road during the evening peak hour in both the 2031 Reference Case of 2031 Development Case with highway mitigation scenarios. However, in the morning peak hour **Figure 10.6** shows that in the 2031 Reference Case scenario the average queue would be circa. 700 metres long, reaching back beyond the end of the slip road where it would impact on the M1 mainline flow, as shown at Figure 16 of the VISSIM1 technical note.

10.42 **Figure 10.6** also shows that in the 2031 Development Case with highway mitigation (J1d scenario) the average and maximum queue lengths would be comfortably stored on the slip road and would not impact on the M1 mainline. This represents a significant operational and safety improvement in the performance of M1 Junction 15 and its interaction with the M1 mainline.

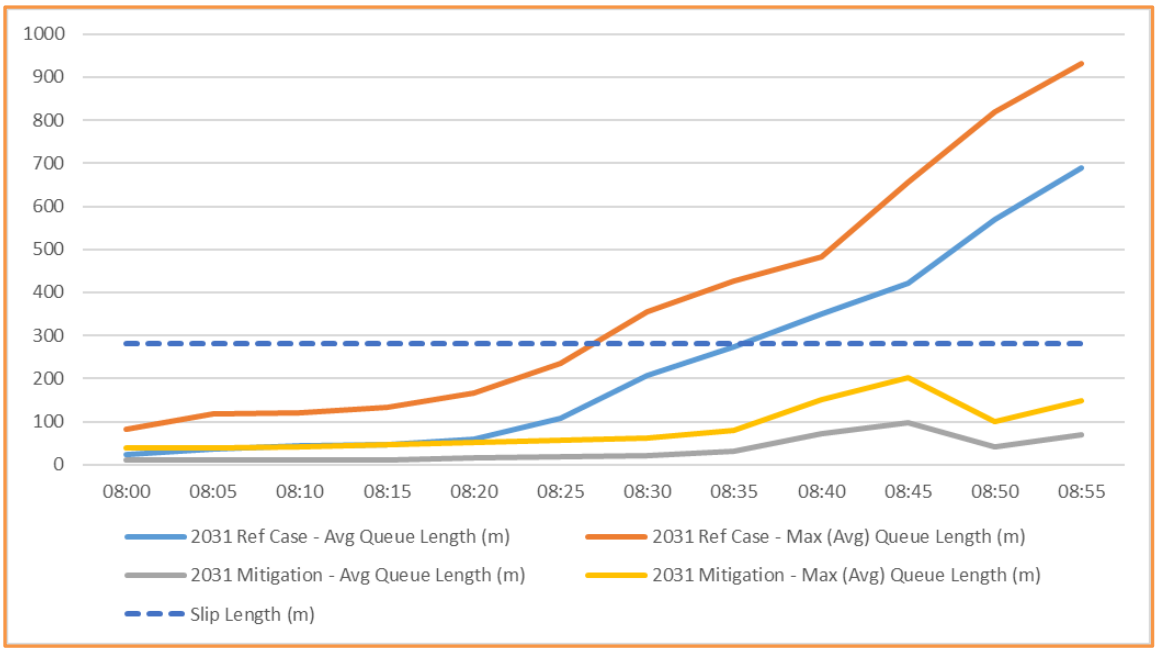


Figure 10.6: 2031 Future Year morning peak hour M1 southbound diverge queue comparison, M1 J15

10.43 Figures 17 and 20 of the VISSIM1 technical note summarise the forecast queueing at M1 Junction 15A in the morning and evening peak hours, respectively.

10.44 It is shown that there are similar average queue lengths on the A5123 approach in both the 2031 Reference Case (D1 scenario) and 2031 Development Case with highway mitigation (J1d scenario) in the morning and evening peak hour periods. There are some small increases in the maximum (average) queue length, due largely to the improvements at M1 Junction 15A allowing additional traffic from the M1 southbound diverge onto the roundabout, and therefore reducing the frequency of gaps at the A5123 approach. However, the increases are not significant.

10.45 In the 2031 Reference Case scenario, **Figure 10.7** shows that the average and maximum queue lengths on the M1 northbound diverge to M1 Junction 15A would steadily rise during the morning peak hour to a length of circa. 2.0km. **Figure 10.8** shows that in the evening peak hour these queues would already extend beyond the end of the slip road at the start of the peak hour, reaching back onto the M1 mainline and increasing to a length approaching 4km by the end of the peak period, as demonstrated on the screenshots provided at Figure 21 of the VISSIM1 technical note. This queue length would cause the flow to breakdown on the M1 mainline in the Reference Case, as demonstrated on the VISSIM screenshots provided at Figures 18 and 20 of the VISSIM1 technical note.

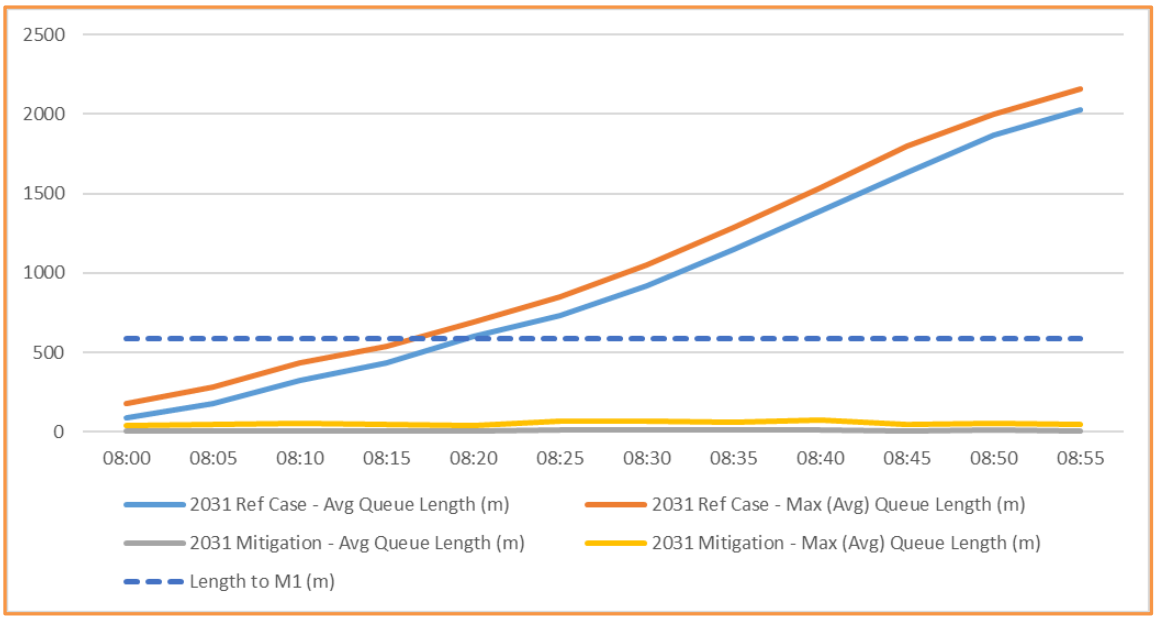


Figure 10.7: 2031 Future Year morning peak hour M1 northbound diverge queue comparison, M1 J15A

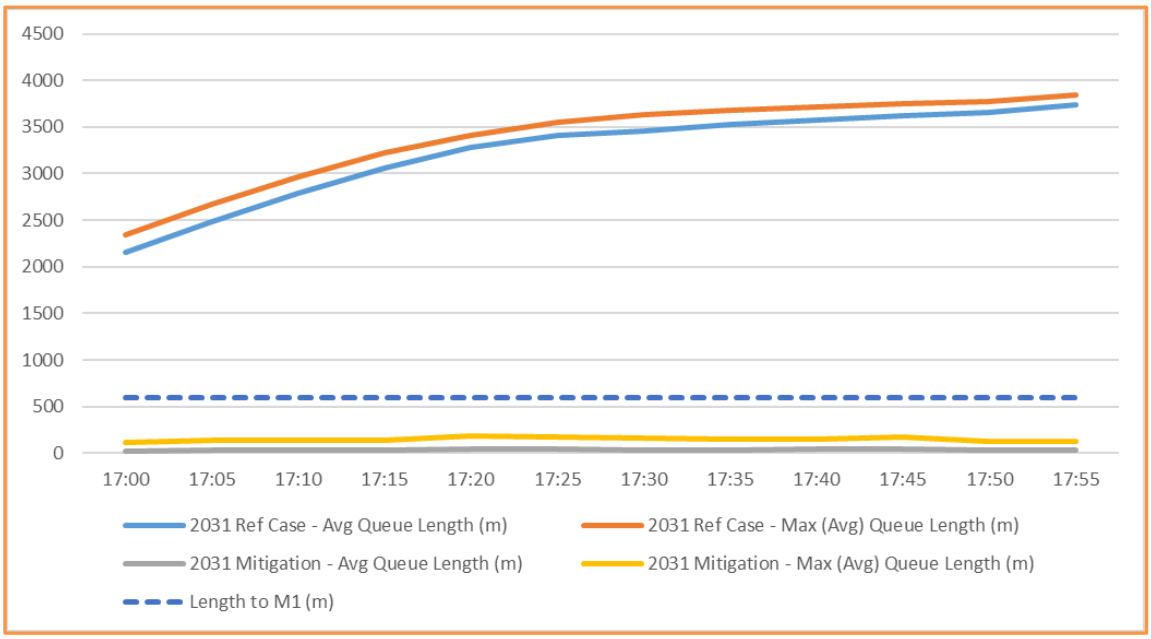


Figure 10.8: 2031 Future Year evening peak hour M1 northbound diverge queue comparison, M1 J15A

10.46 In the 2031 Development Case with highway mitigation (J1d scenario), the average and maximum queue lengths would be dramatically reduced, comfortably contained within the available storage space, as also shown on **Figure 10.7** and **Figure 10.8**, and the VISSIM screenshots provided at Figures 18 and 20 of the VISSIM1 technical note.

10.47 Similarly, for the 2031 Reference Case (D1 scenario), **Figure 10.9** shows that the average and maximum queue lengths on the M1 southbound diverge approach to M1 Junction 15A would steadily rise during the morning peak hour to a length of circa. 3.0km. This queue

length would extend back to the M1 mainline. In the evening peak hour, **Figure 10.10** shows the queue would already extend beyond the end of the slip road at the start of the peak, and is forecast to increase to a length of 5km by the end of the peak period.

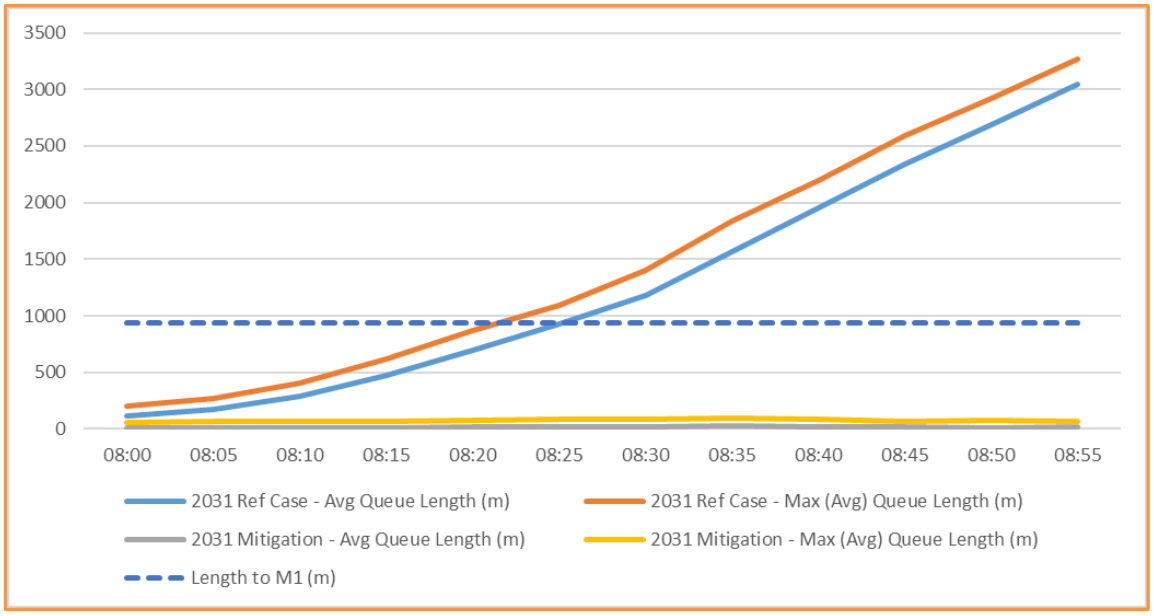


Figure 10.9: 2031 Future Year morning peak hour M1 southbound diverge queue comparison, M1 J15A

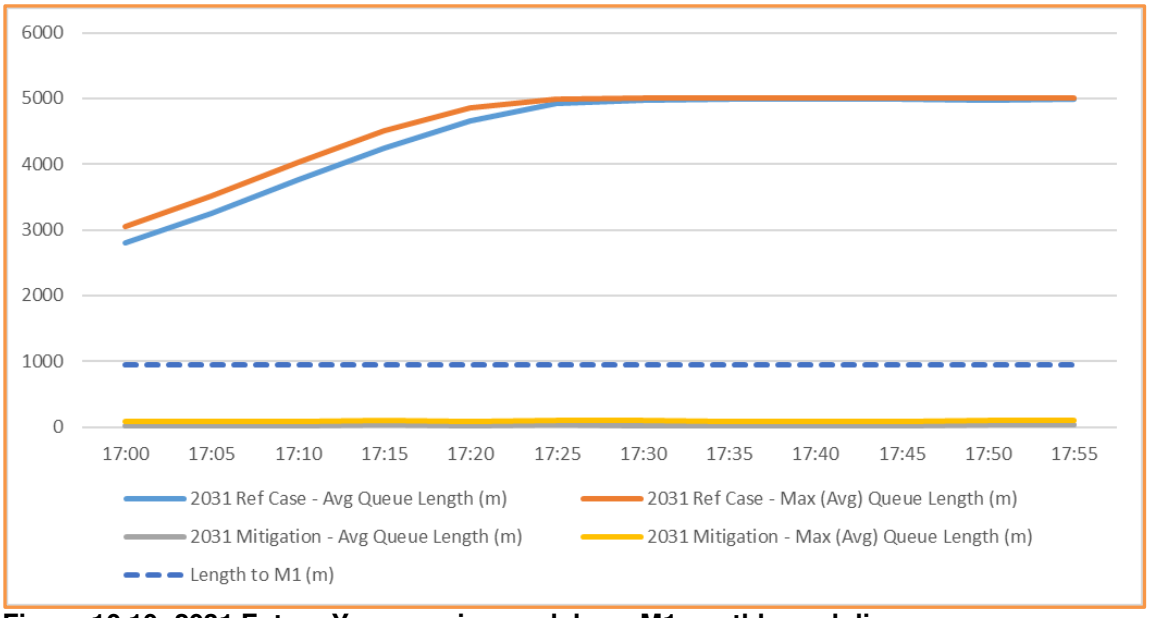


Figure 10.10: 2031 Future Year evening peak hour M1 southbound diverge queue comparison, M1 J15A

10.48 In the 2031 Development Case with highway mitigation (J1d scenario), as a result of the proposed mitigation strategy, the average and maximum queue lengths would be dramatically reduced, comfortably contained within the available storage space.

10.49 The improvements in the performance of the diverge slip roads at M1 Junction 15A and its interaction with the M1 mainline would provide significant operational and safety benefits.

10.50 On the A43 approach to M1 Junction 15A the average and maximum queue lengths in the morning and evening peak hours would increase when compared to the 2031 Reference Case scenario. Average queue lengths would increase by approximately 30 metres and 40 metres in the morning and evening peak hours, respectively. This increase in queueing is a consequence of signalisation of the A43 approach. However, this is acceptable in the context of the significant operational and safety improvements that would be provided at the junction as a result of addressing the queueing problems on the slip roads as described above.

SRFI access

10.51 The operation of the SRFI access is examined in the VISSIM2 technical note (**Appendix 27**). This demonstrates that the proposed SRFI access does not adversely impact the operation of the A508 and would accommodate the SRFI development traffic.

DfT 02/2013 Circular compliant assessment scenario

10.52 The DfT 02/2013 Circular compliant assessment scenario is reported in detail at Section 7 of the VISSIM1 technical note (**Appendix 26**). In general, the findings are similar to the 2031 Future Year assessment scenario.

10.53 In terms of overall network performance, in the 2021 DfT 02/2013 Circular compliant Reference Case (C1 scenario) model there were circa. 1015 unreleased vehicles in the morning peak period and circa. 628 unreleased vehicles in the evening peak period. The 2021 DfT 02/2013 Circular compliant Development Case with highway mitigation (I1 scenario) model results shows that all vehicles were successfully released into the network in both the morning and evening peak periods, indicating that network performance is significantly improved with the development and mitigation proposals in place.

10.54 Excluding the SRFI development traffic, in the 2021 DfT 02/2013 Circular compliant Development Case with highway mitigation (I1 scenario) model an additional 1,315 vehicles in the morning peak hour and additional 1,484 vehicles in the evening peak hour are able to complete their journeys, when compared to the Reference Case models. This also includes additional traffic that is being drawn into the VISSIM network because of the proposed mitigation strategy.

10.55 Significant reductions in average delay per vehicle of 27% (107 seconds to 78 seconds) in the morning peak hour and a reduction of 67% (from 225 seconds per vehicle to 75 seconds) in the evening peak hour, are forecast. Average vehicle speeds increase, and total delay reduce in the evening peak hour in the 2021 DfT 02/2013 Circular compliant Development Case with highway mitigation model, as compared to the Reference Case. In the morning peak hour, a small reduction in average vehicle speeds is forecast (from 39 mph to 38 mph) between the Reference Case and the Development Case, along with an increase in total delay. However, this is because the highway mitigation scenario allows more traffic into the network. These additional vehicles, that experience less delay, increase the total travel time and total delay, as more journeys can be made within the network. The key performance indicator in this situation is therefore delay per vehicle, which reduces with the development and highway mitigation in place.

10.56 In general, the journey times for both cars and HGVs are reduced with the development traffic and proposed mitigation strategy in place, with an average journey time reduction of 23% for cars and 18% for HGVs in the morning peak hour when compared to the 2021 DfT 02/2013 Circular compliant Reference Case. In the evening peak hour an average journey time reduction of 69% and 45% is forecast for cars and HGVs in the 2021 DfT 02/2013 Circular compliant Development Case with highway mitigation scenario, compared to the Reference Case.

10.57 In general, similar patterns of queueing is forecast in the DfT 02/2013 Circular compliant scenario as in the 2031 Future Year scenario, although queue lengths are typically slightly shorter. This means that the morning peak hour queue at M1 Junction 15 on the M1 southbound diverge slip is contained within the slip road in the 2021 DfT Circular compliant Reference Case (C1 scenario).

10.58 At M1 Junction 15A, the morning peak hour queue on the M1 southbound diverge slip is also contained within the slip road in the DfT 02/2013 Circular compliant Reference Case. However, the queue still exceeds the slip road length in the evening peak hour. The queue on the M1 northbound diverge slip road exceeds the slip road length in both the morning and evening peak hours and would lead to flow breakdown on the M1 mainline, which does not occur with the highway mitigation in place.

Summary of VISSIM micro-simulation modelling

10.59 From the review of the network performance, traffic volumes, journey times and queue lengths analysis, the VISSIM micro-simulation modelling demonstrates that the proposed highway mitigation works at M1 Junction 15 and the A45, Junction 15A, and the SRFI access would lead to significant overall operational and safety benefits to the highway

network. At M1 Junction 15, queues on the A45 and A508 would be significantly reduced and the instances of the M1 southbound diverge slip queueing back to the M1 mainline would be removed. At M1 Junction 15A, the instances of queueing back to the M1 mainline are also removed entirely with the proposed highway improvements in place. The highway works are shown to draw additional traffic into the SRN, whilst at the same time reducing journey times and average delay per vehicle, whilst accommodating the SRFI development traffic.

M1 Junction 15, Junction 15A, SRFI access and A45 / C67 Watering Lane – individual junction modelling

10.60 The operation of the M1 Junction 15, Junction 15A, the SRFI access and the A45/C67 Watering Lane junction is demonstrated by the VISSIM modelling presented in the above sections of this chapter. However, for completeness, and to assess with comparison to earlier assessment work, the individual junction models have also been updated with the final 2031 Future Year and DfT 02/2013 Circular compliant NSTM2 turning flows listed at **Table 9.1** and **Table 9.2**, respectively. This work is summarised below.

M1 Junction 15 (study area junction 1)

10.61 The LinSig model results for M1 Junction 15 are provided at **Appendix 46** and summarised in **Table 10.3** for the 2031 Future Year scenarios (D1, G1 and J1d), and at **Table 10.4** for the DfT 02/2013 Circular compliant scenarios (C1, F1 and I1).

10.62 The LinSig modelling demonstrated that with no highway mitigation the development traffic has a negative impact on the operation of the junction in both the 2031 Future Year and 2021 DfT 02/2013 Circular compliant assessment scenarios. The LinSig modelling results support the finding of the VISSIM micro-simulation modelling and demonstrates that the proposed improvement scheme would provide significant betterment, delivering a significantly better than nil-detriment outcome, with large reductions in queueing and delay.

Table 10.3: M1 Junction 15 summary of LinSig results (2031 Future Year assessment scenarios)

scenario	peak	PRC	total delay (pcuHr)
2031 Reference Case (D1)	AM Peak	-100.1%	871.69
	PM Peak	-54.7%	556.63
2031 Development Case no highway mitigation (G1)	AM Peak	-132.0%	1195.45
	PM Peak	-93.0%	1216.93
2031 Development Case with highway mitigation (J1d)	AM Peak	-23.1%	398.17
	PM Peak	-9.9%	186.26

Table 10.4: M1 Junction 15 summary of LinSig results (2021 DfT 02/2013 Circular compliant assessment scenarios)

scenario	peak	PRC	total delay (pcuHr)
DfT 02/2013 Circular compliant Reference Case (C1)	AM Peak	-104.6%	804.25
	PM Peak	-52.6%	588.03
DfT 02/2013 Circular compliant Development Case no highway mitigation (F1)	AM Peak	-141.0%	1117.58
	PM Peak	-93.5%	1269.30
DfT 02/2013 Circular compliant Development Case with highway mitigation (I1)	AM Peak	-19.7%	328.53
	PM Peak	0.4%	139.78

M1 Junction 15A (study area junction 2)

10.63 The impact of the proposed development at M1 Junction 15A was assessed in TN6 using earlier iterations of the NSTM2 for the 2031 Reference Case and 2031 Development Case with incremental highway mitigation scenarios as reported in **Chapter 8.0**, paragraphs 8.85 to 8.96.

10.64 The ARCADY model of the existing junction was updated with the final NSTM2 2031 Reference Case (D1 scenario) turning counts summarised at **Table 9.1** and the 2021 DfT 02/2013 Circular compliant Reference Case (C1 scenario) turning counts summarised at **Table 9.2** The model results are provided at **Appendix 47** and summarised at **Table 10.5** and **Table 10.6**.

10.65 The results for both Reference Case scenarios confirm that both the northern and southern roundabouts would operate over capacity in the morning and evening peak hours, with the M1 northbound off-slip approach to the southern roundabout suffering from significant delay and queueing in the evening peak hour. As highlighted in the VISSIM modelling,

the M1 northbound off-slip approach to the southern roundabout is shown to suffer from significant queueing and delay in both the 2031 Future Year and DfT Circular compliant Reference Case scenarios.

Table 10.5: M1 Junction 15A 2031 (D1) Reference Case assessment results

Northern Roundabout				
scenario		A43 S Link	M1 S'bnd Off-slip	A5123
2031 reference D1 - AM	RFC	82%	93%	88%
	max queue (pcu)	5.09	11.17	7.67
	max delay (secs)	8.55	37.01	13.54
2031 reference D1 - PM	RFC	92%	97%	66%
	max queue (pcu)	12.60	17.04	2.15
	max delay (secs)	19.22	56.15	4.75
Southern Roundabout				
scenario		A43 N Link	A43	M1 N'bnd Off-slip
2031 reference D1 - AM	RFC	118%	99%	156%
	max queue (pcu)	210.77	26.49	148.41
	max delay (secs)	360.40	43.56	837.73
2031 reference D1 - PM	RFC	80%	98%	203%
	max queue (pcu)	3.96	22.54	301.04
	max delay (secs)	7.45	38.00	1787.10

Table 10.6: M1 Junction 15A DfT 02/2013 Circular compliant (C1) Reference Case assessment results

Northern Roundabout				
scenario		A43 S Link	M1 S'bnd Off-slip	A5123
2031 reference C1 - AM	RFC	80%	68%	89%
	max queue (pcu)	4.66	2.63	8.91
	max delay (secs)	7.85	10.94	14.64
2031 reference C1 - PM	RFC	90%	107%	69%
	max queue (pcu)	10.33	47.97	2.44
	max delay (secs)	16.38	133.41	5.09
Southern Roundabout				
scenario		A43 N Link	A43	M1 N'bnd Off-slip
2031 reference C1 - AM	RFC	119%	104%	142%
	max queue (pcu)	219.28	59.56	109.12
	max delay (secs)	378.00	84.15	676.71
2031 reference C1 - PM	RFC	80%	104%	186%
	max queue (pcu)	3.91	59.26	280.86
	max delay (secs)	7.44	84.46	1622.50

10.66 The LinSig model of the proposed mitigation scheme has been updated with the final NSTM2 2031 Development Case with highway mitigation (J1d scenario) turning counts summarised at **Table 9.1** and the DfT 02/2013 Circular compliant Development Case with highway mitigation (I1 scenario) summarised at **Table 9.2**. The LinSig model results are shown at **Appendix 47** and summarised in **Table 10.7** and **Table 10.8** respectively.

10.67 The results for both Development Case with highway mitigation scenarios show that the proposed scheme at M1 Junction 15A would provide significant betterment in the forecast years, delivering a significantly better than nil-detriment outcome. The model results

reflect the VISSIM modelling and demonstrate that there would not be significant queueing on the motorway slip roads.

Table 10.7: Proposed M1 Junction 15A 2031 (J1d) Development Case with mitigation assessment results

Northern Roundabout				
scenario		A43 S Link	M1 S'bnd Off-slip	A5123
2031 dev with mitigation J1d - AM	Deg. of saturation	65%	85%	105%
	max queue (pcu)	2.7	11.7	77.0
	max delay (secs)	5.1	16.2	122.8
2031 dev with mitigation J1d - PM	Deg. of saturation	81%	67%	69%
	max queue (pcu)	6.8	6.0	1.1
	max delay (secs)	9.5	10.1	6.0
Southern Roundabout				
scenario		A43 N Link	A43	M1 N'bnd Off-slip
2031 dev with mitigation J1d - AM	Deg. of saturation	101%	88%	89%
	max queue (pcu)	66.5	13.7	12.1
	max delay (secs)	66.2	22.1	34.0
2031 dev with mitigation J1d - PM	Deg. of saturation	76%	89%	100%
	max queue (pcu)	1.5	14.7	29.4
	max delay (secs)	5.7	22.8	77.1

Table 10.8: M1 Junction 15A DfT 02/2013 Circular compliant (I1) Development Case with highway mitigation assessment results

Northern Roundabout				
scenario		A43 S Link	M1 S'bnd Off-slip	A5123
2021 dev with mitigation I1 - AM	Deg. of saturation	70%	70.4%	110.6%
	max queue (pcu)	2.4	4.4	117.3
	max delay (secs)	5.5	8.4	197.3
2021 dev with mitigation I1 - PM	Deg. of saturation	83%	82%	69%
	max queue (pcu)	6.8	6.0	1.1
	max delay (secs)	17.3	10.1	2.8
Southern Roundabout				
scenario		A43 N Link	A43	M1 N'bnd Off-slip
2021 dev with mitigation I1 - AM	Deg. of saturation	98%	86%	90%
	max queue (pcu)	29.6	13.1	12.9
	max delay (secs)	39.5	16.7	38.7
2021 dev with mitigation I1 - PM	Deg. of saturation	85%	88%	92%
	max queue (pcu)	1.5	14.2	14.0
	max delay (secs)	9.3	19.7	37.4

SRFI access roundabout (study area junction 3)

10.68 The operation of the proposed SRFI access roundabout was assessed using Junctions 8 ARCADY software and traffic flows for the 2031 Development Case with highway mitigation turning counts summarised at **Table 9.1**. The results are summarised in **Table 10.9** below, and the ARCADY outputs are presented at **Appendix 48**. An assessment of the need for the proposed segregated left turn is also provided at Section 7 of the GDSR2 (**Appendix 29**).

10.69 The results in **Table 10.9**, support those reported as part of the VISSIM micro-simulation modelling and demonstrate that in the 2031 Development Case with highway mitigation the site access roundabout is forecast to operate acceptably in both peak hours, with a ratio of flow to capacity of 85% or below for all arms.

10.70 The A508 is not part of the SRN and therefore no assessment of the DfT 02/2013 Circular compliant scenario is required.

Table 10.9: SRFI access 2031 (J1d) Development Case with mitigation assessment results

	AM			PM		
	Queue (PCU)	Delay (s)	RFC	Queue (PCU)	Delay (s)	RFC
	2031 J1d development case					
Arm 1	5.37	7.94	0.82	3.38	5.61	0.74
Arm 2	6.20	15.32	0.85	3.86	9.18	0.78
Arm 3	0.02	4.13	0.01	0.11	3.72	0.10

Arm 1 is A508 North, Arm 2 A508 South, Arm 3 is site access

A45/C67 Watering Lane (study area junction 4)

10.71 The proposed M1 Junction 15 and A45 major upgrade includes widening to the northbound A45 from the junction exit until north of the junction with the C67 Watering Lane. The improvement scheme would upgrade the A45/C67 Watering Lane junction to traffic signal control.

10.72 The LinSig model of the proposed M1 Junction 15 mitigation scheme includes the A45/C67 Watering Lane junction and the results provided at **Appendix 46** demonstrate that in the 2031 Development Case with highway mitigation scenario the junction would operate with a PRC of 3.3% in the morning peak hour and 4.4% in the evening peak hour. All arms would operate with 100%. Mean max queue on Watering Lane would be 9.2 pcus in the morning peak hour and 3.2 pcus in the evening peak hour.

10.73 In the DfT 02/2013 Circular compliant Development Case with highway mitigation scenario the junction would operate with a PRC of 12.5% in the morning peak hour and 19.9% in the evening peak hour. All arms would operate with 100%. Mean max queue on Watering Lane would be 8.0 pcus in the morning peak hour and 3.4 pcus in the evening peak hour.

10.74 The LinSig modelling supports the findings of the VISSIM micro-simulation modelling and demonstrates that the proposed signalised junction would operate acceptably.

A508 corridor route upgrade

10.75 The detailed junction models for the study area junctions along the A508 corridor have been updated with the final 2031 Future Year NSTM2 turning counts summarised at **Table 9.1,** and the results are presented in the following sections. No assessment of the DfT 02/2013 Circular compliant scenario is required as the A508 is not part of the SRN.

A508/Blisworth Road T-junction (study area junction 5)

10.76 The impact of the proposed development at A508/Blisworth Road (Courteenhall) was considered in TN8 (**Appendix 13**) using the 2031 Development Case with incremental highway mitigation J1a scenario. A detailed model of the existing junction was constructed using the PICADY module of Junctions 8 software so that it could be used as the assessment tool. The proposed mitigation is described at paragraphs 8.101 to 8.111 of **Chapter 8.0**.

10.77 The PICADY model of the proposed left-in, left-out junction has been updated to include the final NSTM2 flow sets for the 2031 Development Case with highway mitigation J1d scenario. The model results, provided at **Appendix 49**, and summarised at **Table 10.10** demonstrate that the proposed left-in, left-out arrangement would work well within the 0.85 ratio of flow to capacity (RFC) design threshold in the evening peak hour, with the average delay for vehicles exiting Blisworth Road reducing significantly. In the morning peak hour, the left turn from Blisworth Road would operate slightly over the 0.85 design threshold, but it would operate within 100% of capacity and with a significant reduction in queueing and delay as compared to the Reference Case scenario presented in TN8.

Table 10.10: Proposed A508/Blisworth Road junction 2031 J1d Development Case with mitigation assessment results

	AM			PM		
	Queue (PCU)	Delay (s)	RFC	Queue (PCU)	Delay (s)	RFC
	2031 J1d development case					
Stream B-C	5.43	81.27	0.88	0.44	21.76	0.28
Stream B-A	0.00	0.00	0.00	0.00	0.00	0.00
Stream C-A	-	-	-	-	-	-
Stream C-B	0.00	0.00	0.00	0.00	0.00	0.00
Stream A-B	-	-	-	-	-	-
Stream A-C	-	-	-	-	-	-

Arm A is A508 South, Arm B is Blisworth Road Arm C is A508 North

10.78 It is therefore concluded the proposed left-in, left-out arrangement for the A508/Blisworth Road junction would offer a substantial improvement compared with the existing junction

arrangement. Delays for southbound traffic on the A508 would be removed and journey times would improve as a result.

A508 Northampton Road/Roade Bypass junction (study area junction 6)

10.79 The performance of the proposed A508 Northampton Road/Roade Bypass roundabout was considered in the Roade Bypass Options Report (**Appendix 20**) using the 2031 Development Case with incremental highway mitigation (J1c scenario) traffic flows. A detailed model of the proposed junction was constructed using the ARCADY module of Junctions 8 software so that it could be used as a design tool.

10.80 The ARCADY model of the proposed A508 Northampton Road/Roade Bypass roundabout has been updated to include the final NSTM2 flow sets for the 2031 Development Case with highway mitigation J1d scenario. The model results, provided at **Appendix 50**, and summarised at **Table 10.11**, demonstrate that the proposed roundabout would work well within the 0.85 ratio of flow to capacity design threshold and therefore the roundabout is appropriate for the northern connection of the Roade Bypass to the A508 Northampton Road.

Table 10.11: Proposed A508 Northampton Road/Roade Bypass roundabout 2031 (J1d) Development Case with highway mitigation assessment results

	AM			PM		
	Queue (PCU)	Delay (s)	RFC	Queue (PCU)	Delay (s)	RFC
	Traffic Flows - 2031 J1d development case					
Arm 1	2.72	5.79	0.70	3.85	7.74	0.77
Arm 2	0.28	3.90	0.21	0.75	5.23	0.42
Arm 3	1.83	5.35	0.60	2.04	6.04	0.64

Arm 1 is A508 Northampton Road South, Arm 2 is A508 Northampton Road North Arm 3 is Roade Bypass

Blisworth Road/Knock Lane/Roade Bypass junction (study area junction 7)

10.81 The performance of the proposed Blisworth Road/Knock Lane/Roade Bypass roundabout was considered in Roade Bypass Options Report (**Appendix 20**) using the 2031 Development Case with incremental highway mitigation (J1c scenario) traffic flows. A detailed model of the proposed junction was constructed using the ARCADY module of Junctions 8 software so that it could be used as a design tool.

10.82 The ARCADY model of the proposed Blisworth Road/Knock Lane/Roade Bypass roundabout has been updated to include the final NSTM2 flow sets for the 2031 Development Case with highway mitigation J1d scenario. The model results, provided at **Appendix 51**, and summarised at **Table 10.12**, demonstrate that the proposed

roundabout would work well within the 0.85 ratio of flow to capacity design threshold and therefore the roundabout is appropriate for the connection with Blisworth Road and Knock Lane.

Table 10.12: Proposed Roade Bypass/Blisworth Road/Knock Lane roundabout 2031 (J1d) Development Case with mitigation assessment results

	AM			PM		
	Queue (PCU)	Delay (s)	RFC	Queue (PCU)	Delay (s)	RFC
	Traffic Flows - 2031 J1d development case					
Arm 1	3.29	8.46	0.74	2.98	7.43	0.73
Arm 2	0.10	6.48	0.09	0.27	6.63	0.21
Arm 3	1.49	4.47	0.55	1.29	4.22	0.53
Arm 4	0.57	5.88	0.36	0.21	4.52	0.17

Arm 1 is Roade Bypass North, Arm 2 is Blisworth Road Arm, 3 is Roade Bypass South, Arm 4 is Knock Lane

A508 Stratford Road/Roade Bypass junction (study area junction 8)

10.83 The performance of the proposed A508 Stratford Road/Roade Bypass roundabout was considered in the Roade Bypass Options Report (**Appendix 20**) using the 2031 Development Case with incremental highway mitigation (J1c scenario) traffic flows. A detailed model of the proposed junction was constructed using the ARCADY module of Junctions 8 software so that it could be used as a design tool.

10.84 The ARCADY model of the proposed A508 Stratford Road/Roade Bypass roundabout has been updated to include the final NSTM2 flow sets for the 2031 Development Case with highway mitigation scenario. The model results, provided at **Appendix 52**, and summarised a **Table 10.13**, demonstrate that the proposed roundabout would work well within the 0.85 ratio of flow to capacity design threshold and therefore the roundabout is appropriate for the northern connection to the A508 Stratford Road.

Table 10.13: Proposed A508 Stratford Road/Roade Bypass roundabout 2031 J1d Development Case with mitigation assessment results

	AM			PM		
	Queue (Veh)	Delay (s)	RFC	Queue (Veh)	Delay (s)	RFC
	2031 Traffic Flows - 2031 J1d development case					
Arm 1	4.02	9.38	0.80	2.73	7.38	0.73
Arm 2	0.41	7.15	0.29	0.38	6.01	0.28
Arm 3	1.77	5.24	0.64	2.38	6.03	0.71

Arm 1 is Roade Bypass, Arm 2 is A508 Stratford Road North Arm 3 is A508 Stratford Road South

A508/C26 Rookery Lane/C26 Ashton Road staggered crossroads (study area junction 9)

10.85 The impact of the proposed development at A508/C26 Rookery Lane/C26 Ashton Road priority controlled staggered crossroads was considered in TN8 using 2031 Reference Case and 2031 Development Case with incremental highway mitigation (J1c scenario) traffic flows. A detailed model of the existing junction was constructed using the PICADY module of Junctions 8 software so that it could be used as the assessment tool. The proposed mitigation is described at paragraphs 8.112 to 8.122 of **Chapter 8.0**.

10.86 The PICADY model of the proposed junction has been updated to include the final NSTM2 flow sets for the 2031 Development Case with highway mitigation scenario. The model results, provided at **Appendix 53**, and summarised at **Table 10.14**, demonstrate that the proposed single lane dualling arrangement would work within the 0.85 ratio of flow to capacity design threshold in both the morning and evening peak hours.

Table 10.14: Proposed A508/C26 Rookery Lane/C26 Ashton Road/junction 2031 (J1d) Development Case with mitigation assessment results

	AM			PM		
	Queue (PCU)	Delay (s)	RFC	Queue (PCU)	Delay (s)	RFC
	A1 - 2031 J1d development case					
Stream B-C	0.00	11.51	0.00	0.01	8.62	0.01
Stream B-AD	0.23	20.82	0.19	0.03	13.99	0.03
Stream A-B	-	-	-	-	-	-
Stream A-C	-	-	-	-	-	-
Stream A-D	1.03	14.50	0.49	2.84	30.49	0.74
Stream D-A	5.19	48.08	0.84	3.68	37.84	0.78
Stream D-BC	0.80	63.34	0.44	0.00	0.00	0.00
Stream C-D	-	-	-	-	-	-
Stream C-A	-	-	-	-	-	-
Stream C-B	0.28	12.28	0.22	0.09	8.34	0.08

Arm A is A508 North, Arm B is Ashton Road, Arm C is A508 South, Arm D is Rookery Lane

10.87 It is therefore concluded the proposed single lane dualling arrangement for the A508/C26 Rookery Lane/C26 Ashton Road junction would offer improvement in operation compared with the existing junction arrangement, whilst the realignment of the A508 would reduce the radius on the bend to the south of the junction, thereby improving road safety.

A508/C85 Pury Road ghost island T-junction (study area junction 10)

10.88 The impact of the proposed development at A508/Pury Lane priority-controlled T-junction was considered in TN8 using the 2031 Development Case with incremental highway mitigation (J1c scenario) traffic flows. A detailed model of the existing junction was

constructed using the PICADY module of Junctions 8 software so that it could be used as the assessment tool.

10.89 The PICADY model of the proposed junction has been updated to include the final NSTM2 flow sets for the 2031 Development Case with highway mitigation J1d scenario. The model results, provided at **Appendix 54**, and summarised at **Table 10.15** show that whilst the proposed improvement scheme would deliver the anticipated improvement in performance in the morning peak hour, the junction performance has deteriorated in the evening peak hour when compared to the results for the 2031 Development Case with incremental highway mitigation J1c scenario that is presented in TN8.

10.90 This deterioration in performance is caused by an increase in the southbound flow on the A508 in the evening peak hour which makes it more difficult for right-turning vehicles to exit Pury Road.

Table 10.15: Proposed A508/Pury Road junction 2031 (J1d) Development Case with highway mitigation assessment results

	AM			PM		
	Queue (PCU)	Delay (s)	RFC	Queue (PCU)	Delay (s)	RFC
	Traffic Flows - 2031 J1d development case					
Stream B-C	0.98	12.79	0.50	25.12	274.68	1.25
Stream B-A	0.11	211.57	0.12	4.49	420.05	1.10
Stream C-A	-	-	-	-	-	-
Stream C-B	23.07	138.17	1.04	5.77	52.84	0.88
Stream A-B	-	-	-	-	-	-
Stream A-C	-	-	-	-	-	-

Arm A is A508 South, Arm B is Pury Road, Arm C is A508 North

10.91 The turning counts traffic provided at **Appendix 43** show that 33 pcus turn right out of Pury Road in the evening peak hour. Sensitivity testing at the junction shows that if the right-turn flow was reduced by only 10 pcus, the junction would operate acceptably. This indicates that the operation of the junction is sensitive to fluctuations in right turning traffic flow from Pury Road that are not fully represented in the NSTM2. As a result, it is likely that drivers would seek other routes to avoid a known delay.

10.92 It is concluded the proposed mitigation at the A508/Pury Road junction remains an appropriate intervention, as it provides relief to a known capacity issue which could lead to a road safety problem, without encouraging traffic to use inappropriate routes.

C27 Stoke Road/Knock Lane T-junction (study area junction 11) and Knock Lane and Blisworth Road

10.93 As discussed in TN8 the turning flows at the C27 Stoke Road/Knock Lane T-junction are low in the 2031 Reference Case and, despite a switch in background traffic from using Stoke Road to the south of the junction, to using Knock Lane, which in percentage terms is a large increase, they remain low in the 2031 Development Case with highway mitigation J1d scenario. Nevertheless, the improvement scheme as shown on the **Highway Plans 2.4F** is proposed at the junction, due to the existing poor state of repair and evidence of vehicles overrunning the carriageway edge.

10.94 Tables 13 and 14 of the Development Case Forecast Report which summarise the study area V/C performance, also suggest that this junction will operate conformably. To confirm this, detailed models of the existing and proposed junction were constructed using the PICADY module of Junctions 8 software so that it could be used as the assessment tool.

10.95 The model results for the existing junction using the 2031 Reference Case traffic flows given at **Table 9.1** are provided at **Appendix 55** and summarised at **Table 10.16**. The model results for the proposed junction using the 2031 Development Case with highway mitigation (J1d scenario) traffic flows are also provided at **Appendix 55** and are summarised at **Table 10.17**. The results demonstrate that the junction would operate well within capacity in all scenarios.

Table 10.16: Existing C27 Stoke Road/Knock Lane T-junction 2031 (D1) Reference Case assessment results

	AM			PM		
	Queue (PCU)	Delay (s)	RFC	Queue (PCU)	Delay (s)	RFC
	2031 D1					
Stream B-C	0.00	0.00	0.00	0.00	0.00	0.00
Stream B-A	0.17	11.32	0.15	0.08	10.90	0.07
Stream C-AB	0.00	0.00	0.00	0.00	0.00	0.00
Stream C-A	-	-	-	-	-	-
Stream A-B	-	-	-	-	-	-
Stream A-C	-	-	-	-	-	-

Table 10.17: Proposed C27 Stoke Road/Knock Lane T-junction 2031 (J1d) Development Case with highway mitigation assessment results

	AM			PM		
	Queue (PCU)	Delay (s)	RFC	Queue (PCU)	Delay (s)	RFC
	2031 J1d					
Stream B-C	0.00	0.00	0.00	0.00	0.00	0.00
Stream B-A	0.13	9.02	0.11	0.35	11.05	0.26
Stream C-AB	0.00	0.00	0.00	0.00	0.00	0.00
Stream C-A	-	-	-	-	-	-
Stream A-B	-	-	-	-	-	-
Stream A-C	-	-	-	-	-	-

10.96 Paragraphs 8.127 to 8.132 summarise the assessment work and consultations undertaken with regard to the proposed highway improvements at the C27 Stoke Road/Knock Lane T-junction and the proposed widening to the carriageway at the bend on Knock Lane.

10.97 It was concluded that traffic flows on Knock Lane and Blisworth Road would increase as a result of background traffic switching to use this route to access the A508 via the new bypass, and also due to some additional traffic reassigning to use Knock Lane and Blisworth Road to access Blisworth due to the proposed left-in, left-out at the A508/Blisworth Road (Courteenhall) junction. However, whilst a high percentage increase (due to the low background flows), the total traffic using the route remains low, at around 285 vehicles two-way with a tidal nature consistent with arrival and departures from Blisworth in the peak hours. The review of the PIA on Knock Lane and Blisworth Road (Roade) did not identify an existing accident problem that would be exacerbated by the increased traffic using the routes.

10.98 This assessment has therefore been updated based on the final NSTM2 2031 Development Case with highway mitigation (J1d scenario) traffic flows. **Figure 10.11** and **Figure 10.12** combine extracts from the 'J1d reassignment plots' and the 'J1d vs D1' flow difference plots that are provided at Figures 27 to 30 of the Development Case Forecast Report (**Appendix 24**).

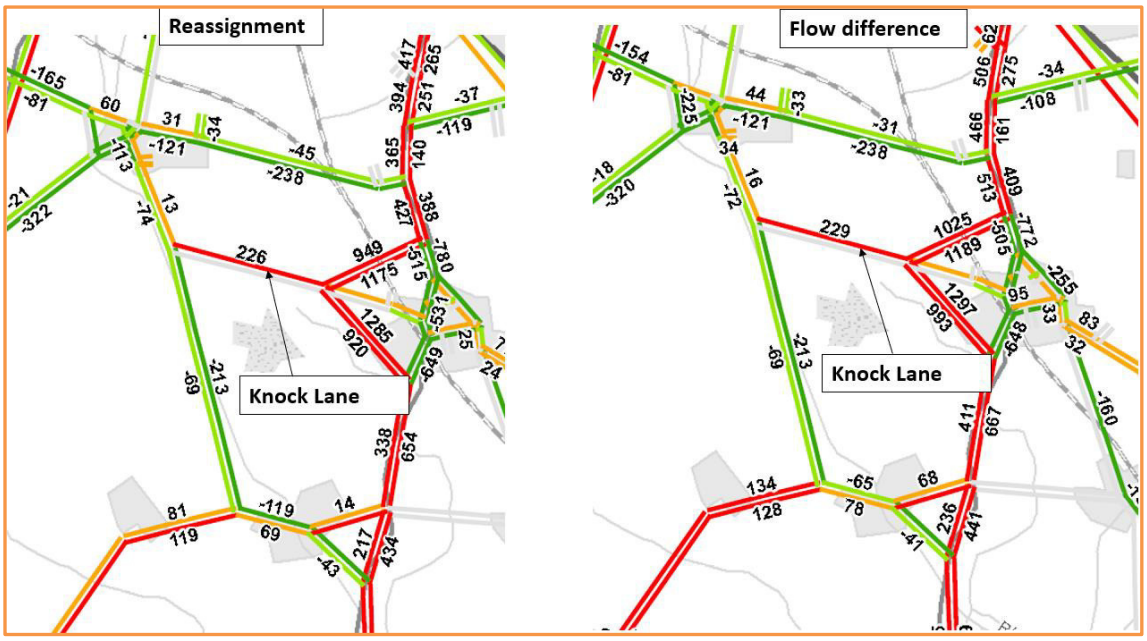


Figure 10.11: 2031 Future Year J1d reassignment and 'J1d vs D1' flow difference plots – AM peak

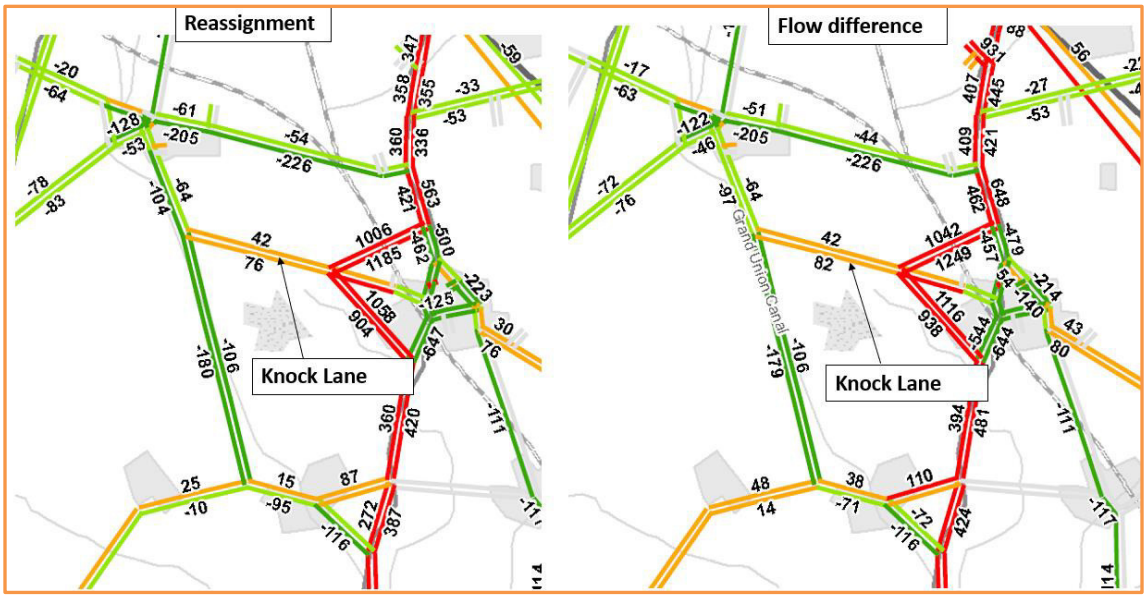


Figure 10.12: 2031 Future Year J1d reassignment and 'J1d vs D1' flow difference plots – PM peak

10.99 Comparison of the reassignment and flow difference plots show that in the morning peak hour 226 of the 229 additional vehicles to use Knock Lane and Blisworth Road would be existing traffic reassigning to use the route to access the new bypass. The plots suggest that most of the reassignment (213 of the 226), is traffic that was previously travelling southbound on Stoke Road to access the A508 via Stoke Bruerne. A similar trend can be seen in the evening peak hour.

10.100 Overall, total traffic flows on Knock Lane and Blisworth Road would remain low, at 365 two-way vehicles in the morning peak hour and 256 two-way vehicles in the evening peak

hour. The morning peak hour flow is tidal, with 318 of the 365 vehicles travelling eastbound. The proposed 7.5T environmental weight restriction would restrict HGVs, other than for access, from using the road.

10.101 The extent of the proposed improvements to Knock Lane and Blisworth Road are shown on **drawing NGW-BWB-GEN-XX-SK-C-SK51-S2-P1**. In total 840m (42%) of the road would be improved and widened as part of the proposed highway mitigation works, including widening around the bend. The remaining straight sections of the road have good forward visibility and cars travelling in opposite directions would be able to pass each other using the available road width.

10.102 The forecast reductions in traffic on Stoke Road due to existing traffic switching to use Knock Lane to access the new bypass will also reduce NCC's maintenance burden on Stoke Road, which NCC have confirmed is a problem, particularly near the canal.

10.103 Notwithstanding this, NCC are mindful that the increased use and passing traffic on Knock Lane could advance the need for maintenance of the carriageway along the straight sections of the road that would not be improved.

10.104 It has therefore agreed with NCC that in addition to the proposed highway works a 'Knock Lane & Blisworth Road maintenance and minor works' fund would be provided to NCC to be used in the event that the increased use of the road should advance the need for maintenance or other remedial works.

Roade (study area junctions 24, 25, 26)

10.105 The flow difference plots for the 2031 Development Case with highway mitigation (J1d) scenario shown at Figures 27 and 29 and Appendix B of the Development Case Forecast Report (**Appendix 24**) show that traffic flows through Roade on the A508 are forecast to reduce by around 74% and 52% in the morning and evening peak hours, respectively. This would alleviate congestion within the village and at study area junctions 24, 25 and 26. This is demonstrated at Tables 13 and 14 of the Development Case Forecast Report which summarise the study area V/C performance of these junctions, which would see a significant improvement in operation and will accommodate the reduced traffic demand conformably.

10.106 The NSTM2 strategic modelling demonstrates that existing HGV traffic would choose to use the new bypass rather than travel though the village. However, this would be enforced through the proposed 7.5T environmental weight restriction through the village and on the

other local roads to the south of the SRFI site, which along with the existing 7.5T environmental weight restrictions that are in place on C85 Pury Road would restrict HGVs to using the A508.

Courteenhall Road/High Street/Northampton Road (study area junction 27)

10.107 Tables 13 and 14 of the Development Case Forecast Report which summarise V/C performance at the study area junctions indicate that there would be an improvement in the performance of Courteenhall Road/High Street/Northampton Road T-junction in Blisworth in the morning peak hour, but a deterioration in the performance of the evening peak hour. However, the flow difference plots show that there would be reductions in the traffic flows through this junction in both peak hours and therefore more detailed assessment has been undertaken.

10.108 A detailed model of the existing junction was constructed using the PICADY module of Junctions 8 software so that it could be used as the assessment tool. The operation of the junction was assessed using the 2031 Reference Case and 2031 Development Case with highway mitigation (J1d scenario) traffic flows listed at **Table 9.1**. The full results are provided at **Appendix 56** and are summarised at **Table 10.18**.

10.109 The results demonstrate that there would be a significant improvement in the operation of the junction in both the morning and evening peak hours as a result of the proposed development and highway mitigation strategy drawing traffic away from Blisworth Village and using this junction.

Table 10.18: Existing Courteenhall Road/High Street/Northampton Road T-junction 2031 Future Year assessment results

	AM			PM		
	Queue (PCU)	Delay (s)	RFC	Queue (PCU)	Delay (s)	RFC
	D1					
Stream B-AC	75.39	503.30	1.27	144.76	1095.85	1.56
Stream C-A	-	-	-	-	-	-
Stream C-B	26.81	162.36	1.06	23.47	148.82	1.04
Stream A-B	-	-	-	-	-	-
Stream A-C	-	-	-	-	-	-
	J1d					
Stream B-AC	57.97	337.52	1.17	66.71	393.24	1.19
Stream C-A	-	-	-	-	-	-
Stream C-B	3.69	28.89	0.80	1.72	17.16	0.60
Stream A-B	-	-	-	-	-	-
Stream A-C	-	-	-	-	-	-

Grafton Regis

10.110 Paragraphs 8.133 to 8.139 summarise the assessment work and consultations undertaken regarding the proposed highway improvements to the A508 at Grafton Regis.

10.111 The proposed improvement scheme is as shown on the **Highway Plans 2.4F**. As part of their response to the Stage 2 Consultation NCC noted that a controlled crossing may be required to assist in accessing the bus northbound bus stop. The need for a signal crossing has been examined using the final NSTM2 traffic data.

10.112 In the 2031 Reference Case (D1 scenario) the NSTM2 two-way AADT traffic flow on the A508 north of Church Lane through Grafton Regis is forecast to be 10,371 vehicles. In the 2031 Development Case with highway mitigation J1d scenario, the two-way AADT flow on this section of road is forecast to increase to 14,890 vehicles. However, by providing the proposed pedestrian refuge, pedestrians accessing the bus stop will be able to cross the A508 in two stages. Therefore, the higher directional AADT flow is taken, which in this case is the southbound direction, with an AADT flow of 7,842 vehicles.

10.113 Table 6/1 of DMRB TA 91/05[31] 'Provision of Non-Motorised Users' provides guidance on the suitability of informal at grade crossings based on AADT flow. The appropriateness of informal crossings is defined by three AADT flow ranges, as follows:

- Normally Appropriate (AADT below 8,000);
- Potentially Appropriate (AADT 8,000 to 12,000); and
- Not Normally Appropriate (AADT above 12,000).

10.114 The 2031 Reference Case AADT flow of 10,371 vehicles places the existing informal crossing arrangement with central refuge in the potentially appropriate category. With the proposed pedestrian refuge on the A508 in place, the 2031 Development Case with highway mitigation (J1d scenario) AADT flow of 7,842 vehicles puts the proposed informal crossing in the normally appropriate category.

10.115 Based on this assessment, combined with the location of the crossing within a 30mph area and the likely low usage of the crossing, a controlled crossing is not required.

[31] DMRB Volume 5, Section 2, Part 5, TA 91/05 'Provision of Non-Motorised Users'

Summary

10.116 This chapter has presented the assessment of the residual impact of the development traffic and the highway mitigation proposals at the study area junctions.

10.117 Assessment of proposed highway mitigation at M1 Junction 15 and the A45/C67 Watering Lane junction, M1 Junction 15A and the SRFI access has been undertaken using a VISSIM micro-simulation model. Assessment has been undertaken for the DfT 02/2013 Circular compliant and 2031 Future Year assessment scenarios using traffic cordons extracted from the NSTM2.

10.118 The VISSIM micro-simulation modelling demonstrates that the proposed M1 Junction 15 and A45 major upgrade and the M1 Junction 15A improvements would provide a significant improvement to the operation of the highway network compared to the Reference Case scenarios. Journey times and average delay per vehicle would be significantly reduced, whilst at the same time allowing the SRN to accommodate the development traffic and additional background traffic. Peak hour queues at M1 Junction 15 on the A45 and A508 would be significantly reduced and instances of queueing traffic blocking back to the M1 mainline on the southbound diverge slip would be removed. The highway improvements at M1 Junction 15A address constraints at the junction and would remove instances of queuing traffic on both the northbound and southbound diverge slip roads blocking back to the M1 mainline.

10.119 The results of the micro-simulation modelling therefore demonstrate the suitability of the proposed highway works to mitigate the impact of the development traffic, whilst also allowing the SRN to function in a safer and more efficient manner as compared to the reference case scenarios.

10.120 Assessment of the residual traffic impacts at the study area junctions has been undertaken using industry standard assessment tools. This has been undertaken for all study area junctions for the 2031 Future Year assessment scenario, and for junctions on the SRN, a DfT 02/2013 Circular compliant assessment scenario has also been undertaken. With the highway mitigation strategy in place the residual impact of the proposed development is demonstrated to be reduced to acceptable levels

11.0 FIRST PHASE OF HIGHWAY MITIGATION IN OPENING YEAR

Introduction

11.1 An assessment of the opening year development traffic impact was undertaken to demonstrate that the proposed phasing of the highway mitigation as provided at **Table 4.2** is appropriate.

11.2 The potential first phase of the development is described in paragraphs 4.102 to 4.108. It would comprise the intermodal rail terminal and aggregates terminal served by four trains per day, with up to 1 million sqft of warehousing and distribution units with additional mezzanine floor space. 2021 is identified as the opening year for assessment purposes.

11.3 In the 2021 opening year, the following highways infrastructure and mitigation will be in place:

- the SRFI access roundabout onto the A508;
- dualling of the A508 between the SRFI access and M1 Junction 15; and
- the M1 Junction 15 & A45 major upgrade.

11.4 Figures 6 and 8 and Figures 7 and 9 of the Development Case Forecast Report (**Appendix 24**) present the morning and evening NSTM2 flow difference and reassignment plots comparing the Reference Case (B1 scenario) with the Development Case no highway mitigation (E1 scenario) in the 2021 Opening Year. The reassignment plots show that without any highway mitigation, the opening year development traffic displaces background traffic from the A508 and A45 during the morning and evening peak hours, as traffic avoids congestion at M1 Junction 15.

11.5 Tables 9 and 10 of the Development Case Forecast Report summarises the V/C ratios at the study area junctions for the Opening Year Reference Case (B1 scenario) and Opening Year Development Case no highway mitigation (E1 scenario) in the morning and evening peak hours, respectively. The comparison of the V/C ratios shows that in general there is little change in the performance of the study area junctions between the Reference Case and the Development Case no highway mitigation scenarios. However, it is notable that the V/C ratio for the Courteenhall Road/High Street/Northampton Road junction increases from 83% to 92% in the morning peak hour. This is due to traffic increases at the junction resulting from the background traffic being displaced by the development traffic in the unmitigated Development Case scenario.

11.6 With the proposed phase 1 highway mitigation in place (H1 scenario) the V/C comparison presented at Tables 13 and 14 of the Development Case Forecast Report show that there would be a substantial improvement in the operation of M1 Junction 15. The flow difference and reassignment plots presented at Figures 19 to 22 of the Development Case Forecast Report show that traffic is drawn to the A508 and A45 due to the improved performance of M1 Junction 15. This is reflected in the V/C ratio for the Courteenhall Road/High Street/Northampton Road junction which reduces from 83% to 76% due to a reduction in traffic passing through this junction.

11.7 The increased traffic using the A45 leads to an increase in the V/C ratio at the A45/C67 Watering Lane junction and the A45 Wootton Interchange in the morning peak. At the Watering Lane junction, the V/C ratio is forecast to increase from 69% to 79% between the Opening Year Reference Case (B1 scenario) and Opening Year Development Case with phase 1 highway mitigation (H1 scenario). At the Wootton Interchange the V/C ratio is forecast to increase from 70% to 79% of capacity between these scenarios.

11.8 Elsewhere, and during the evening peak hour, there is little change in the forecast in V/C ratios of the study area junctions.

11.9 Based on the above analysis, the study area for the 2021 Opening Year assessment comprises the proposed site access junction, and the following off-site junctions:

- M1 Junction 15 including the A45/C67 Watering Lane junction;
- M1 Junction 15A;
- A45 Queen Eleanor Interchange; and
- A508 corridor.

11.10 It should be noted that since the future year assessment has concluded that it is more appropriate to provide mitigation at the Queen Eleanor Interchange, no opening year assessment has been undertaken at the Wootton Interchange.

11.11 The residual impact of the development and the highway mitigation proposals at the study area junctions for the 2021 Opening Year have been assessed using turning movements extracted from the NSTM2 for the scenarios shown in **Table 9.3**.

M1 Junction 15

11.12 The LinSig model of the existing junction has been updated to include the final NSTM2 flow sets for the 2021 Opening Year Reference Case (B1 scenario) and 2021

Development Case no highway mitigation (H1 scenario). The model results, provided at **Appendix 58**, and summarised at **Table 11.1** show that the junction would operate above its maximum capacity in both the 2021 Opening Year Reference Case and 2021 Opening Year Development Case no highway mitigation scenarios.

Table 11.1: M1 Junction 15 2021 Opening Year assessment results

scenario	peak	PRC	total delay (pcuHr)
2021 Opening Year Reference Case (B1)	AM Peak	-57.5%	541.41
	PM Peak	-46.5%	422.54
2021 Opening Year Development Case no highway mitigation (E1)	AM Peak	-65.6%	604.04
	PM Peak	-65.4%	527.70
2021 Opening Year Development Case with highway mitigation (H1)	AM Peak	0.9%	136.97
	PM Peak	6.3%	103.90

11.13 The performance of the junction deteriorates by 8.1% in the morning peak hour (-57.5% vs -65.6%) and by 18.9% in the evening peak hour (-46.5% vs -65.4%). The traffic due to the development in the opening year would have an impact on the performance of the junction, particularly in the evening peak hour. As a result, it is appropriate that the proposed mitigation scheme at M1 Junction 15 should be delivered prior to occupation of the phase 1 development.

11.14 The mitigation LinSig model has been updated to include the traffic flows for 2021 Development Case with phase 1 highway mitigation (H1 scenario) and the model results are shown at **Appendix 58** and also summarised in **Table 11.1** above. The results show that the proposed improvement scheme would operate within acceptable performance criteria in both the morning and evening peak hours for the 2021 Opening Year scenario. The model shows that all internal queueing could be accommodated and there would not be significant queueing on the motorway slip roads.

11.15 It is concluded that in the 2021 Opening Year, M1 Junction 15 will operate with spare capacity, providing an immediate improvement on the existing level of performance of the junction.

M1 Junction 15A

11.16 The ARCADY models of the existing junction have been updated to include the NSTM2 flow sets for the 2021 Opening Year Reference Case (B1 scenario) and 2021 Opening Year Development Case with phase 1 highway mitigation (H1 scenario), i.e. with M1 Junction 15 and A45 improvements in place, as referenced at **Table 9.3**.

11.17 The model results for the northern roundabout provided at **Appendix 59** and summarised in **Table 11.2**, show that it would operate acceptably in the morning peak hour for both the 2021 Reference Case and 2021 Development Case with phase 1 highway mitigation opening year scenarios. However, the northern roundabout would operate above its design capacity (i.e. 85%) in both scenarios in the evening peak hour, although all arms would operate within 100% of capacity.

Table 11.2: M1 Junction 15A northern roundabout 2021 Opening Year assessment

	AM			PM		
	Queue (PCU)	Delay (s)	RFC	Queue (PCU)	Delay (s)	RFC
	NSTM Traffic Flows - 2021 B1					
Arm 1	3.76	6.49	0.77	7.04	11.20	0.86
Arm 2	5.77	20.84	0.83	8.09	29.34	0.89
Arm 3	4.13	7.83	0.78	2.45	5.21	0.69
	NSTM Traffic Flows - 2021 H1					
Arm 1	2.97	5.48	0.72	6.50	10.54	0.85
Arm 2	4.45	15.72	0.79	6.19	22.61	0.85
Arm 3	3.31	6.59	0.73	2.40	5.05	0.68

Arm 1 =A43 South Link, Arm 2 = M1 Southbound Offslip, Arm 3 = A5123

11.18 The model results for the southern roundabout are provided at **Appendix 59** and summarised in **Table 11.3**. The results show that the roundabout would operate above its maximum capacity in both the 2021 Reference Case and 2021 Development Case with phase 1 highway mitigation opening year scenarios in the morning and evening peak hours. However, the results show that there would be no impact due to the proposed opening year development in the 2021 Development Case scenario, with queue lengths and delays reducing on all approaches when compared to the Reference Case, except for Arm 2 in the morning peak hour where the queue would increase by 5 pcus.

Table 11.3: M1 Junction 15A southern roundabout 2021 Opening Year assessment

	AM			PM		
	Queue (Veh)	Delay (s)	RFC	Queue (Veh)	Delay (s)	RFC
	NSTM Traffic Flows - 2021 B1					
Arm 1	172.84	301.47	1.16	5.26	9.66	0.84
Arm 2	22.63	42.05	0.98	9.09	16.88	0.91
Arm 3	196.86	1065.28	1.61	310.52	1673.54	1.94
	NSTM Traffic Flows - 2021 H1					
Arm 1	144.41	250.00	1.14	4.01	7.68	0.80
Arm 2	27.67	49.65	0.99	8.50	15.63	0.90
Arm 3	158.76	806.74	1.51	299.58	1611.81	1.91

Arm 1 =A43 North Link, Arm 2 = A43, Arm 3 = M1 Northbound Offslip

11.19 It is concluded the development would not impact on the performance of M1 Junction 15A in the 2021 Opening Year and therefore the proposed M1 Junction 15A mitigation scheme is not required as part of the phase 1 highway mitigation.

Site access roundabout

11.20 The operation of the proposed development access roundabout was assessed using Junctions 8 ARCADY software. The model uses the NSTM2 flow sets for the 2021 Development Case with phase 1 highway mitigation (H1 scenario) as referenced at **Table 9.3**. The results are summarised in **Table 11.4**, and the ARCADY outputs are presented at **Appendix 60**.

Table 11.4: 2021 Opening Year site access roundabout assessment results

	AM			PM		
	Queue (PCU)	Delay (s)	RFC	Queue (PCU)	Delay (s)	RFC
	2021 H1 Opening Year					
Arm 1	1.57	3.16	0.59	1.09	2.90	0.45
Arm 2	1.06	3.84	0.47	1.02	3.62	0.47
Arm 3	0.00	2.88	0.00	0.02	2.94	0.02

11.21 The results in **Table 11.4** show that in the 2021 Opening Year Development Case with phase 1 highway mitigation scenario, the site access roundabout is forecast to operate acceptably in both peak hours, with a ratio of flow to capacity below 85% for all movements.

A45/C67 Watering Lane junction

11.22 The LinSig model of the proposed M1 Junction 15 mitigation scheme includes the A45/Watering Lane junction and the results provided at **Appendix 58** demonstrate that in the 2021 Opening Year Development Case with phase 1 highway mitigation (H1 scenario), the junction would operate with a PRC of 9.5% in the morning peak hour and 21.6% in the evening peak hour. All arms would operate with 100%. Mean max queue on Watering Lane would be 8.8 pcus in the morning peak hour and 3.2 pcus in the evening peak hour.

11.23 The LinSig modelling demonstrates that the proposed signalised junction would operate acceptably in the 2021 Opening Year with the proposed M1 Junction 15 and A45 major upgrade in place.

A45 Queen Eleanor Interchange

11.24 The LinSig model of the existing junction has been updated to include the NSTM2 flow sets for the 2021 Opening Year Reference Case and 2021 Opening Year Development Case with phase 1 highway mitigation, scenarios provided at **Appendix 45**. The model results, provided at **Appendix 61**, and summarised at **Table 11.5**, show that the junction would operate above its maximum capacity in both the 2021 Opening Year Reference Case and 2021 Opening Year Development Case scenarios.

Table 11.5: A45 Queen Eleanor Interchange 2021 Opening Year assessment results

scenario	peak	PRC	total delay (pcuHr)
2021 Opening Year Reference Case (B1)	AM Peak	-97.3%	1237.29
	PM Peak	-93.9%	1388.31
2021 Opening Year Development Case (H1)	AM Peak	-98.9%	1228.15
	PM Peak	-96.0%	1400.89

11.25 The performance of the junction deteriorates by 1.6% in the morning peak hour (-98.9% vs -97.3%) and by 2.1% in the evening peak hour (-96.0% vs -93.9%). Therefore, the traffic impact due to the development in the Opening Year would not have a severe impact on the performance of the junction, and the proposed mitigation scheme at the Queen Eleanor Interchange is not required as part of the phase 1 highway mitigation.

A508 Corridor

11.26 The proposed highway mitigation strategy for the SRFI development includes a bypass for the village of Roade and a series of junction improvements along the A508 corridor to the south of the development as part of the A508 corridor route upgrade.

11.27 The proposed A508 Roade Bypass is the principal trigger for the A508 corridor route upgrade as it releases the bottleneck through Roade and is responsible for drawing traffic away from local routes and back onto the A508.

11.28 The Roade Bypass would be delivered as soon as is practicable, and no later than 2 years following first occupation of the SRFI site. However, due to the length of time necessary for the construction of the Roade Bypass, and timing restrictions associated with installing the bridge over the WCML railway, it would not be in place prior to the opening of the development.

11.29 Without the Roade Bypass, whilst there are forecast changes in traffic levels along the A508 corridor south of the site access due to the improvement works at M1 Junction 15, these changes are relatively minor, as shown in the flow difference plots provided at Figures 19 and 21, and Appendix B of the Development Case Forecast Report (**Appendix 24**). There would be an increase in traffic of 131 pcus southbound in the morning peak hour, which equates to just over 2 pcus per minute. In the evening peak hour, the two-way flow would decrease by 5 pcus.

11.30 The NSTM2 select link analysis (SLA) for the opening year shows the assignment of the development traffic to the highway network in the morning and evening peak hour. These plots are provided at **Appendix 45**. They demonstrated that there would be less than 30 two-way development trips south of the SRFI access junction in the Opening Year.

11.31 The NSTM2 V/C assessment summarised at Tables 13 and 14 of the Development Case Forecast Report show that in the 2021 Opening Year scenario with the phase 1 highway mitigation in place (H1 scenario), there would be little change in the operation of the study area junctions along the A508 corridor.

11.32 Given the SRFI development traffic increases would be confined to less than 30 two-way trips, and the relatively small volume of reassigned traffic on the A508 south of the site access, it is concluded that the mitigation proposals at A508/Blisworth Road, A508/C26Rookery Lane/C26 Ashton Road and the A508/Pury Road junctions are not required until the Roade Bypass has been constructed.

11.33 Notwithstanding the above, the A508/High Street mini-roundabout in Roade is a known congestion hotspot during peak times. Therefore, the operation of the mini-roundabout in the 2021 Opening Year was assessed using Junctions 8 ARCADY software. The model uses the NSTM2 flow sets for the 2021 Opening Year Reference case and 2021 Opening Year Development Case with phase 1 highway mitigation scenarios traffic flows given at **Table 9.3**. The results are summarised in **Table 11.6**, and the ARCADY outputs are presented at **Appendix 62**.

Table 11.6: 2021 opening year A508/High Street mini-roundabout assessment results

	AM			PM		
	Queue (PCU)	Delay (s)	RFC	Queue (PCU)	Delay (s)	RFC
	B1					
Arm 1	187.97	953.44	1.38	4.00	28.73	0.77
Arm 2	0.68	18.28	0.39	1.13	18.92	0.54
Arm 3	6.36	32.20	0.85	10.16	46.68	0.92
	H1					
Arm 1	184.93	936.35	1.37	3.78	27.72	0.76
Arm 2	0.77	18.72	0.43	1.22	19.60	0.55
Arm 3	6.29	31.95	0.85	13.16	58.42	0.95

Arm 1 is A508 North, Arm 2 is High Street, Arm 3 is A508 South

11.34 The results in **Table 11.6** show that the A508/High Street mini-roundabout would operate above capacity in the morning and evening peak hours for both the 2021 Opening Year Reference Case and 2021 Opening Year Development Case scenarios.

11.35 The model results show that in the morning peak hour there would not be a material impact on junction performance due to the proposed development in the Opening Year, with queueing and delay remaining generally consistent across the two scenarios.

11.36 In the evening peak hour, the queue on the A508 south approach would increase by 3 pcus in the 2021 Development Case scenario. This increase is not severe and since traffic conditions in Roade would be greatly improved once the proposed bypass is opened, no interim mitigation measures should be required at this junction.

Summary

11.37 Assessment of the opening year development traffic impact has been undertaken in the 2021 Opening Year. This demonstrates that the proposed phasing of the highway mitigation is appropriate and that in 2021 with the proposed M1 Junction 15 and A45 major upgrade in place, M1 Junction 15 will operate with spare capacity, providing an immediate improvement on the existing level of performance of the junction.

12.0 CONSTRUCTION TRAFFIC IMPACT ASSESSMENT

Introduction

12.1 The overarching systems and controls that would be adopted during the construction of the proposed development and associated highway mitigation works to minimise any adverse environmental impacts are set out in the provisions of the DCO and are detailed within the Construction Environmental Management Plan (CEMP), which is appended to Chapter 2 of the ES.

Infrastructure Programme

12.2 The Indicative Master Programme is provided at Appendix 2 of the CEMP. It breaks down the construction works into two key components, as listed below:

- Off-site highway improvements;
  - M1 J15 and A45 major upgrade and link to site access;
  - M1 J15A improvements; and
  - Roade Bypass and A508 improvements.
- Main-site construction;
  - Bulk earthworks;
  - Landscaping;
  - Road Construction;
  - Construct Rail Terminal; and
  - Buildings.

12.3 The Indicative Master Programme includes the indicative construction programme showing the above work components. The works would be phased over a 5.5 year period.

12.4 Prior to occupation of the first building on the site, the following works will have been completed:

- A508 SRFI access and dualling between the site access and M1 Junction 15;
- M1 Junction 15 and A45 major upgrade;
- Landscaping phase 1;
- On site road construction phase 1; and
- Rail Terminal ('terminal' as shown in box a) of Document 2.8.

12.5 The A508 Roade Bypass will be delivered as soon as is practicable, and no later than 2 years following first occupation of the site. However, due to the construction time

necessary for the bypass, and timing restrictions associated with installing the bridge over the WCML railway, it would not be in place prior to the opening of the development.

12.6 The M1 Junction 15A improvements will be complete prior to the opening of the A508 Roade Bypass. However, it cannot be constructed at the same time as the M1 Junction J15 and A45 major upgrade and SRFI access to avoid working on two adjacent motorway junctions concurrently.

12.7 The above constraints on the off-site works components and other practical restraints, are set out in the CEMP. However, the importance of managing the phasing of the components to mitigate delays and disruption on the existing highway network is recognised as the most significant practical restraint.

12.8 Generally, this is best achieved by diverting traffic onto new alignments away from works under construction and controlling the level of interference on the networks at any time. Therefore, the CEMP defines additional restraints that could be imposed. These will be discussed and agreed with Highways England and the local highway authorities during the detailed design.

Working hours

12.9 Construction work within the development site would be confined to the following:

- 07:00 -19:00 hours Monday to Friday;
- 07:00 -13:00 hours Saturday.

12.10 All delivery vehicles and plant arriving and leaving the site would also comply with the same time restrictions, although site personnel would be permitted to access the site shortly before these hours and exit the site shortly after them. Construction work outside the development site will require night working to comply with the requirements of Highways England, or for practical and safety reasons.

12.11 In summary, for the construction process, and to ensure a robust assessment, the following assumptions have been made:

- A 5.5 years construction period; and
- A 10 hour, five day working week for 49 weeks per year.

12.12 Based on the construction programme and total mass of material required for each key works component identified within the Indicative Master Programme, the total numbers of HGV and light goods vehicle (LGV) movements have been estimated. Estimates for the number of construction workers travelling to the site by car and van have also been made.

12.13 A summary of the estimated average daily construction traffic movements is provided at **Table 12.1**. This is based on a 5-day working week, assuming 49 working weeks per year. It is therefore a robust assessment as the average excludes Saturday working, the inclusion of which would reduce the overall daily traffic movement figures given in the table. A detailed assessment is included in the Construction Traffic Assumptions, which are included at **Appendix 33**.

Table 12.1: Average daily construction traffic movements (one-way)

Year	HGV	LGV	Car	Vans	Total
1	147	33	117	157	455
2	171	39	175	129	515
3	125	28	86	95	334
4	72	14	36	48	170
5	72	14	36	48	170
6	36	7	18	24	85

Assessment of construction traffic impacts

12.14 Access and egress to each part of the off-site construction works would be via a metalled access road joined to the public highway. Access to the SRFI site during the earlier stages of the construction process, would be via a new temporary ghost island priority-controlled T-junction construction on the A508. The general arrangement of this is shown at Drawing **NGW-BWB-GEN-XX-SK-C-SK07-S-P4**. Whilst the temporary junction is in place the speed limit on this section of the A508 will be reduced from derestricted to 40mph via a temporary Traffic Regulation Order provided for in the DCO. The temporary junction would be replaced with the site access roundabout as part of the site access construction works prior to first occupation on the SRFI site.

12.15 The routing of construction traffic would be agreed with the Police, NCC, Highways England and the Project Manager. Delivery vehicles would be routed via the principal and strategic road networks to avoid effects on local residential areas. No heavy construction traffic, other than that associated with the construction of the A508 Roade Bypass and A508 improvements would be permitted to use the A508 to the south of the SRFI site.

12.16 Based on **Table 12.1**, Year 2 would be the busiest in terms of HGV and LGV movements associated with the construction process. During Year 2 it is estimated that an average of 171 daily one-way HGV movements would visit the site, with 39 daily one-way LGV movements.

12.17 Taken over the 10-hour working day, the above one-way movements would equate to some 34 HGV two-way movements per hour, and around 8 two-way LGV movements per hour. Even allowing for doubling this average figure, to accommodate short periods of peak demand, these flows are low in the context on the adjacent highway network flows, which at M1 Junction 15 average around 6,300 vehicles during each of the morning and evening peak hours. Hence these flows will not require mitigation works in their own right.

12.18 For construction workers, when taken in total, the busiest period for car and van movements would also be Year 2, when a total of 304 daily one-way movements are forecast. To understand the likely origins of construction staff, the employee trip distribution has been extracted from the NSTM2. This has then been used to establish the traffic impacts on the main routes to and from the site.

12.19 It is assumed that the majority of staff (80%) would arrive just prior to the start of work at 0700 hours and leave the site just after at 1900 hours. The resulting cumulative additional trips on the existing highway network are summarised at **Table 12.2**. The detailed calculations are included at **Appendix 33**.

Table 12.2: Distribution of construction staff arrival and departure trips

Route	Trips
A45	109
M1 South	50
A508	37
M1 North	47

12.20 **Table 12.2** shows that the traffic impact of the additional journeys associated with construction staff movements to the site in the morning and from the site in the evening would be diluted, as they would be split across a number of main routes. Furthermore, the operation times of the construction site would mean that staff movements do not generally coincide with the highway network peak hours. It is therefore concluded that construction staff movements would not have a material impact on the operation of the existing highway network.

Summary

12.21 It is concluded that the construction traffic would not result in a material impact on the operation of the existing highway network. The measures and procedures outlined in the CEMP will ensure that any adverse environmental impacts are minimised, and heavy construction traffic would not be permitted to travel on the A508 to the south of the site, thereby avoiding impacting upon local villages.

13.0 SUMMARY AND CONCLUSIONS

13.1 This Transport Assessment (TA) has been prepared by ADC Infrastructure Ltd who are appointed by Roxhill (Junction 15) Ltd to assess the transport and infrastructure requirements of the proposed Northampton Gateway Strategic Rail Freight Interchange (SRFI). The SRFI site is located to the immediate west of M1 Junction 15, approximately 6km from Northampton Town Centre, in Northamptonshire.

13.2 The SRFI site is in a strategically significant location for logistics and distribution activity and, being adjacent to Junction 15 of the M1 and having a direct rail connection, it provides excellent road and rail connection opportunities with the rest of the UK.

13.3 The scale of development requires a transport strategy that seeks to manage travel demand from the outset, whilst providing appropriate access to serve the development and addressing the impact of the development trips on the existing local highway and strategic road network.

13.4 The assessment of the transport impact of the development is based on a comprehensive transport modelling exercise, for which a Transport Working Group was established to oversee the process. The Transport Working Group comprises representatives from the local highway authority (Northamptonshire County Council), Highways England and their term consultant Aecom, along with other specialist transport consultants acting for Roxhill (Junction 15) Ltd.

13.5 The Transport Working Group have agreed this TA methodology, scope and inputs via a series of transport related documents and Technical Notes. This TA has brought together in one place the findings from the Transport Working Group approved documents and Technical Notes, which together with the ES Transport Chapter support the Development Consent Order (DCO) for the development of the site in accordance with the Parameters Plan. The supporting documents include a separate Framework Travel Plan and Public Transport Strategy.

13.6 In keeping with most inland rail freight terminals, the rail freight terminal is likely to operate on a 24-hour basis from Monday to Friday, and until Saturday lunchtime. All the B8 units are likely to operate on a 24-hour basis, seven days a week. The main shifts are therefore likely to be 0600-1400 hours, 1400-2200 hours and 2200-0600 hours, although there will be some variation depending on the individual occupier requirements.

13.7 The Northampton Gateway SRFI is forecast to generate 1,111 and 1,393 two-way person trips during the morning and evening peak hours. The Transport Working Group required that the assessment of the highway impact be undertaken without considering the effect of the Framework Travel Plan or Public Transport Strategy. Therefore, whilst this approach has been adopted in this TA, it does not include the required 20% reduction in single occupancy vehicle journeys to and from the SRFI site that is the target identified in the Framework Travel Plan. Accordingly, this TA assesses vehicle trip generations (based on a single occupancy vehicle mode share of 92%), of 1,044 two-way trips in the morning peak hour and 1,303 two-way trips in the evening peak hour, of which approximately 269 from each peak would be HGV trips.

13.8 The proposed Public Transport Strategy comprising a new bus service, in conjunction with the Framework Travel Plan for the development, would positively influence the modal share of public transport and reduce traffic generation from the levels assessed in this TA.

13.9 Providing pedestrian and cyclists routes through the site, together with improved connections and complementary improvements to the external networks would encourage travel by these modes. The development would provide new and enhanced facilities at M1 Junction 15 and connecting with Collingtree via the bridge over the M1 at High Street, along with a new shared use footway/cycleway along the western side of the A508 linking with Roade, and a shared use facility along the eastern side of the proposed Roade Bypass.

13.10 Therefore, with the Public Transport Strategy and Travel Plan operational, trip generations would be reduced in comparison to the worse-case scenario assessed in this TA and the residual impacts would also be reduced.

13.11 Development of a SRFI at Northampton Gateway, once fully operational, would remove over 92 million HGV miles per year from the highway network, equating to over £50 million in monetised environmental benefits per year as calculated using the methodology set out in the Department for Transport's Guide to Mode Shift Revenue Support Scheme. The proposed development would provide a distribution hub, meaning that HGV journey distances would be reduced, reducing overall HGV mileage on the road network and helping to achieve the Government's objective of a modal shift from road freight to rail.

13.12 Nevertheless, to ensure that the full impact of the SRFI is modelled in the vicinity of the SRFI site, the transport modelling has assumed that all HGV trips will be new trips to the highway network. The result is a robust assessment of the traffic impacts as it means that

there is some double counting of HGV traffic, particularly on the main links to and from the existing urban and industrial areas, such as those located off the A45.

13.13 To identify impacts due to the development and confirm that the proposed highway improvements are appropriate in scale and layout, strategic transport modelling of the scheme has been undertaken using the Northamptonshire Strategic Transport Model (NSTM2). Further detailed analysis of key junctions has then been undertaken using VISSIM micro-simulation and industry standard assessment tools, supported by a Walking, Cycling and Horse Riding Assessment and Review and a Stage 1 Road Safety Audit.

13.14 Assessment of the operation of the highway network in the 2031 Reference Case (without the proposed development) demonstrates that existing congestion at M1 Junction 15 and along the A508 will worsen in the future due to background traffic growth. The strategic transport modelling demonstrates that, without intervention, the traffic growth on the A508 would be restricted and would fall far short of the average growth in background traffic that is forecast for the Northamptonshire area up to 2031. The constraints at M1 Junction 15 and on the A508 mean that the surrounding local road network is required to accommodate a greater proportion of traffic growth in the 2031 Reference Case than would otherwise be expected.

13.15 Unmitigated, the constraints at M1 Junction 15, in combination with those on the A508 through Roade, would lead to the development traffic exacerbating congestion and displacing background traffic from the A508 and A45 to use inappropriate routes on local roads to avoid the A508 and M1 Junction 15. Unmitigated, the SRFI development also has potential to increase the number of HGVs passing through Roade on the A508.

13.16 To mitigate the development traffic impacts, the development proposals include a comprehensive package of highway mitigation measures that comprise:

- Construction of a new roundabout on the A508 Northampton Road to serve as the access to the development, configured to require all departing HGVs to travel north to M1 Junction 15;
- Dualling of the A508 between the new site access roundabout and M1 Junction 15;
- Significant enlargement and reconfiguration of M1 Junction 15;
- Widening of the A45 to the north of M1 Junction 15 and the signalisation of the Watering Lane junction;

- Alteration of M1 Junction 15A to provide an additional lane and signalisation on the A43 northbound approach, signal control and additional flared lane on the A43 eastbound approach, an additional lane on the A5123 southbound approach and circulatory carriageway widening;
- Construction of a new bypass west of Roade between the A508 Northampton Road to the north of Roade and the A508 Stratford Road to the south of Roade, including a four-arm roundabout connecting the Bypass to Blisworth Road;
- 7.5T environmental weight restrictions (with access permitted for loading):
  - throughout Roade;
  - along Knock Lane/Blisworth Road between Roade Bypass and Stoke Road;
  - along Blisworth Road (Courteenhall Road) between the A508 and High Street, including parts of Blisworth;
  - along the unnamed road between the A508 and Quinton;
  - throughout Stoke Bruerne and Shutlanger; and
  - Wootton & East Hunsbury, to the west of the A45, east of Towcester Road and south of the A5076.
- Improvements at key locations along the A508 as part of an 'A508 route upgrade'; comprising:
  - Blisworth Road (Courteenhall) junction improvement;
  - C26 Rookery Lane/Ashton Road junction improvement;
  - C85 Pury Road junction improvement;
  - C27 Stoke Road/Knock Lane junction improvement and additional widening to Knock Lane/Blisworth Road (although not on the A508, this is required because of changing traffic volumes on the A508); and
  - Provision of a pedestrian crossing at a bus stop and ghost island in Grafton Regis.
- A financial contribution provided to Northamptonshire County Council for:
  - improvement schemes at the A45 Queen Eleanor Interchange and at junctions along the A5076, extending between the A45 and A5123; and
  - a Knock Lane and Blisworth Road maintenance and minor works fund, to be used in the event that the increased use of the roads should advance the need for maintenance or other remedial works

13.17 The proposed highway mitigation measures are necessary to provide satisfactory access to the Northampton Gateway SRFI and to mitigate the traffic impacts of the development. However, it is demonstrated that the highway mitigation works also release existing constraints on the A508, M1 and A45 corridors, allowing the highway network to function in a safer and more efficient manner, and allowing the benefits of the proximity of the SRFI site to M1 Junction 15 to be fully realised. Existing traffic is drawn back onto the principal

and strategic road network, particularly the A508, and away from less suitable routes. This is a beneficial impact since these are the roads most suited for that traffic and there is a consequential reduction in traffic using many of the surrounding local roads and villages.

13.18 The VISSIM micro-simulation modelling demonstrates that the proposed M1 Junction 15 and A45 major upgrade and the M1 Junction 15A improvements would provide a significant improvement to the operation of the highway network compared to the Reference Case scenarios. Journey times and average delay per vehicle would be significantly reduced, whilst at the same time allowing the strategic road network to accommodate the development traffic and additional background traffic, which is shown to be drawn into the strategic road network because of the highway mitigation measures. Peak hour queues at M1 Junction 15 on the A45 and A508 would be significantly reduced and instances of queueing traffic blocking back to the M1 mainline on the southbound diverge slip would be removed. The highway improvements at M1 Junction 15A address constraints at the junction and would remove instances of queuing traffic on both the northbound and southbound diverge slip roads blocking back to the M1 mainline.

13.19 The results of the micro-simulation modelling therefore demonstrate the suitability of the proposed highway works to mitigate the impact of the development traffic, whilst also allowing the strategic road network to function in a safer and more efficient manner as compared to the Reference Case scenarios.

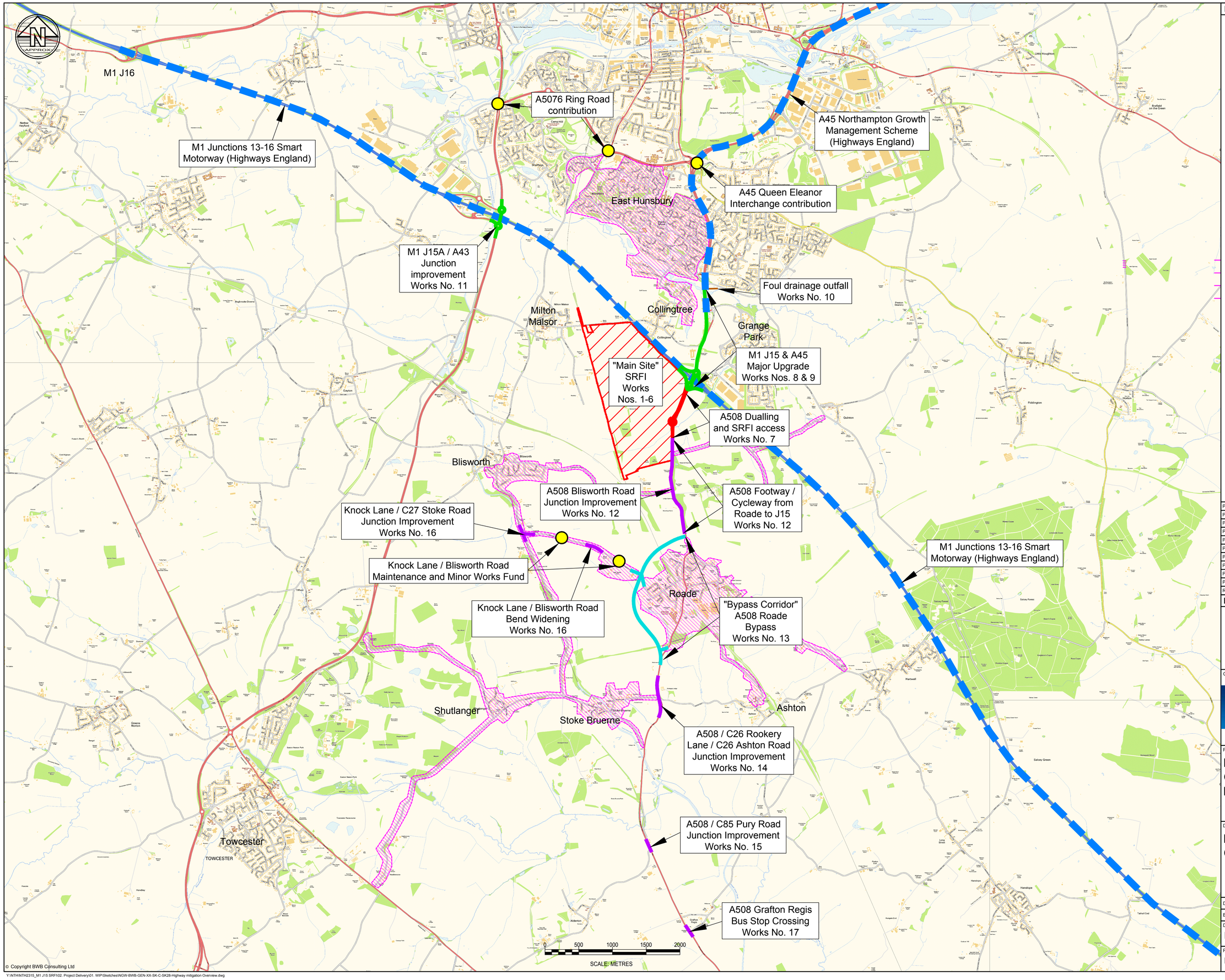
13.20 Assessment of the residual traffic impacts at the remaining study area junctions has been undertaken using industry standard assessment tools. This has been undertaken for all study area junctions for the 2031 Future Year assessment scenario and, for junctions on the strategic road network, a DfT 02/2013 Circular compliant assessment scenario has also been undertaken. With the highway mitigation strategy in place the residual impact of the proposed development is demonstrated to be reduced to acceptable levels.

13.21 Assessment of the opening year development traffic impact has been undertaken in the 2021 Opening Year. This demonstrates that the proposed phasing of the highway mitigation is appropriate and that in 2021, with the proposed M1 Junction 15 and A45 major upgrade in place, M1 Junction 15 will operate with spare capacity, providing an immediate improvement on the existing level of performance of the junction.

13.22 The impact of the construction traffic on the operation of the highway network has been examined and shown not to result in a material impact. The measures and procedures outlined in the Construction Environmental Management Plan (CEMP) will ensure that any adverse environmental impacts are minimised.

13.23 It is concluded that the proposed development would comply with the National Policy Statement for National Networks. Subject to the improvements presented within this TA and accompanying Framework Travel Plan, it would be satisfactorily accessed by a full range of travel modes. Improvements can be undertaken on the transport network that mitigate the significant impacts of the development and ensure that the residual impacts of the proposed development are reduced to acceptable levels.

DRAWINGS



Y:\NTH\NTH2315_M1 J15 SRFI\02. Project Delivery\01. WIP\Sketches\NGW-BWB-GEN-XX-SK-C-SK28-Highway mitigation Overview.dwg

Legend

The Proposed Development is comprised of components (1), (2), (3) and (4)

(1) "Main site"

- The SRFI including the railway connection (Works Nos. 1 - 6)
- A508 SRFI access roundabout and dualling (Works No. 7)

(2) "Bypass site" or "Bypass corridor"

- A508 Roade Bypass (Works No. 13)

(3) "Highway mitigation works" or "Highways mitigation measures"

- A508 corridor (Works Nos. 12 & 14 - 17)
- M1 Junction 15 & A45; M1 Junction 15A (Works Nos. 8, 9 & 11)
- Areas to be provided with a 7.5T environmental weight restriction (access permitted for loading within the restricted area)

(4) "Foul drainage outfall for Main Site"

- Foul drainage outfall (Works No. 10)

Shown for informatory purposes only

- Contributions made in the Development Consent Obligation
- Highways England schemes

Rev	Date	Details of issue / revision	Drw	Rev
P10	30.04.18	Minor alteration to terminology	SRH	SRH
P9	25.04.18	Works Nos. added	SRH	SRH
P8	26.03.18	Updated to reflect changes since Stage 2 consult	SRH	SRH
P7	18.10.17	HGV restriction areas added (Stoke B; E Hunbury)	SRH	SRH
P6	21.09.17	Presentational Update	SRH	SRH
P5	20.09.17	Colours amended	SRH	SRH
P4	12.09.17	A508 Grafton Regis bus crossing shown	SRH	SRH
P3	12.09.17	7.5T restriction added	SRH	SRH
P2	25.08.17	Mitigation updated	PG	SRH
P1	23.08.17	Preliminary Issue	PG	SRH

Issues & Revisions

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Client

ROXHILL

Project Title

NORTHAMPTON GATEWAY RAIL FREIGHT INTERCHANGE

Drawing Title

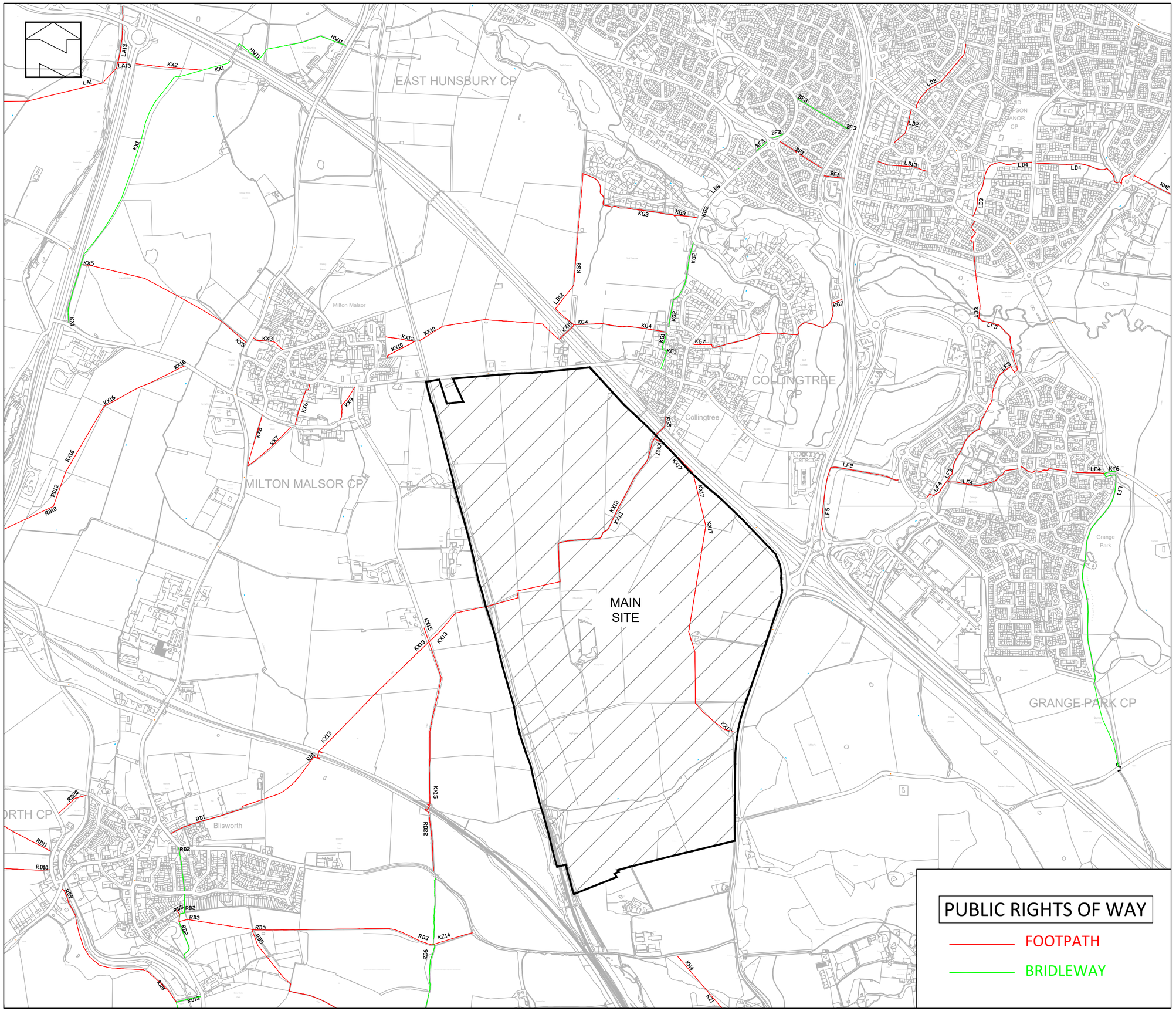
HIGHWAY MITIGATION OVERVIEW

Drawn:	P. Goodyear	Reviewed:	S. Hilditch		
BWB Ref:	NTH 2315	Date:	23.08.17	Scale@A1:	1:25000

Drawing Status

PRELIMINARY

Project - Originator - Zone - Level - Type - Role - Number	Status	Rev
NGW-BWB-GEN-XX-SK-C-SK28	S1	P10



Rev	Description	Date
P2	Paper size changed to A2	26/01/18
P1	Preliminary issue	15/09/17

Client:

ROXHILL

Project:

Northampton Gateway Strategic Rail Freight Interchange

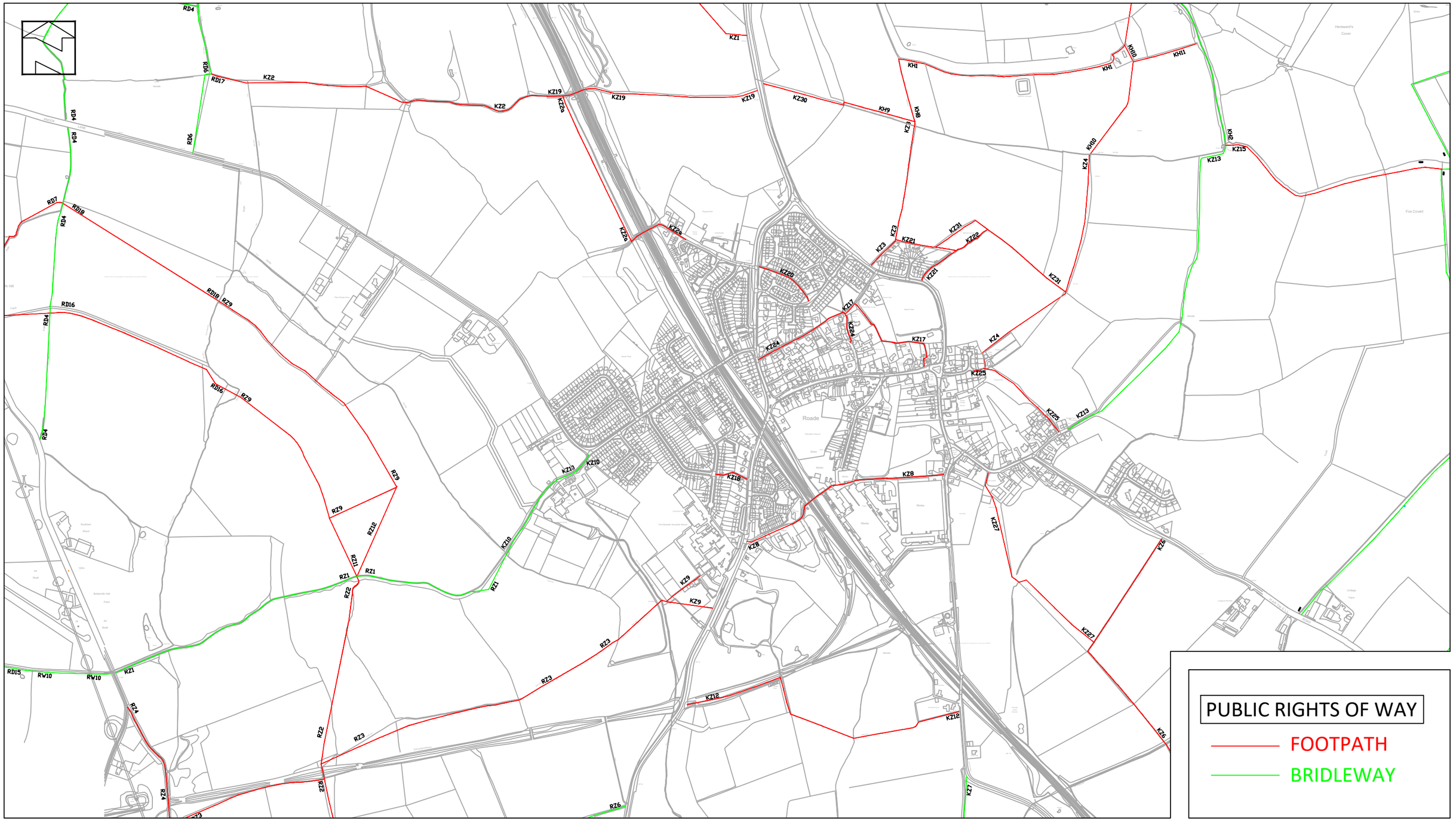
Title:

Existing PRoW in vicinity of the site

ADC INFRASTRUCTURE

Drg Size:	Scale:	Date:
A2	1:11000	15/09/2017

Drg No:	Rev:
ADC1475/009	P2



Rev	Description	Date
P2	A1 to A3	26/09/17
P1	Preliminary Issue	22/11/16

Project:

Northampton Gateway Strategic Rail Freight Interchange

Title:

Existing PROW in vicinity of Roade

Client:

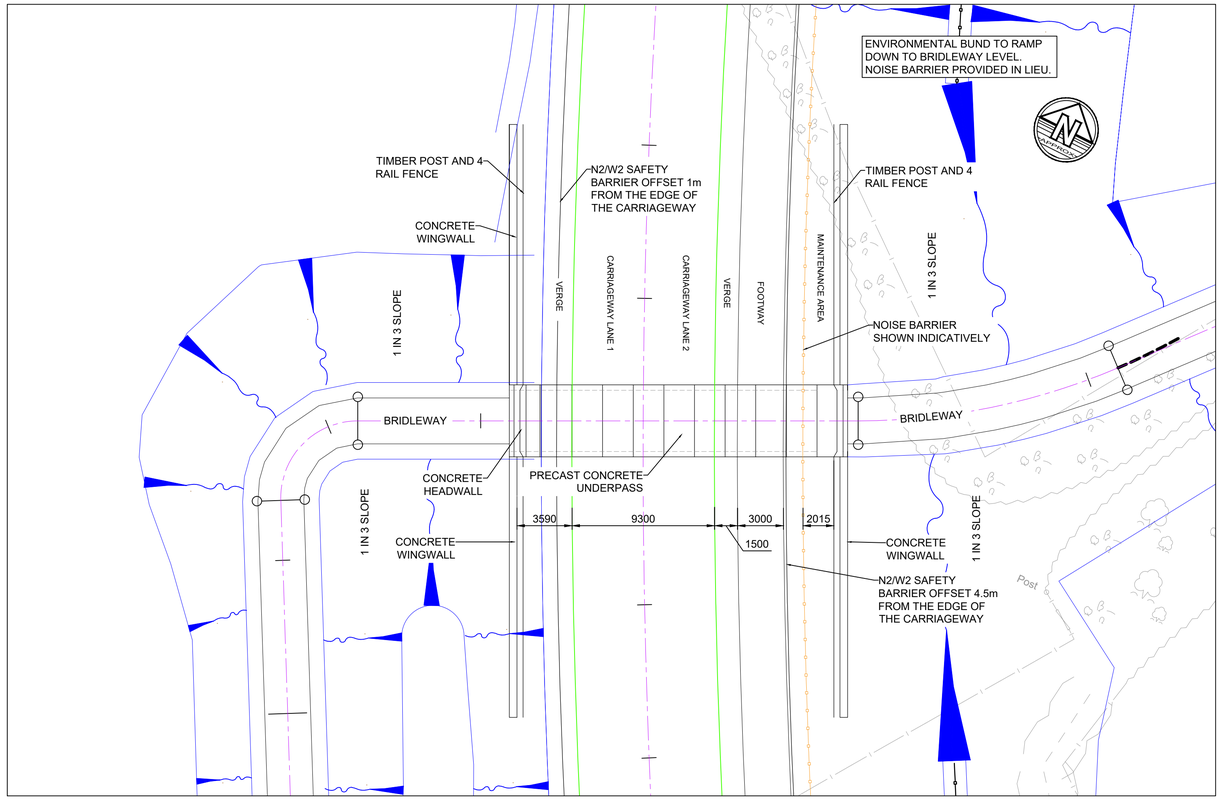
ROXHILL

ADC INFRASTRUCTURE

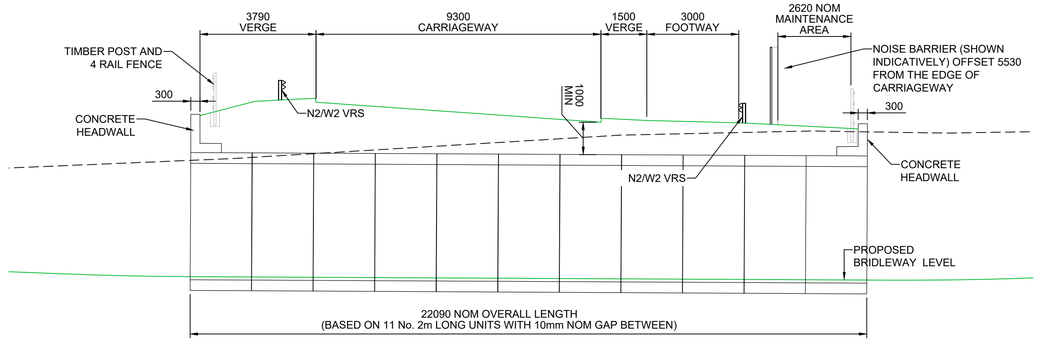
Drg Size:	Scale:	Date:
A3	1:10000	22/11/2016

Drg No: ADC1475/001

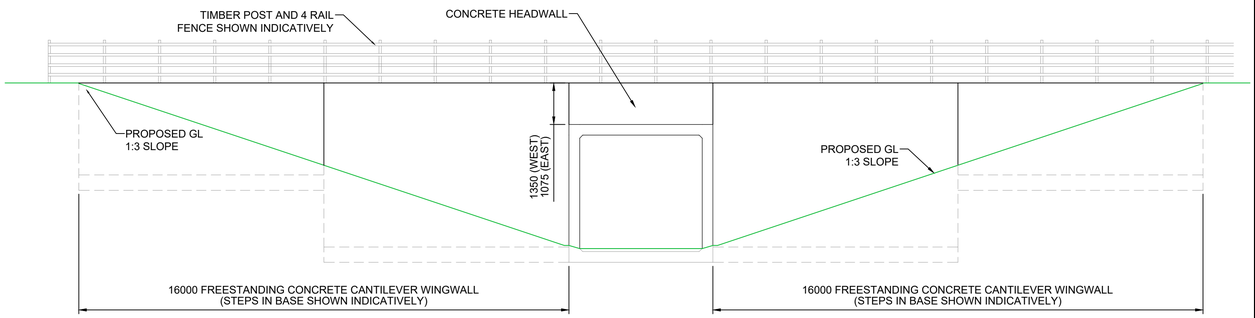
Rev: P2



PLAN ON PROPOSED UNDERPASS
SCALE 1:200 @A1



LONG SECTION ON PROPOSED UNDERPASS
SCALE 1:100 @A1



TYPICAL ELEVATION ON HEADWALL AND WINGWALLS
SCALE 1:100 @A1

SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION

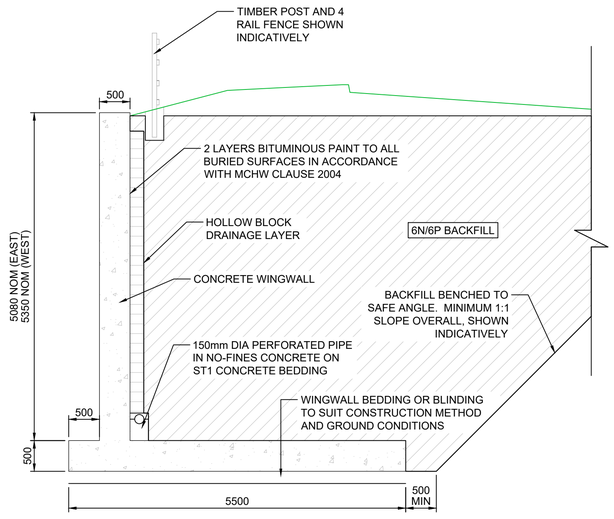
1. IT IS THE RESPONSIBILITY OF EVERY PERSON INVOLVED WITH THESE WORKS TO NOTIFY THEIR SUPERVISOR IMMEDIATELY OF ANY CONCERNS THAT THEY HAVE OR THAT HAVE BEEN REPORTED TO THEM REGARDING ANY HEALTH, SAFETY OR ENVIRONMENTAL MATTER.
2. A DESIGN RISK ASSESSMENT HAS IDENTIFIED THE FOLLOWING RESIDUAL HAZARDS. FOR FULL DETAILS REFER TO THE DESIGNERS RISK ASSESSMENT INCLUDED IN THE DOCUMENT NGW-BWB-SBR-R-RA-CB-0001

2.1. CONSTRUCTION:

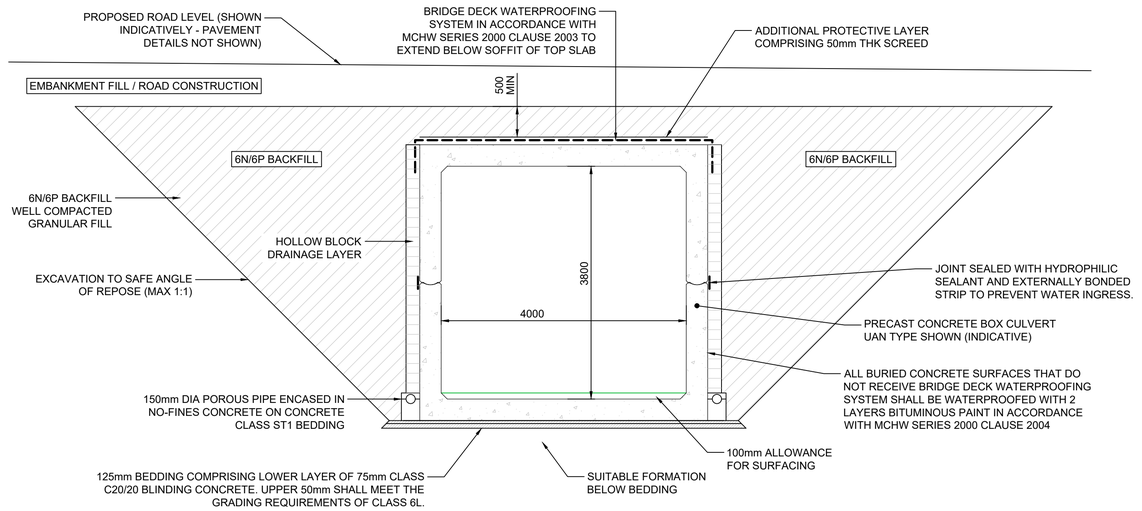
2.1.1. INSTABILITY OF CONCRETE BOX UNITS - HAZARD ARISES FROM CONTRACTOR TO ENSURE BOTH SIDES ARE FILLED SIMULTANEOUSLY IN SMALL INCREMENTS TO PREVENT THE UNDERPASS BEING PUSHED OUT OF ALIGNMENT.

2.1.2. SLOPE STABILITY- CUTTINGS TO BE CHECKED FOR SLOPE STAIBILITY AS A PART OF THE DETAILED DESIGN.

2.1.3. FAILURE OF STRUCTURE - HAZARD ARISES FROM LOADING INDUCED BY CONSTRUCTION PLANT. CONSTRUCTION PLANT SHALL NOT BE PERMITTED TO DRIVE OR TRACK OVER THE UNDERPASS UNTIL THE PLACEMENT AND COMPACTION OF SPECIFIED DEPTH OF FILL OVER THE CONCRETE BOX UNITS, WHICH WILL BE INFORMED BY THE DESIGNER AT DETAILED DESIGN STAGE.



TYPICAL WINGWALL BACKFILL AND DETAILS
SCALE 1:50 @A1



TYPICAL SECTION THROUGH UNDERPASS
SCALE 1:50 @A1

NOTES (CONTINUED)

19. CONCRETE FINISHES TO BE AS FOLLOWS

BURIED FORMED SURFACES (RECEIVING WATER PROOFING)	F1
BURIED FORMED SURFACES (NOT RECEIVING WATERPROOFING)	F3
BURIED UNFORMED SURFACES (RECEIVING WATER PROOFING)	U1
BURIED FORMED SURFACES (NOT RECEIVING WATERPROOFING)	U4
EXPOSED FORMED SURFACES	F2
EXPOSED UNFORMED SURFACES	U2

20. BURIED SURFACES SHALL RECEIVE TWO COATS OF BITUMINOUS PAINT IN ACCORDANCE WITH SHW CLAUSE 2004.
21. EXTERNAL ARISES TO BE CHAMFERED 25 X 25mm.
22. CONSTRUCTION JOINTS TO BE PER SHW CLAUSE 1710.

Notes

1. THIS DRAWING IS FOR APPROVAL IN PRINCIPLE AND SHALL BE READ IN CONJUNCTION WITH APPROVAL IN PRINCIPLE REPORT REF. NGW-BWB-SBR-R-RP-CB-0001.
2. ALL DIMENSIONS ARE INMETRES UNLESS OTHERWISE NOTED.
3. ALL LEVELS ARE IN METRES (AOD).
4. DO NOT SCALE THIS DRAWING.
5. THE DESIGN ENGINEER TO VERIFY SETTING OUT, LEVELS AND DIMENSIONS IN THIS DRAWING AT DETAIL DESIGN STAGE.
6. ALL EXISTING SERVICES POSITIONS ARE TO BE VERIFIED ON SITE BY THE CONTRACTOR PRIOR TO STARTING THE WORKS.
7. ALL TEMPORARY WORKS DESIGN TO BE BY THE CONTRACTOR.
8. THE GROUND BENEATH THE CULVERT SHALL BE SUITABLY PREPARED TO REMOVE ALL TOPSOIL AND SOFT MATERIAL. TO BE REPLACED WITH ACCEPTABLE FILL.
9. ANY INSITU CONCRETE SHALL BE ALLOWED TO REACH STRENGTH BEFORE BACKFILLING COMMENCES
10. COMPACTION OF BACKFILL SHALL BE IN ACCORDANCE WITH SHW CLAUSE 610
11. THE BACKFILL MATERIAL WILL BE CLASS 6N/6P.
12. ALL VEGETATION SHALL BE CLEARED INCLUDING ROOTS IN THE VICINITY OF THE STRUCTURE AND SUITABLE MEASURE SHALL BE TAKEN TO LIMIT REGROWTH
13. ALL WINGWALLS AND HEADWALLS SHALL HAVE TIMBER POST AND 4 RAIL FENCE TO HCD DRAWING H3 AND PROJECT SPECIFIC APPENDIX 1/3 INSTALLED BEHIND THEM TO ACT AS EDGE PROTECTION.
14. DRAINAGE OUTFALL DETAILS ARE SHOWN INDICATIVELY. FINAL DETAILS TO BE CONFIRMED AT THE DETAILED DESIGN STAGE.
16. NOISE BARRIER SHOWN INDICATIVELY. FINAL DETAILS TO BE CONFIRMED AT THE DETAILED DESIGN STAGE.
17. ALL IN-SITU CONCRETE SHALL CONFORM TO BS 8500-1:2015 + A1:2016 AND BS EN 206:2013.
18. MINIMUM STRENGTH OF STRUCTURAL CONCRETE TO BE C40/50.

ISSUES & REVISIONS

Rev	Date	Details of issue / revision	Drw	Rev
P1	06.12.17	FOR APPROVAL	HM	AW

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Client: ROXHILL

Project Title: **NORTHAMPTON GATEWAY RAIL FREIGHT INTERCHANGE**

Drawing Title: **BRIDLEWAY UNDERPASS GENERAL ARRANGEMENT**

Drawn:	H Mustafa	Reviewed:	A Wood		
BWB Ref:	NTH2315	Date:	06.12.17	Scale@A1:	As Shown

Drawing Status: **FOR APPROVAL**

Project - Originator - Zone - Level - Type - Role - Number: **NGW-BWB-SBR-R-DR-CB-0001**

Status: **S4** Rev: **P1**

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.

Legend

ISSUES & REVISIONS

Rev	Date	Details of issue / revision	Drw	Rev
P1	23.03.18	Preliminary Issue	SRH	SRH

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Client: ROXHILL

Drawn:	S. Hilditch	Reviewed:	S. Hilditch
BWB Ref:	NTH 2315	Date: 23.03.18	Scale@A1: 1:2500

Project Title

NORTHAMPTON GATEWAY RAIL FREIGHT INTERCHANGE

Drawing Status: FOR COMMENT

Drawing Title

KNOCK LANE & BLISWORTH ROAD (ROADE) EXTENT OF IMPROVEMENTS

Project - Originator - Zone - Level - Type - Role - Number	Status	Rev
NGW-BWB-GEN-XX-SK-C-SK51	S3	P1

J15

M1 SOUTHBOUND
M1 NORTHBOUND

A508

Inset A

Note: Temporary access to be used until such time as access can be taken from the proposed SRFI site access roundabout

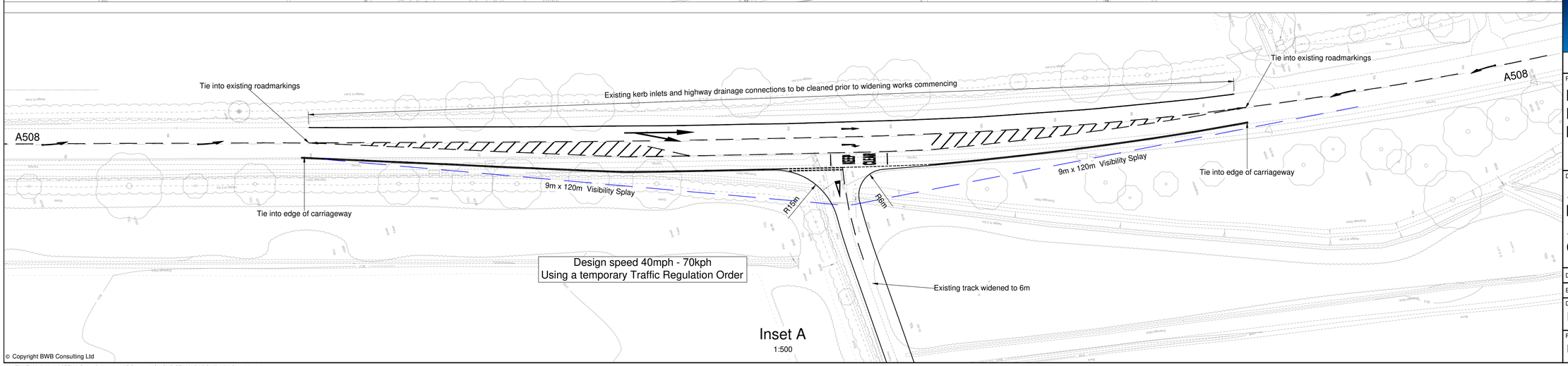
No heavy construction traffic permitted on A508. Except for construction traffic associated with the A508 improvements

A508

Existing Track

Temporary Track

Main Site
1:2500



Inset A
1:500

Notes

1. Do not scale this drawing. All dimensions must be checked/ verified on site. If in doubt ask.
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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.

Legend

- Proposed edge of carriageway
- Site Compound
- Onsite Roads

Rev	Date	Details of issue / revision	Drw	Rev
P4	13.03.18	Layout revised and site compounds added	PG	SRH
P3	11.05.17	Title revised and note added about access usage	PG	SRH
P2	09.05.17	Location plan added and junction radius revised	PG	SRH
P1	08.05.17	Preliminary Issue	PG	SRH

Issues & Revisions

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Client

ROXHILL

Project Title

M1 J15 NORTHAMPTON RAIL FREIGHT INTERCHANGE

Drawing Title

A508 TEMPORARY GHOST ISLAND CONSTRUCTION ACCESS AND MAIN SITE COMPOUNDS

Drawn:	P. Goodyear		Reviewed:	S. Hilditch	
BWB Ref:	NTH 2315	Date:	08.05.17	Scale@A1:	Varies

Drawing Status

FOR COMMENT

Project - Originator - Zone - Level - Type - Role - Number	Status	Rev
NGW-BWB-GEN-XX-SK-C-SK07	S3	P4

Y:\NTH\NTH2315_M1 J15 SRFI\02. Project Delivery\01. WIP\Sketches\NGW-BWB-GEN-XX-SK-C-SK07_A508 Ghost Island.dwg