Appendix 24
NSTM2: Development Case Forecast Report

ADC Infrastructures Ltd

NORTHAMPTON GATEWAY - STRATEGIC RAIL FREIGHT INTERCHANGE

Development Case Forecast Report

70035256
MAY 2018

CONFIDENTIAL

ADC Infrastructures **Ltd**

NORTHAMPTON GATEWAY - STRATEGIC RAIL FREIGHT INTERCHANGE

Development Case Forecast Report

TYPE OF DOCUMENT (VERSION) CONFIDENTIAL

PROJECT NO. 70035256
OUR REF. NO. 70035256

DATE: MAY 2018

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QUALITY CONTROL

Issue/revision	First issue	Revision 1	Revision 2	Revision 3
Remarks	Draft for client comment	Revised	Final	
Date	January 2018	April 2018	May 2018	
Prepared by	Peter Holman	Rory Thomas	Rory Thomas	
Signature			Thomas, Rory Author Basingstoke (Mountbatten House) 2018.05.08 09:58:43 +01'00'	
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Authorised by	Craig Drennan	Craig Drennan	Nadia Lyubimova	
Signature			Lyubimova, Nadia 2018.05.08 11:05:16 +01'00'	
Project number	70035256	70035256	70035256	
Report number	70035256	70035256	70035256	
File reference	\\ser01bas1uk.corp.pbwan.net\projects\70011697 - Northamptonshire Major Model Update\D Design and Analysis\#Developer Testing\Northampton Gateway\Text\Development Case Report\Northampton_Gateway_SRFI_Development_Case_Forecast_Report_Final_Draft_v7.docx			

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1 INTRODUCTION

1.1 BACKGROUND

1.1.1. WSP has been commissioned by ADC Infrastructure Ltd, on behalf of Roxhill (Junction 15) Ltd, to undertake transport modelling work in relation to the Northampton Gateway SRFI (Strategic Rail Freight Interchange) development, hereafter referred to as "the Northampton Gateway development".

1.1.2. The Northampton Gateway development is situated in Northamptonshire, adjacent to Junction 15 of the M1. Due to the location of the development, the Northamptonshire Strategic Traffic Model (NSTM) has been selected for the purpose of this modelling exercise. NSTM is the Northampton County Council's (NCC) strategic model, maintained and operated by WSP.

1.1.3. NSTM was recently revised as part of NCC's major model update (referred to as NSTM2), to update it to a 2015 base year, and as a result the model was subject to an extensive revalidation exercise. In addition, WSP has also undertaken further local validation work as part of the Northampton Gateway project, to ensure the model is fit for the specific purpose of examining the transport impacts of the Gateway development. The results of this local validation exercise are described in the associated Local Model Validation Report (LMVR)[1].

1.1.4. As a result of this work, the model is considered fit for the purpose of examining the transport impacts associated with the Northampton Gateway development. However, it has been agreed between ADC Infrastructure Ltd and the Transport Working Group, that the modelling exercise will not make use of the modal choice/ public transport components of the model. The Transport Working Group includes representatives from NCC, Highways England, AECOM, Roxhill and ADC Infrastructure.

1.1.5. The SATURN (Simulation and Assignment of Traffic in Urban Road Networks), version 11.3.12U_N4, suite of programs was used to build NSTM2, while EMME4 has been used to build the Demand Model and the Public Transport Model. The strategic model developed by WSP offers an integrated system for a range of transport modes, representing private and public transport, as well as modal interchange behaviour such as walking.

1.1.6. NSTM2 is a four-stage transport model. The stages are set out below:

- Trip generation
- Mode choice
- Trip distribution
- Assignment.

1.1.7. The model specification was developed in accordance with current Department for Transport (DfT) guidelines detailed in DfT Transport Analysis Guidance (TAG)[2]. TAG provides guidance and advice on the accepted approach for the development of transport models in relation to the appraisal of transport and/or development schemes.

1.1.8. The Northampton Gateway development consists of a number of large scale warehousing and distribution units, along with an inter-modal rail freight terminal. The development proposals include provision for rail sidings to serve individual buildings. The proposed warehousing and distribution area comprises approximately five million sq. ft. of B8 (storage and distribution), with ancillary B1 (office) allocation and an allowance for mezzanine floor space.

[1] WSP. 2017. M1 J15 Northampton Gateway Strategic Rail Freight Interchange, *Local Model Validation Report.*
[2] DfT. 2017. *Transport analysis guidance: WebTAG.* https://www.gov.uk/guidance/transport-analysis-guidance-webtag.

1.2 PURPOSE OF REPORT

1.2.1. The purpose of this report is to present the outputs from the NSTM2 modelling of the Northampton Gateway development with regard to the local and strategic road network in the vicinity of the development. This report specifically looks at the impacts of the development case (with Northampton Gateway development) scenario compared against the Reference case (without Northampton Gateway development) scenario, for both 2021 and 2031 forecast years.

1.2.2. In addition, a set of development case with mitigation scenarios have also been developed. An assessment of the impact of these schemes will also be presented in this report.

1.2.3. Details of the development of the forecast scenarios can be found in Section 2 of this report. Further information in relation to the Reference case scenario can be found in the Reference Case Forecast Report[3].

1.2.4. The information contained within this report only considers the results of the modelling exercise described within.

1.3 NSTM2 STUDY AREA

1.3.1. Northamptonshire's location in the centre of England has long made it an important focus of the nation's transport system. In the west of the county, between the villages of Norton and Whilton, four historic transport corridors run in close proximity, as set out below:

- The A5: Originally a Roman road linking London and Chester, known to the Saxons as Watling Street, and later a major turnpike between London and Holyhead
- The Grand Union Canal: Opened on the 21st June 1796, it is part of the Grand Junction linking Braunston in Northamptonshire with the River Thames at Brentford
- The West Coast Main line railway: Opened in 1838 by the London & Birmingham Railway, it is part of the first line linking London with the Midlands and the north
- The M1: The first inter-urban motorway to be completed in the UK which opened on 2nd November 1959.

The national focus on town planning and urban redevelopment following World War 2, has led to a number of towns in the county being designated as new or expanding towns, including:

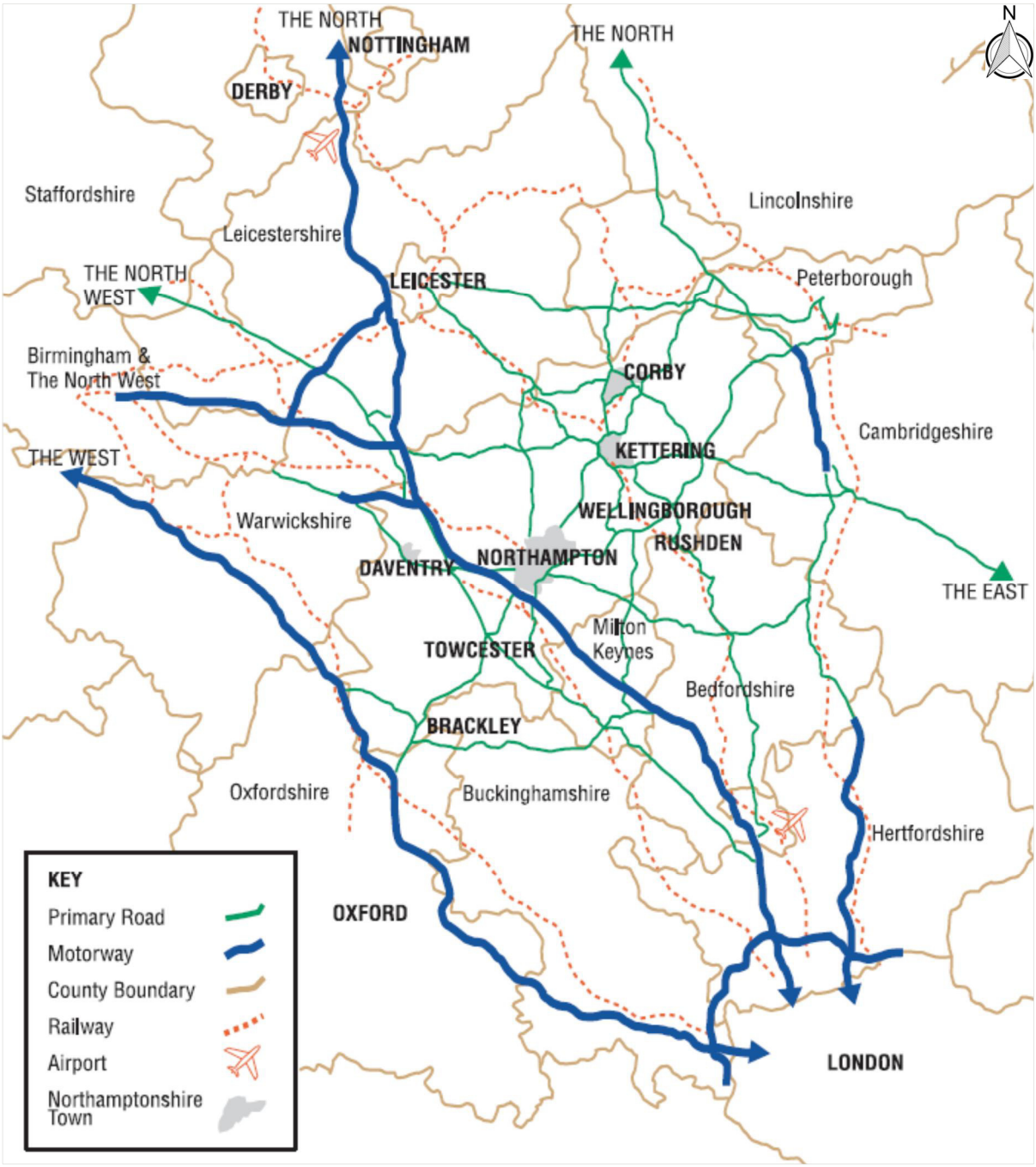
- Corby: Designated as a new town in 1950, largely to accommodate the growing steel industry
- Daventry: Designated as an expanding town in 1962, to cope with overspill from Birmingham
- Wellingborough: Designated an expanding town in 1964, to cope with overspill from London
- Northampton: Designated as a new town in 1968, to cope with overspill from London.

1.3.2. In addition, the designation of Milton Keynes, which borders the county, as a new town in 1967, has had a major impact on areas of Northamptonshire. Most of the county remains rural in nature; although only a relatively small percentage of employment, even in the rural areas, is agriculture. Much of the population who live in the county's villages commute to work, either to the larger settlements in the county, adjacent settlements in neighbouring counties, or to London.

1.3.3. Figure 1 illustrates the major settlements and strategic transport network within the county.

[3] WSP. January 2018. *Northampton Gateway SRFI Reference Case Forecast Report*.

Figure 1 - Strategic Transport Network within Northamptonshire



Source: Northamptonshire County Council Local Transport Plan 2006 – 2011[4]

[4] NCC. 2011. *Northamptonshire Local Transport Plan 2006-2011.*

1.4 DEVELOPMENT OF NSTM2

1.4.1. In 2008, as part of the sustainable transport highway services contract for NCC, the MGWSP joint venture was commissioned by NCC to combine and update the two strategic transportation models that existed at that time. This included:

- North Northamptonshire Highway Model (SATURN)
- West Northamptonshire Multi-Modal Model (SATURN and EMME/2)

1.4.2. The combined model known as NSTM was initially validated to a base year of 2008, with validation exercises undertaken for the highway, public transport and demand models. However, much of the origin and destination demand data originated from 2002 and 2005, and was already on the cusp of TAG acceptability at the time the original model was completed. Following the original validation in 2008, the model base year has been updated and revalidated in two stages to improve key areas in the highway model.

1.4.3. During the first stage of updates, the validation base year was set to 2014, as the majority of the survey data used in that validation exercise was collected in 2014. This update also took account of significant changes to the highway network around Northampton, and incorporated additional observed count data into the model. The public transport and demand models were also updated accordingly, but their validation was not reviewed.

1.4.4. In addition to the above, a second stage of updates and improvements has also been carried out for a number of areas to ensure full WebTAG compliance for the purpose of this study. These refinements are set out below:

- The inclusion of an inter-peak time period, in addition to the AM and PM peak time periods.
- The highway model has been fully reviewed
- The public transport model has been updated, as it had not been reviewed since 2008.
- The demand model now has a fully incremental structure, in accordance with the DfT's best practice.
- Updated base trip matrices have been developed using updated observed data. Road side interview (RSI) and some of the observed count data was very old, with smaller towns and rural areas not previously well represented. However, this has been significantly improved in the updated NSTM.

1.4.5. For the development of the NSTM2 trip matrices, WSP requested Citi Logik to capture Vodafone Mobile Phone Network Data (MND), and prepare initial origin-destination matrices for the NSTM fully modelled area. The MND was supplemented with existing data sources including 2011 Census Data and TrafficMaster data, and this has been used as the basis for the development of updated trip matrices to match the NSTM specification.

1.4.6. Most of the additional data used for the second stage of updates was collected in 2015 and therefore the model base year is 2015. Further information regarding the development of the updated NSTM can be found in the supporting LMVR[1]

1.4.7. The NSTM2 model can quantify the potential benefits/ disbenefits of policy change or changes to transport infrastructure in Northamptonshire, enabling the testing and quantification of transport impacts arising from future transport proposals and housing/ employment developments (including developer led), in an efficient and consistent manner.

1.4.8. The model specification was also developed in accordance with current DfT's guidelines detailed in the latest WebTAG guidance[2], which provides guidance and advice on the accepted approach for the development of transport models in relation to the appraisal of transport and/or development schemes.

1.4.9. The 2015 NSTM2 model has been used as the basis for the development of a number of forecast scenarios aimed at testing the impact of the Northampton Gateway development. Further information regarding the development of the forecast models can be found in Section 2 of this report.

1.5 REPORT STRUCTURE

1.5.1. The report includes the following sections:

- Introduction (Section 1) – provides details on the background and scope of the work.
- Reference Case Forecasting (Section 2) – sets out the development of the Reference Case forecast scenarios.
- Northampton Gateway Development overview (Section 3) – describes the proposed Northampton Gateway development.
- Northampton Gateway Development case model assessments (Section 4) – describes the development case model outputs.
- Northampton Gateway Mitigation scenarios (Section 5) – sets out the mitigation scenarios developed and options tested
- Northampton Gateway Development case with mitigation model assessments (Section 6) – the results of the mitigation tests.
- Summary (Section 7) – sets out the main findings of the work.

2 REFERENCE CASE FORECASTING

2.1 INTRODUCTION

2.1.1. This section of the report sets out the committed and allocated development used to derive the Reference case forecast models, as well as the committed infrastructure schemes included in the modelled networks. Further details regarding the modelling assumptions used to derive the final land use quantum for each scenario are also provided.

2.1.2. Section 3 provides an overview of the Northampton Gateway development, which is included in the development case scenarios, on top of the committed and allocated development described below.

2.1.3. The NSTM2 demand model was developed using DfT's recommended use of an incremental model formulation, in which each stage of the model is forecast based on the relative cost changes compared to the validated base model.

2.1.4. A forecast report[5] was produced in November 2017 for NCC that outlines the NSTM2 model structure and the proposed methodology to update the four-stage Transport Demand Model (TDM).

2.2 FORECAST YEARS

2.2.1. The forecast years for the NSTM2 are 2021 and 2031, in line with the current Local Plan timescale.

2.2.2. Generalised cost parameters for each forecast year were calculated from the TAG data book (December 2015)[6] to remain consistent with previous forecasting work.

2.3 FORECAST SCENARIOS

2.3.1. ADC infrastructure provided a brief[7] to WSP which detailed the scope of the modelling methodology, as well as a list of the various development scenarios to be modelled. This included a number of Reference Case scenarios and a number of development case scenarios, with and without mitigation.

2.3.2. Details of the development case with mitigation forecast scenarios and associated modelling results can be found Section 3.3 and Section 4 of this report. Further details of the Reference Case and associated modelling results can be found in the Reference Case Forecast Report[3].

2.3.3. For all three peak periods (AM peak, Inter peak and PM peak), three Reference Case models have previously been prepared:

- Scenario B1 2021 Opening Year Reference Case: all committed and allocated development and infrastructure in place by 2021
- Scenario C1 2021 Circular Compliant Reference Case: all committed development and infrastructure compliant in the DfT 02/2013 Circular
- Scenario D1 2031 Future Assessment Year Reference Case: all committed and allocated development and infrastructure in place by 2031.

2.3.4. For all peak periods, three development case models have been prepared:

- Scenario E1 2021 Opening Year Development Case: as scenario B1, but with a proportion of the proposed Northampton Gateway development included.

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[5] Northamptonshire County Council November 2017. Northamptonshire Strategic Transport Model; Traffic Forecasting Report: Core Strategy Assessment

[6] DfT. 2015. *WebTag: TAG data book, December 2015.* https://www.gov.uk/government/publications/webtag-tag-data-book-december-2015.

[7] ADC infrastructure. 2016. *Technical Note 1: Transport modelling methodology; Report Reference: ADC1475 TN1 (22nd August 2016).*

- Scenario F1 2021 Circular Compliant Development Case: as scenario C1, but with 100% of the proposed Northampton Gateway development included
- Scenario G1 2031 Future Assessment Year Development Case: as scenario D1, but with 100% of the proposed Northampton Gateway development included.
- For all peak periods, three development case with mitigation models have been prepared:
- Scenario H1 2021 Opening Year Development Case: as scenario E1, but with opening year highway mitigations included.
- Scenario I1 2021 Circular Compliant Development Case: as scenario F1, but with a 100% of the Northampton Gateway development mitigations included.
- Scenario J1d 2031 Future Assessment Year Development Case: as scenario G1, but with 100% of the proposed Northampton Gateway development mitigations included. Scenarios J0, J1, J1a, J1b and J1c represent incremental steps toward scenario J1d, which tests the full range of proposed mitigations in the future assessment year.

2.4 BACKGROUND GROWTH

2.4.1. Background car growth for each forecast year was obtained through TEMPro 7.28. TEMPro 7.2 is the latest version of the DfT's trip end presentation program, which can be used to obtain outputs from the National Trip End Model (NTEM9). TEMPro is used to provide projections of future planning data, changes in socio-economic characteristics of the population, and changes in car ownership across the UK. Therefore it can be used to provide a basis for the construction of future year travel demand.

2.4.2. Table 1 and Table 2 set out the NTEM car origin growth factors used for the various user classes at the district level for the periods 2015 to 2021 and 2015 to 2031, respectively.

Table 1 - 2015-2021 origin growth factors (car)

District	2015 to 2021 origin growth factors (car)								
	AM peak			Inter-peak			PM peak		
	Commute	Business	Other	Commute	Business	Other	Commute	Business	Other
Corby	1.08	1.06	1.10	1.04	1.04	1.09	1.02	1.04	1.07
Daventry	1.03	1.05	1.09	1.04	1.05	1.08	1.04	1.05	1.07
East Northants	1.01	1.03	1.07	1.02	1.03	1.07	1.02	1.04	1.05
Kettering	1.05	1.06	1.09	1.04	1.06	1.08	1.04	1.06	1.07
Northampton	1.06	1.06	1.08	1.05	1.06	1.08	1.04	1.06	1.07
South Northants	1.01	1.04	1.08	1.03	1.04	1.08	1.04	1.05	1.06
Wellingborough	1.07	1.06	1.10	1.05	1.05	1.08	1.03	1.05	1.07
Rest of UK	1.04	1.05	1.08	1.04	1.05	1.07	1.04	1.06	1.06

[8] DfT. 2017. *TEMPro downloads.* https://www.gov.uk/government/publications/tempro-downloads.
[9] DfT. 2017. *National Trip End Model (NTEM).* https://data.gov.uk/dataset/national-trip-end-model-ntem.

Table 2 - 2015-2031 origin growth factors (car)

District	2015 to 2031 origin growth factors (car)								
	AM peak			Inter-peak			PM peak		
	Commute	Business	Other	Commute	Business	Other	Commute	Business	Other
Corby	1.25	1.17	1.32	1.14	1.12	1.26	1.09	1.11	1.22
Daventry	1.10	1.12	1.22	1.10	1.11	1.20	1.09	1.12	1.17
East Northants	1.02	1.07	1.17	1.05	1.08	1.17	1.06	1.09	1.13
Kettering	1.12	1.13	1.21	1.10	1.12	1.19	1.09	1.12	1.16
Northampton	1.15	1.14	1.21	1.11	1.12	1.20	1.10	1.12	1.17
South Northants	1.07	1.10	1.21	1.09	1.10	1.19	1.09	1.11	1.16
Wellingborough	1.11	1.12	1.20	1.10	1.10	1.19	1.08	1.10	1.16
Rest of UK	1.10	1.12	1.19	1.10	1.11	1.18	1.09	1.12	1.15

2.4.3. As TEMPro only provides data for the car demand segment, background growth factors for Light Goods Vehicles (LGV) and Heavy Goods Vehicles (HGV) have been extrapolated from the DfT's 2015 Road Traffic Forecast (RTF2015)[10] generated from the National Transport Model (NTM), for the same forecast periods. The growth factors for LGV and HGV are shown in Table 3.

Table 3 - Traffic growth factors (LGV and HGV)

Demand segment	Traffic growth factors	
	2015 to 2021	2015 to 2031
LGV	1.17	1.43
HGV	1.05	1.12

2.5 NORTHAMPTONSHIRE PLANNING DATA

2.5.1. Forecast planning data was obtained from the relevant planning authorities for the following developments:

- Outstanding planning permissions, not yet completed
- Known proposed developments, thought to be likely to go ahead, even though a planning application may not yet have been submitted.

2.5.2. Data was also provided regarding the development sites allocated in the Core Spatial Strategies for the county. Data provided came from the following sources:

- North Northamptonshire Joint Planning Unit (NNJPU) consistent with NNJPU Forecasting Report data for Scenario 2 - August 2013
- West Northamptonshire Joint Core Strategy Local Plan (Part 1) – December 2014.

[10] DfT. 2015. *Road Traffic Forecasts 2015.* https://www.gov.uk/government/publications/road-traffic-forecasts-2015.

2.6 PROCESSING DEVELOPMENT DATA

2.6.1. The land use inputs required by the NSTM2 demand model, in relation to development, are the numbers of households, jobs and school pupils, as well as retail floor space for retail developments. The information for these data inputs was provided to WSP by NCC in terms of committed, proposed and potential developments for the forecast years of 2021 and 2031.

2.6.2. There is no standard guidance on whether individual developments should be modelled in isolation dependent on their size. Therefore the relative size of individual developments was reviewed on a case-by-case basis to determine the likely impact and potential need to model separately from other development growth.

2.7 MODELLING REFERENCE CASE HOUSING DEVELOPMENTS

2.7.1. Residential developments with a household size:

- lower than ten were included in the total number of houses for small scale developments within their respective district. This total was then distributed proportionally across all the zones within a specific district.
- between 10 and 400 households were allocated to an existing zone at the correct location within the NSTM2 zone system.
- developments greater than 400 households (i.e. strategic sites) were modelled explicitly in the sense they were given their own unique zone(s). The internal road network and mitigation for these explicitly modelled developments were also included within the NSTM2 network. Coding of the internal road network for explicitly modelled developments was taken from the respective masterplan for the development if it was available. In the absence of this information, sensible assumptions were made in terms of how traffic for these major developments would likely load onto the road network.

2.7.2. Further details regarding the housing development quantum, zone numbers and locations of all of the committed developments that have been included within the various 2021 and 2031 forecast scenarios can be found in the Reference Case forecast report[3].

2.8 MODELLING REFERENCE CASE EMPLOYMENT SITES

2.8.1. Employment use classes were split into three different categories:

- B1: Business
- B2: General Industry
- B8: Storage and Distribution.

2.8.2. Information was generally provided in terms of site area, but these needed to be converted into job totals for input into the demand model. Assumptions on employment density as used by the North Northamptonshire Joint Planning Unit were adopted for this purpose.

2.8.3. Employment sites providing:

- fewer than ten jobs were included in the total number of jobs for small scale developments within their respective district, and this was then spread proportionally across all the zones within that district.
- between 10 and 400 jobs were allocated to an existing zone within the NSTM.
- greater than 400 jobs (i.e. strategic sites) were modelled explicitly in the sense they were given their own zone(s). The internal road network and mitigation for these explicitly modelled developments was also included within the NSTM2 network. Coding of the internal road network for explicitly modelled developments was taken from the respective masterplan for the development if it was available. In the absence of this information assumptions were made in terms of how traffic for these major developments would likely load onto the road network.

2.8.4. Further details regarding the employment development quantum, zone numbers and locations of all of the committed developments that have been included within the various 2021 and 2031 forecast scenarios can be found in the Reference Case forecast report[3].

2.9 MAJOR INFRASTRUCTURE

2.9.1. Major infrastructure improvements were included in the 2021 and 2031 Reference Case models, which were deemed to be committed or associated with a specific major development. The location and details of the schemes included can be found in the associated Reference Case forecast report[3].

2.10 REFERENCE CASE FORECAST TRAFFIC GROWTH

2.10.1. To derive Reference Case future year demand, the base year demand has been factored up to account for background traffic growth from NTEM and the DfT's Road Traffic Forecast, for each forecast year and demand segment. Finally, the relevant future year development growth for each scenario (as outlined in the Reference Case forecast report[3]) has then been added on top, to create the final forecast traffic growth for each scenario and year.

2.10.2. As NSTM2 is not constrained to NTEM growth (cars) and the RTF2015 (LGV/HGV), the growth between base and the forecast year is generally higher than presented by NTEM.

2.10.3. The matrix totals for the base year and each Reference case forecast scenario can be found in the Reference Case forecast report[3].

2.10.4. Appendix A of the Reference Case Forecast Report shows development quantum, zone numbers and locations of all of the committed/allocated developments that have been included within the 2021 and 2031 Reference Case scenarios.

3 NORTHAMPTON GATEWAY DEVELOPMENT OVERVIEW

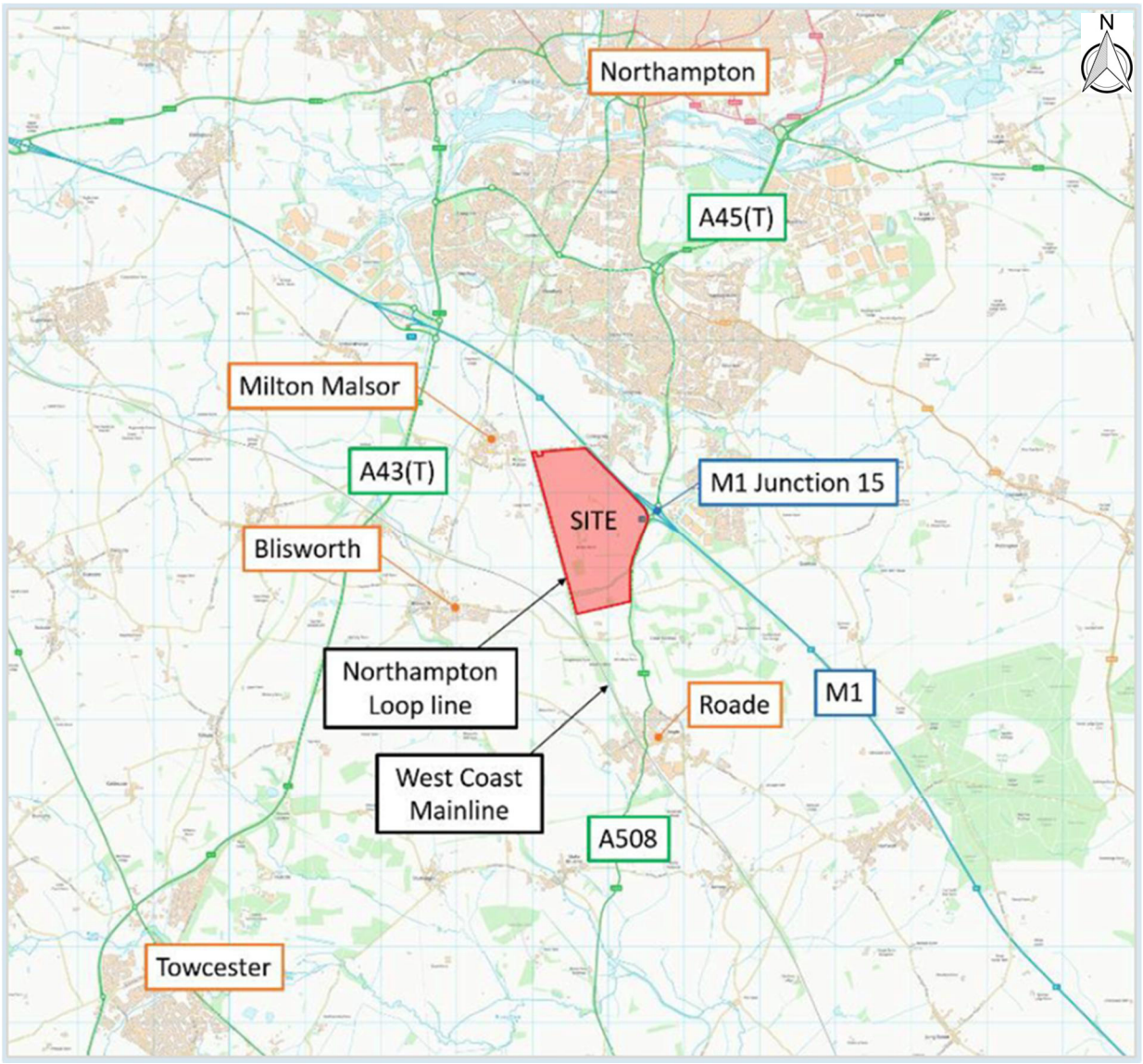
3.1 LOCATION

3.1.1. The Northampton Gateway development is located just to the south-west of M1 Junction 15, which passes the site in a north-west to south-east direction. To the immediate south-east the site is bounded by the A508, which runs from Old Stratford to Junction 15 of the M1, to the north-west the site is the A43, an east - west route running along the border between Buckinghamshire and Northamptonshire. To the north of the site is the A45, which is the main arterial route between the M1, Northampton and the A14.

3.1.2. In terms of rail connections, the site is situated just north-east of the West Coast Mainline (WCML), one of the most important railway corridors in the United Kingdom, connecting London with the northern powerhouse. The Northampton Loop Line runs alongside the boundary of the site. It is a branch of the WCML and serves the town of Northampton, to the north-east of the development.

3.1.3. The site location, and surrounding road and rail network are shown in Figure 2.

Figure 2 - Northampton Gateway SRFI location



Source: M1J15 Northampton Gateway SRFI Technical Note 2: Trip generation ADC 1475 TN2 v4

3.2 NORTHAMPTON GATEWAY DEVELOPMENT PROPOSALS

3.2.1. The proposed Northampton Gateway development comprises a large scale Strategic Rail Freight Interchange (SRFI) with two principle development areas: a warehousing and distribution area to the east of the site, and an intermodal rail freight and aggregates terminal to the west of the site. It is also proposed that the rail freight terminal will include provision for a Rapid Rail Freight (RRF) facility.

3.2.2. In terms of the land use quantum for the purpose of the modelling exercise, the site consists of approximately 5.0 million sq. ft. of storage and distribution space (B8) with ancillary office space (B1) and an allowance for mezzanine floor space.

3.2.3. Figure 3 shows the proposed Illustrative masterplan for the Northampton Gateway development, including the layout of the individual development units.

Figure 3 - Northampton Gateway SRFI indicative masterplan

Source: Roxhill[11]

[11] Roxhill. 2017. *Planning Application in Progress.* http://www.roxhill.co.uk/portfolio/northampton-gateway-j15/.

3.3 DEVELOPMENT CASE LAND USE QUANTUM

3.3.1. Three development case scenarios have been produced in addition to the Reference Case scenarios, as described previously. Scenario E1, scenario F1 and scenario G1 include the respective Reference Case (scenario B1, scenario C1 and scenario D1) committed and allocated development quantum, with the addition of part, or the whole, Northampton Gateway development.

3.3.2. Table 4 sets out the land use quantum for the Northampton Gateway development for each development case scenario.

Table 4 - Land use quantum for the Northampton gateway development

Scenario	Description	Land use summary	Notes
E1	Opening year development case	B8	Intermodal rail terminal operating at 4 trains per day + 1 million sq. ft. of warehousing development with up to 1/3 mezzanine space
F1	Circular compliant development case	B8	100% of development
G1	Future assessment year development case	B8	100% of development

3.4 DEVELOPMENT CASE TRIP GENERATION

3.4.1. Table 5 illustrates the trip generation for each of the development case scenarios. Scenario E1 includes only partial build-out of the development, and therefore the trip generation for this scenario is lower than scenario F1 and scenario G1.

Table 5 - Trip generation for the Northampton Gateway development

Scenario	AM peak				PM peak			
	Lights		Heavies		Lights		Heavies	
	Arrivals	Departures	Arrivals	Departures	Arrivals	Departures	Arrivals	Departures
E1	111	12	35	33	37	128	35	33
F1	700	75	138	131	230	804	138	131
G1	700	75	138	131	230	804	138	131

3.5 NORTHAMPTON GATEWAY DEVELOPMENT CASE TRIP DISTRIBUTION

Light vehicle trip distribution

3.5.1. The trip distribution for the Northampton Gateway development was initially generated using the same methodology as for the Reference Case developments. However, upon reviewing the results from the NSTM2 demand model, it was decided that the distribution of trips for light vehicles using the M1 south was unrealistic, as the results showed predominately less development trips using the route, compared with other routes.

3.5.2. A comparison of the M1 NSTM2 light vehicle distribution with 2011 Census journey to work (JTW) data was carried out using nearby large scale employment sites. It was found that a greater proportion of trips associated with these sites would likely travel to and from the area using the M1 south.

3.5.3. As a result it was agreed with the Transport working Group to adjust the trip distribution of light vehicles using the M1 south with 2011 Census journey to work (JTW) data. Table 6 illustrates the final trip distribution used for the Northampton Gateway development.

Table 6 - Light vehicle trip distribution for the Northampton Gateway development

Route	AM peak		PM peak	
	Origin	Destination	Origin	Destination
A45	38%	51%	44%	51%
M1 (S)	26%	14%	11%	19%
M1 (N)	21%	17%	28%	16%
A508	15%	19%	18%	18%

3.5.4. Further information regarding the methodology for the adjustment of the trip distribution for the Northampton Gateway development can be found in WSP TN1 M1 Gateway Trip Distribution Technical Note[12].

3.5.5. Figure 4 and

3.5.6. Figure 5 show the distribution of light traffic arriving and departing the Northampton Gateway development during the AM peak in Scenario G1, after adjustment of the development distribution.

HGV trip distribution

3.5.7. The HGV trip distribution assumed in NSTM2 for the development was derived from the detailed assessment undertaken in Technical Note 3, which was approved by the Transport Working Group.

[12] WSP. 2017. *Technical Note: M1 Gateway Trip Distribution.*

Figure 4 - Northampton Gateway development arrival distribution

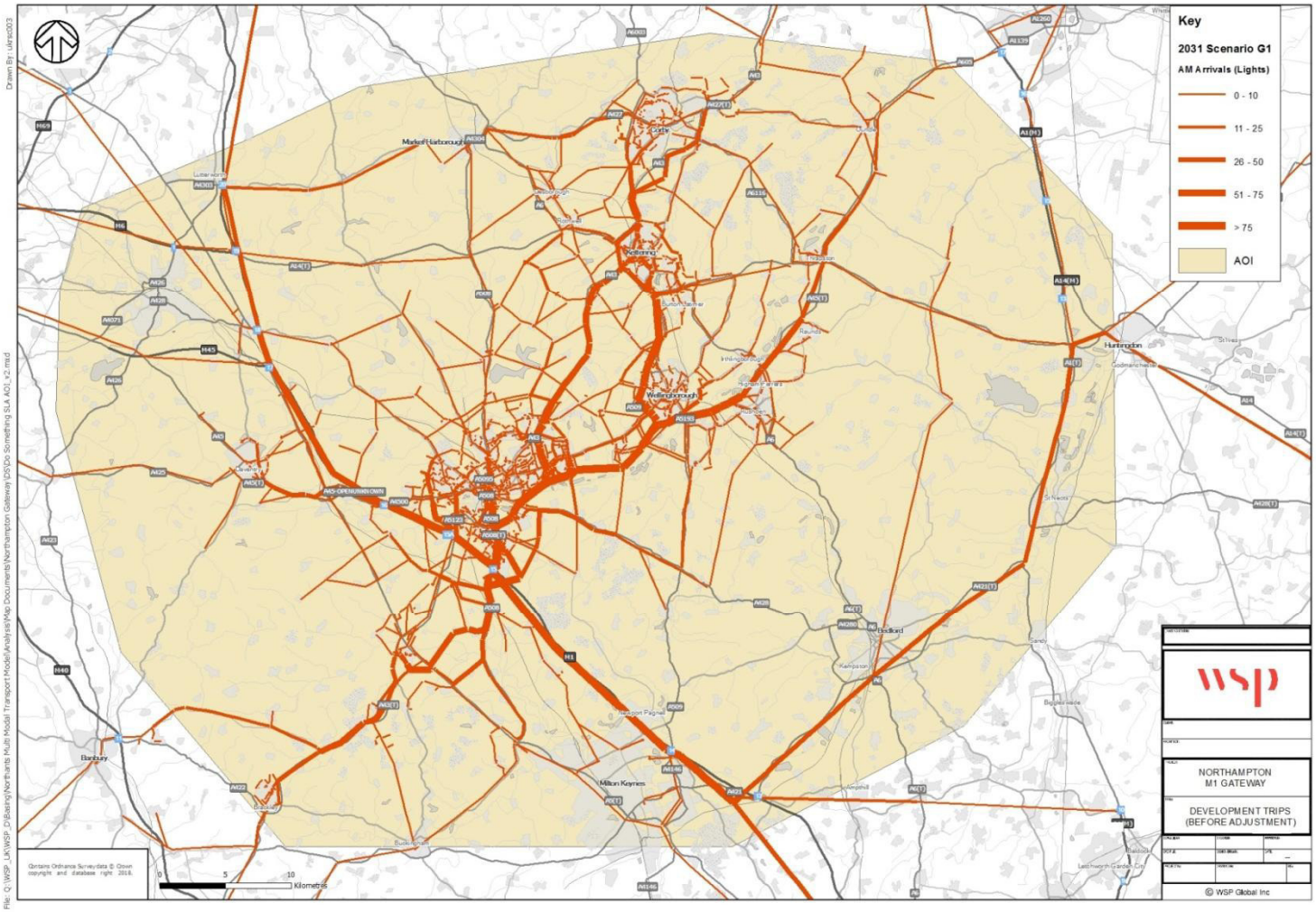
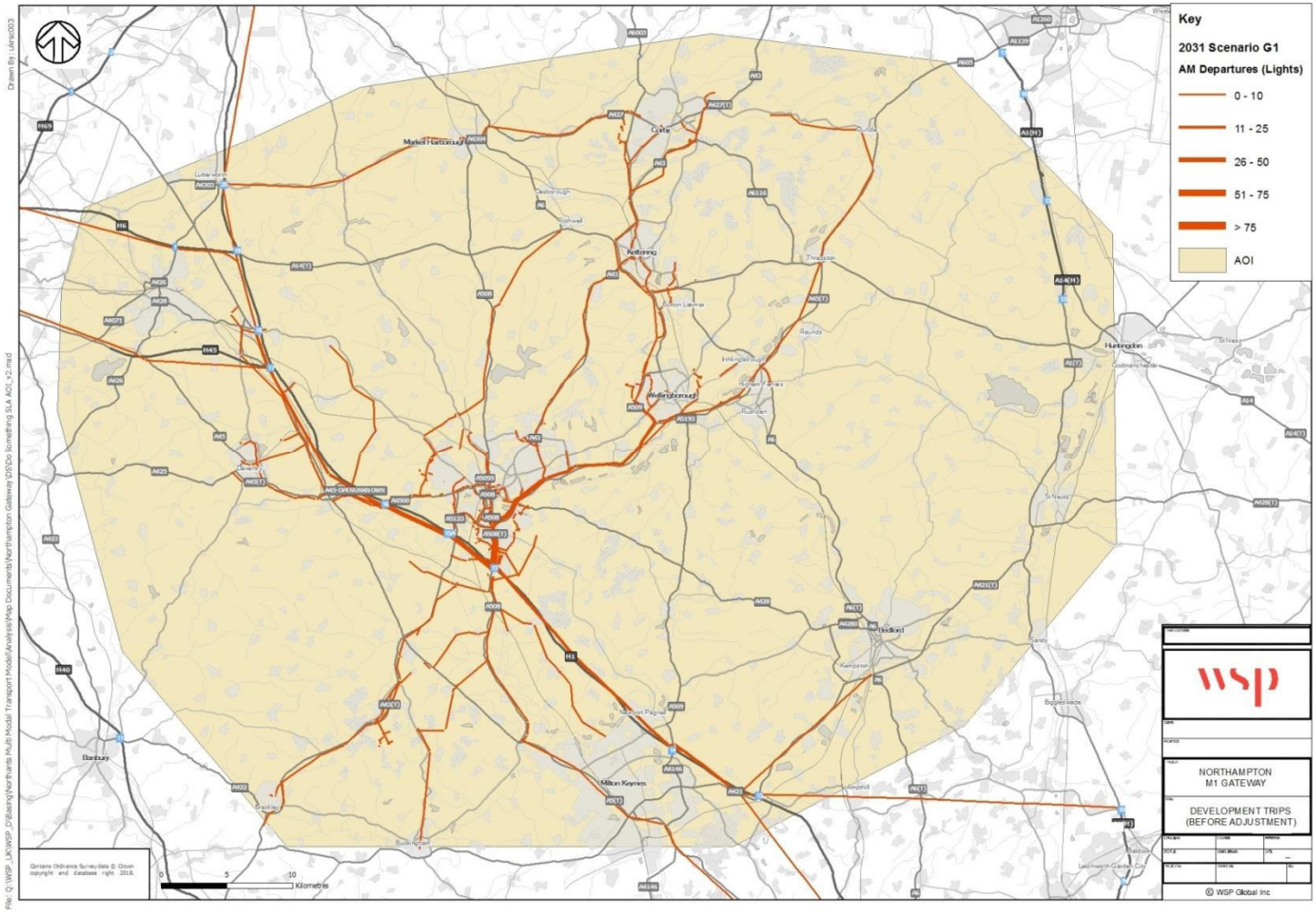


Figure 5 - Northampton Gateway development departure distribution



4 NORTHAMPTON GATEWAY DEVELOPMENT CASE MODEL ASSESSMENTS

4.1 OVERVIEW

4.1.1. This section presents the results of the Development Case modelling assessment undertaken for this study. Table 7 provides an overview of the modelling assessment process. The results of the mitigated development case scenarios can be found in Section 5.

Table 7 - Overview of the modelling assessment process

Development case scenario	Comparison scenario	Assessment year	Difference	Purpose
E1 opening year development case	B1 opening year Reference case	2021	Includes partial build-out of the Northampton Gateway development to a 2021 forecast horizon.	Provides opening year traffic flows for assessment of the first phase of development.
F1 circular compliant development case	C1 circular compliant Reference case	2021	Includes complete build-out of the Northampton Gateway development to a 2021 forecast horizon.	Provides total traffic flows for the assessment of the requirement for highway mitigation on the SRN, if necessary, and design of the SRN highway.
G1 future assessment year development case	D1 future assessment year development case	2031	Includes complete build-out of the Northampton Gateway development to a 2031 forecast horizon.	Provides total traffic flows for the assessment of the requirement for highway mitigation on the local road network and assessment of development traffic impacts in the forward planning year on the SRN. It also provides total traffic flows for design of the local road network mitigation, if necessary.

4.1.2. By comparing the Development Case scenarios (with the Northampton Gateway development) against the respective Reference Case scenarios (without the Northampton Gateway development), the potential traffic impacts of the proposed development can be determined for the various forecast scenarios.

4.1.3. The results are presented in this report by way of the following outputs for the AM peak and PM peak periods for all development case scenarios:

- Actual flow difference plots
- Reassignment plots
- Junction volume to capacity (V/C) differences.

4.1.4. High quality versions of the all plots described in this section can be found in Appendix B.

4.2 ACTUAL FLOW DIFFERENCE AND REASSIGNMENT PLOTS

4.2.1. Actual flow can be defined as the amount of traffic that can use a link given upstream capacity constraint and queuing, as opposed to demand or 'unmetered' traffic flow. The plots included in this section show the actual flow difference between the development case scenarios and respective Reference case scenarios.

4.2.2. For the purpose of this modelling exercise the traffic flow is shown as vehicles/ per hour. Links with increases in actual flow are shown in red/orange and links with decreases in actual flow are shown in green, relative to the respective comparison scenario set out in Table 7.

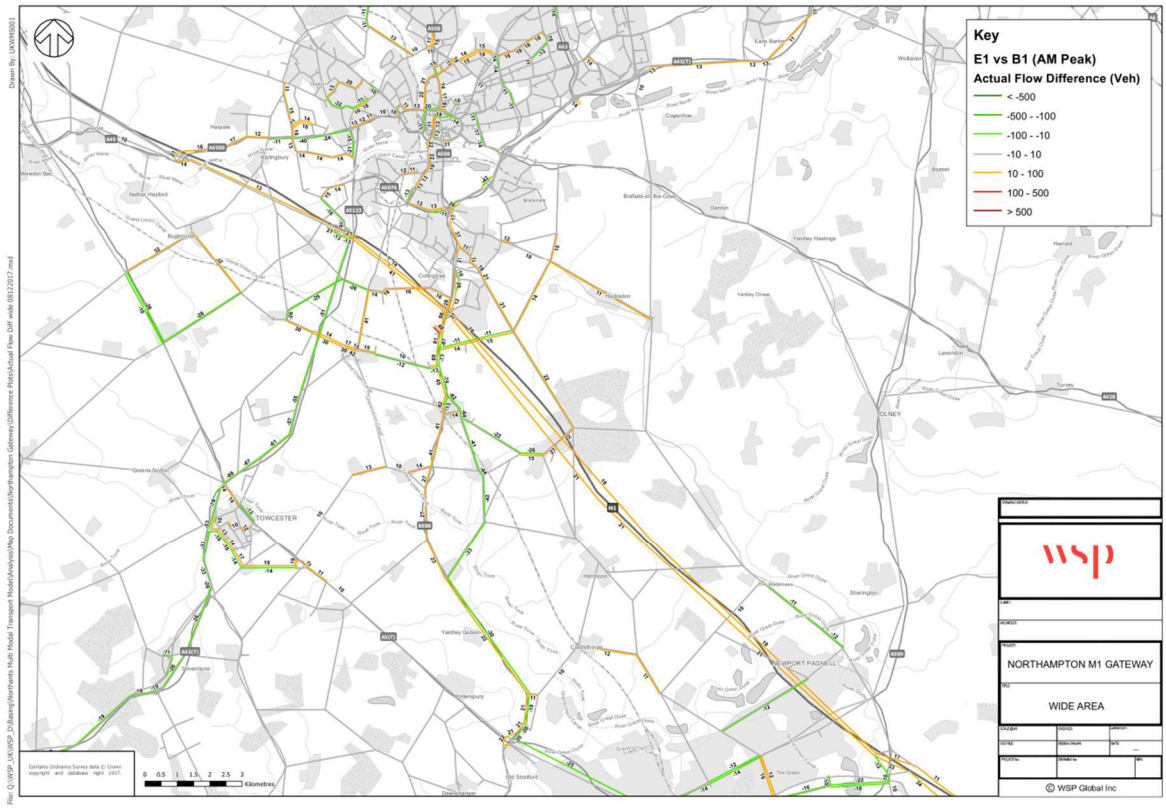
4.2.3. Reassignment plots have also been generated for each comparison, in addition to the actual flow difference plots. These show the actual flow difference between comparison scenarios for trips which do not have an origin from, or a destination to, the Northampton Gateway development. For the purpose of the report this is referred to as 'existing traffic'.

4.2.4. An examination of the reassignment plots can give an idea of how existing traffic will respond, in terms of route choice, to the additional traffic provided by the new development in the network. Reference will be made to these plots throughout the following section where necessary.

SCENARIO E1: OPENING YEAR DEVELOPMENT CASE

4.2.5. Figure 6 and Figure 7 show the actual flow difference and reassignment plots between scenario E1 and scenario B1, in the AM peak, respectively.

Figure 6 - Actual flow difference scenario E1 to scenario B1 during the AM peak



4.2.6. With a proportion of the Northampton Gateway development in place during the AM peak, there are flow increases of between 40 to 90 vehicles in each direction on a number of strategic routes in the area, compared with the Reference case. This includes up to 60 two-way trips on the M1 and up to 90 trips northbound on the A508.

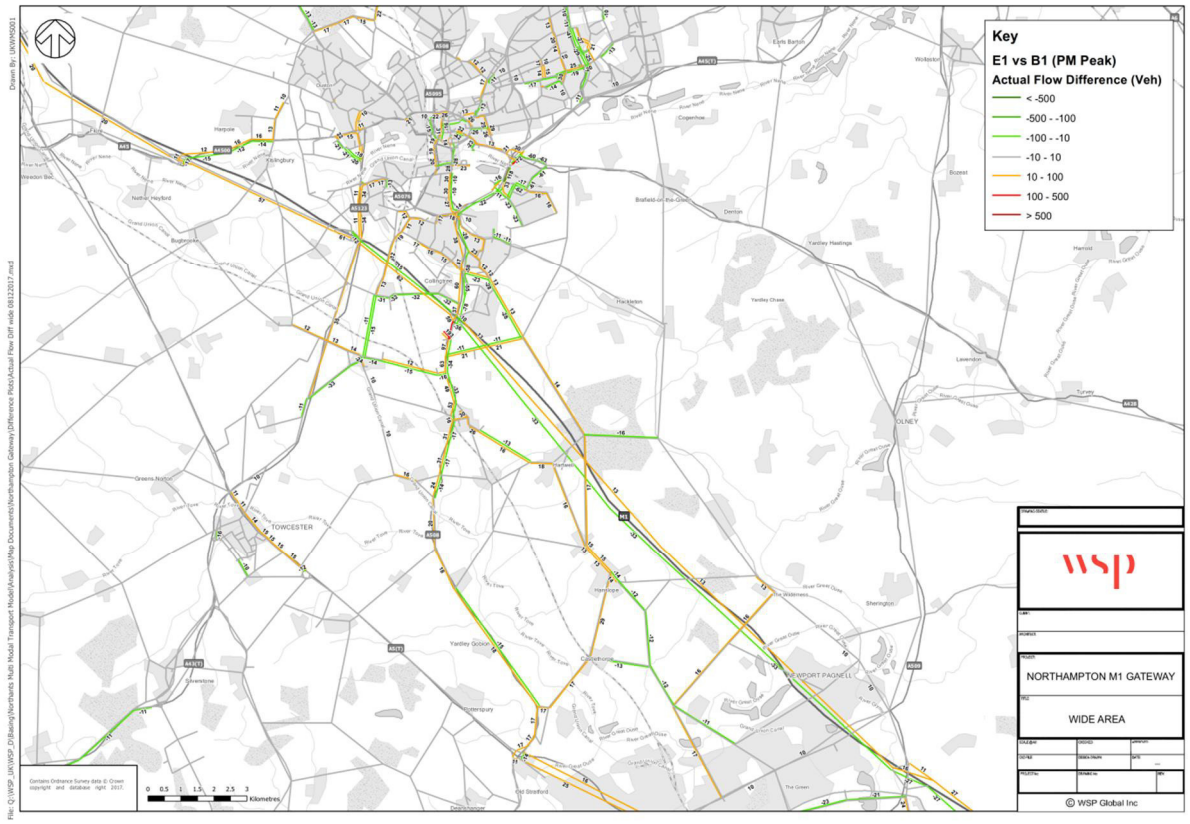
4.2.7. There are also smaller increases of up to 30 two-way trips on a number of local routes including Wootton Road, and the A45, through Wootton.

Figure 7 - Traffic reassignment scenario E1 to scenario B1 during the AM peak

4.2.8. The inclusion of the Northampton Gateway development in the AM peak also results in the reassignment of existing traffic, which is diverting to alternative routes, to avoid areas impacted by the development traffic. This includes a reduction of up to 90 vehicles northbound on the A43, through Towcester, and up to 100 vehicles southbound on the A45/ A508, through Junction 15 of the M1. Although, in most cases these reduction are partially offset by the additional development traffic.

4.2.9. Figure 8 and Figure 9 show the actual flow difference and reassignment plots between scenario E1 and scenario B1, in the PM peak, respectively.

Figure 8 - Actual flow difference scenario E1 to scenario B1 during the PM peak



4.2.10. A similar pattern of actual flow increases is observed in the PM peak, compared with the Reference case. This includes an increase in traffic flow of up to 65 vehicles northbound on the M1, to the west of J15, and over 60 vehicles northbound on the A508/ A45, towards Northampton during the PM peak hour.

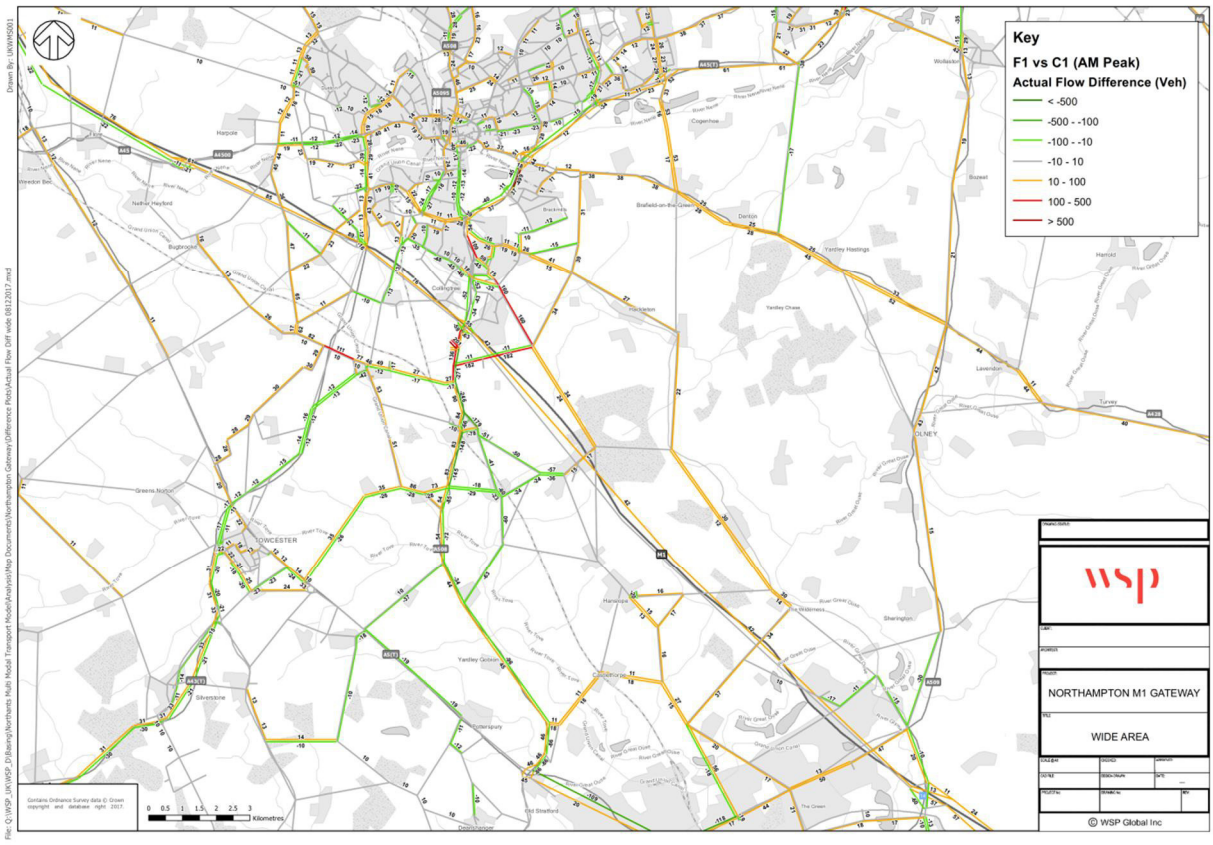
Figure 9 - Traffic reassignment scenario E1 to scenario B1 during the PM peak

4.2.11. In terms of existing traffic reassignment, there are decreases in actual flow observed southbound on the A508 and southbound on the A43, amounting to a reduction of up to 60 vehicles. On the A45, through Northampton there are similar reductions in existing traffic flow or around 10 to 100 vehicles in each direction. Although, in most cases these reductions are partially offset by the additional development traffic.

SCENARIO F1: CIRCULAR COMPLIANCE DEVELOPMENT CASE

4.2.12. Figure 10 and Figure 11 show the actual flow differences and traffic reassignment between scenario F1 and scenario C1, in the AM peak, respectively.

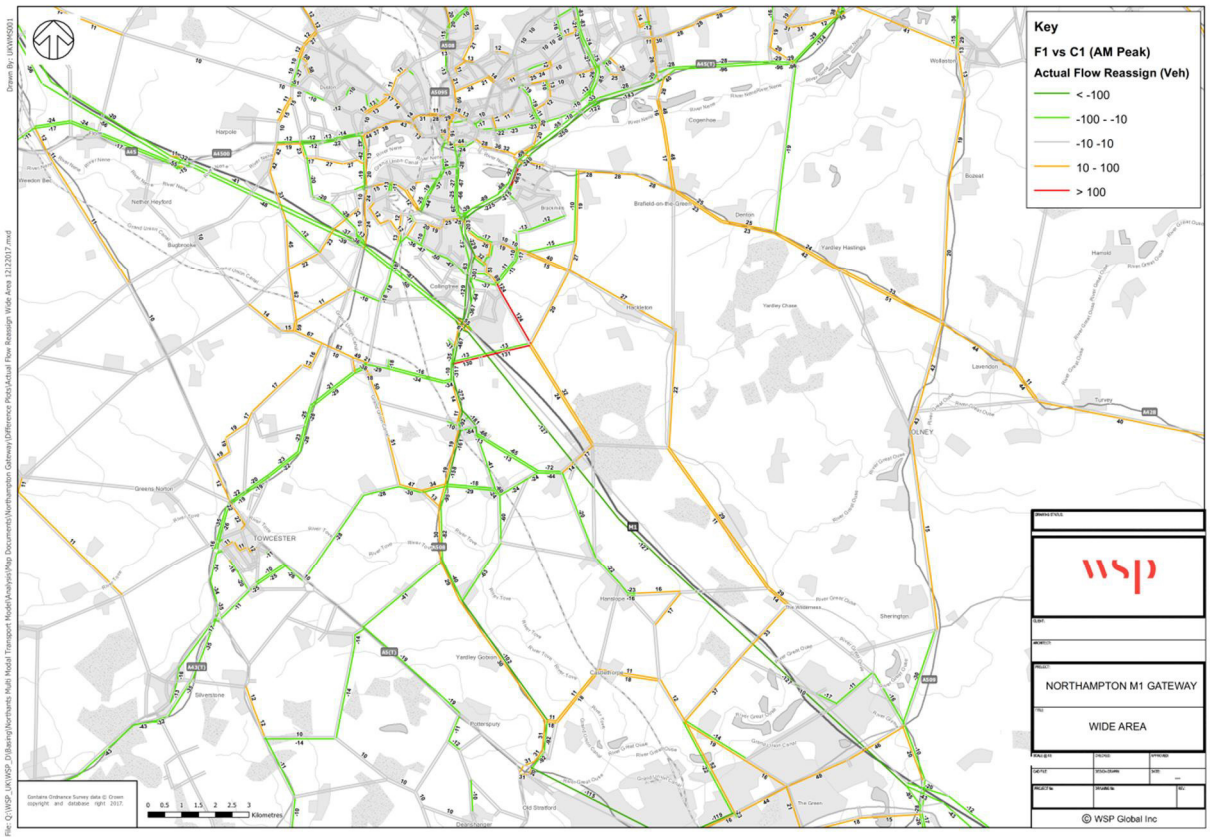
Figure 10 - Actual flow difference scenario F1 to scenario C1 during the AM peak



4.2.13. With full build out Northampton Gateway development in place there are increases in actual traffic flow observed on a number of links during the AM peak, compared with the respective Reference case. This includes an increase of up to 90 vehicles southbound on the M1, up to 200 vehicles northbound on the A508, in the vicinity of the development access junction, and up to 50 vehicles southbound on the A45 through Northampton.

4.2.14. In addition, a number of local routes experience increases in actual traffic flows. This is particularly noticeable southbound on Wootton Road via Courteenhall, where local and development traffic is using the route to avoid the A45/ A508 around J15 of the M1. Actual traffic flows increase by up to 190 vehicles on this route.

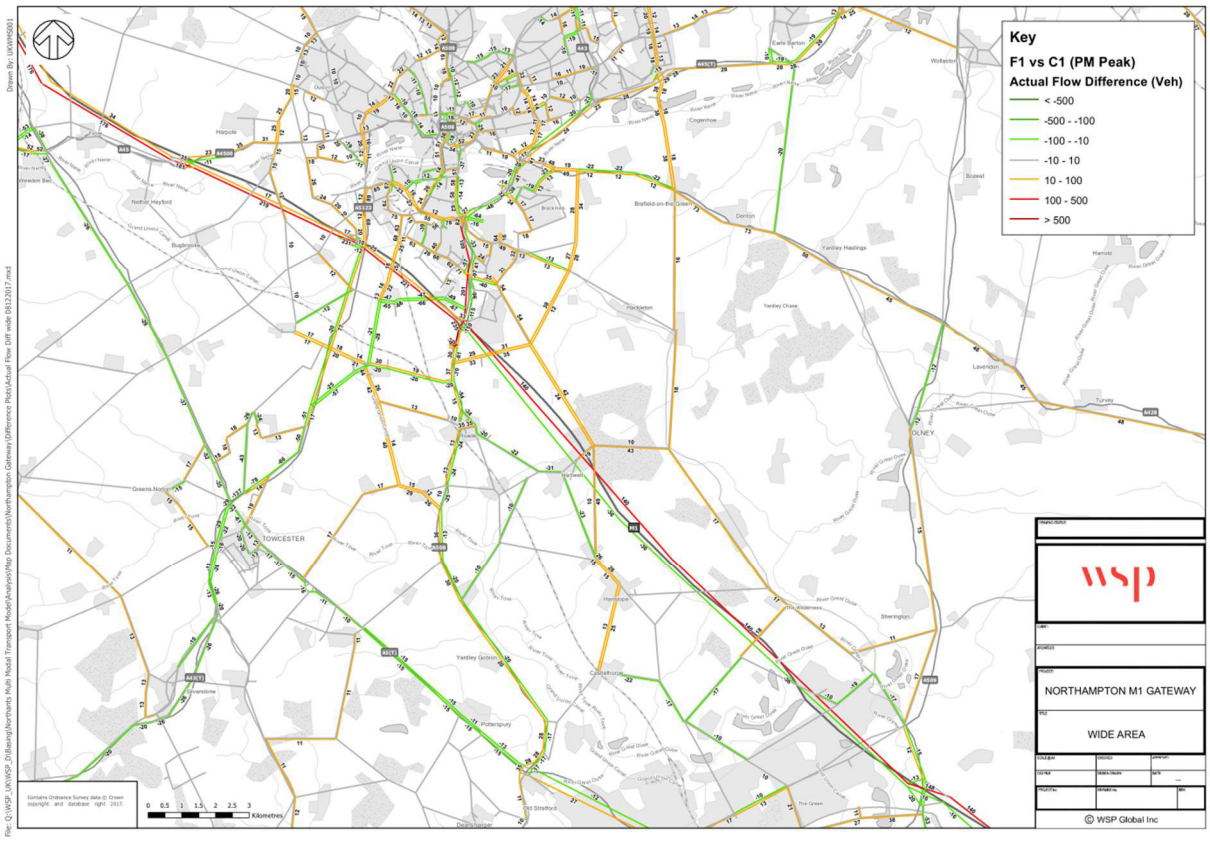
Figure 11 - Traffic reassignment scenario F1 to scenario C1 during the AM peak



4.2.15. With the development in place, there is notable reassignment of existing traffic in the AM peak, particularly away from the A45 through Northampton (a reduction of up to 300 two-way trips). It appears that this traffic is being dispersed across a variety of other local routes which avoid A45/ A508 (i.e. M1 Junction 15) in the vicinity of the development.

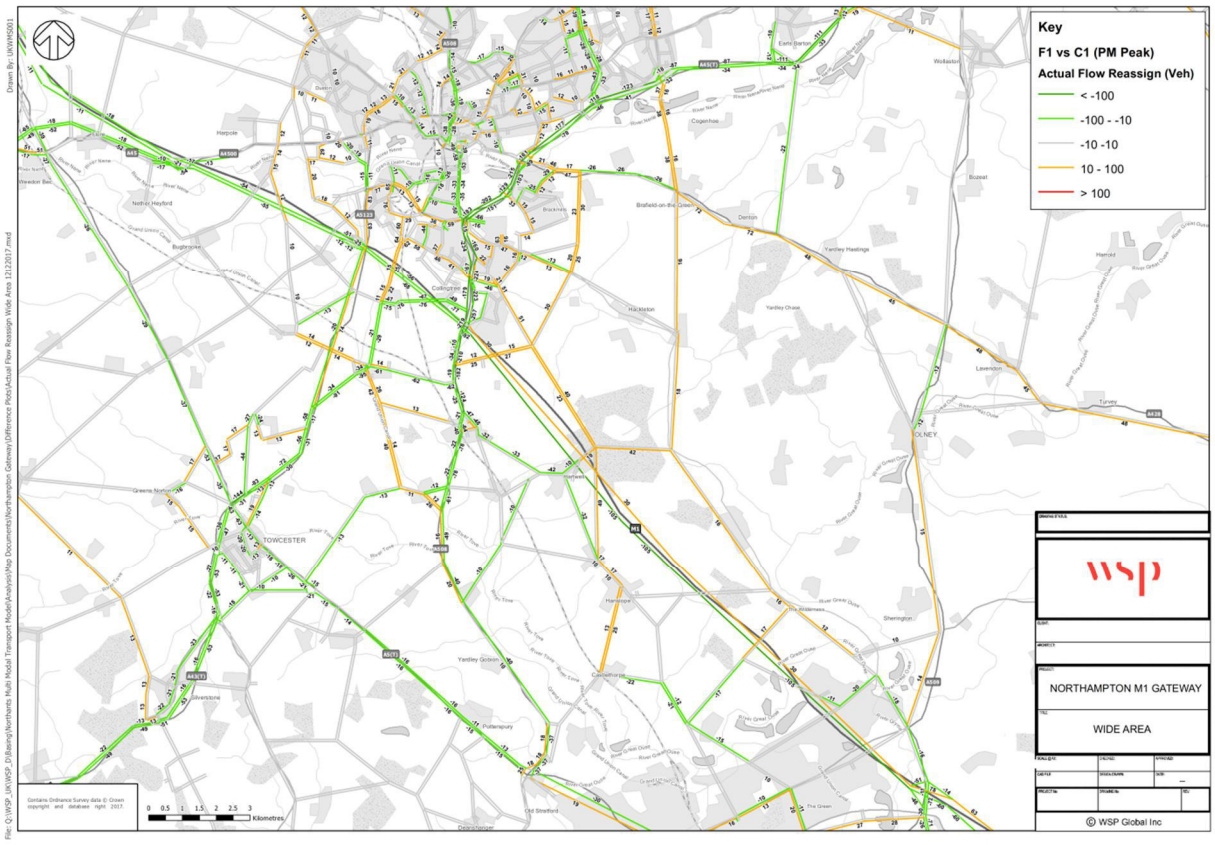
4.2.16. Figure 12 and Figure 13 show the actual flow differences and traffic reassignment between scenario F1 and scenario C1, in the PM peak, respectively.

Figure 12 - Actual flow difference scenario F1 to scenario C1 during the PM peak



4.2.17. In the PM peak the biggest impact felt by the additional development traffic is on the M1, which is the main route used by development traffic exiting the site. There are actual flow increases of up to 230 vehicles northbound and 150 vehicles southbound on the M1, despite some existing traffic reassigning away from this route. There are also notable increases in traffic flow northbound on the A45 of up to 200 vehicles, heading into Northampton from the development site.

Figure 13 - Traffic reassignment scenario F1 to scenario C1 during the PM peak

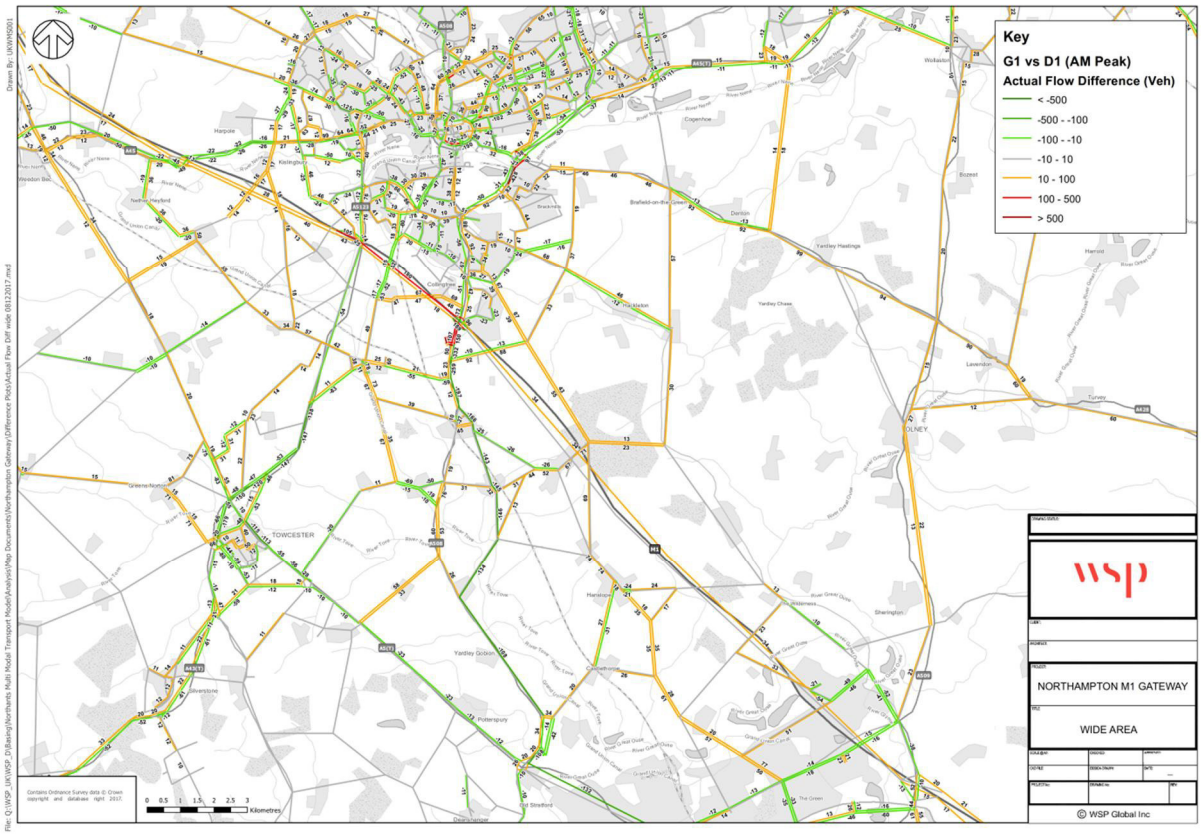


4.2.18. As a result of the increase in actual flow arising from the development traffic, there is notable reassignment of existing traffic away from the A45 and A508 in both directions during the PM peak, particularly in the vicinity of J15 of the M1, where existing traffic flows reduce by as much as 400 two-way trips. However, these reductions are offset by the additional traffic generated by the development site.

SCENARIO G1: FUTURE ASSESSMENT YEAR DEVELOPMENT CASE

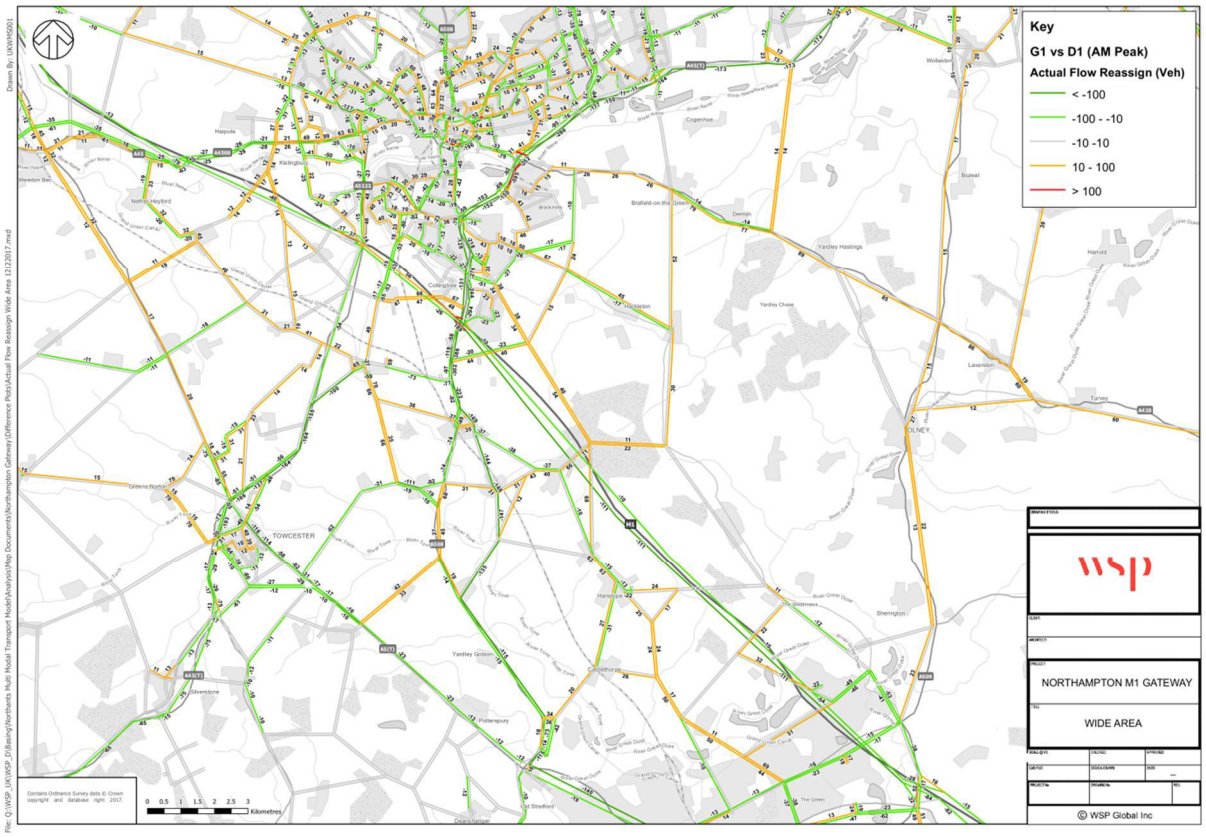
4.2.19. Figure 14 and Figure 15 show the actual flow differences and traffic reassignment between scenario G1 and scenario D1, in the AM peak, respectively.

Figure 14 - Actual flow difference scenario G1 to scenario D1 during the AM peak



4.2.20. There are a number of strategic routes which experience increases in actual traffic flows in the AM peak with the full build out of the Northampton Gateway development in place, on top of 2031 background growth. This includes actual flow increases of up to 180 vehicles on the southbound approach to Junction 15 of the M1 and up to 260 two-way vehicle trips on the A508 between Junction 15 of the M1 and the development access junction.

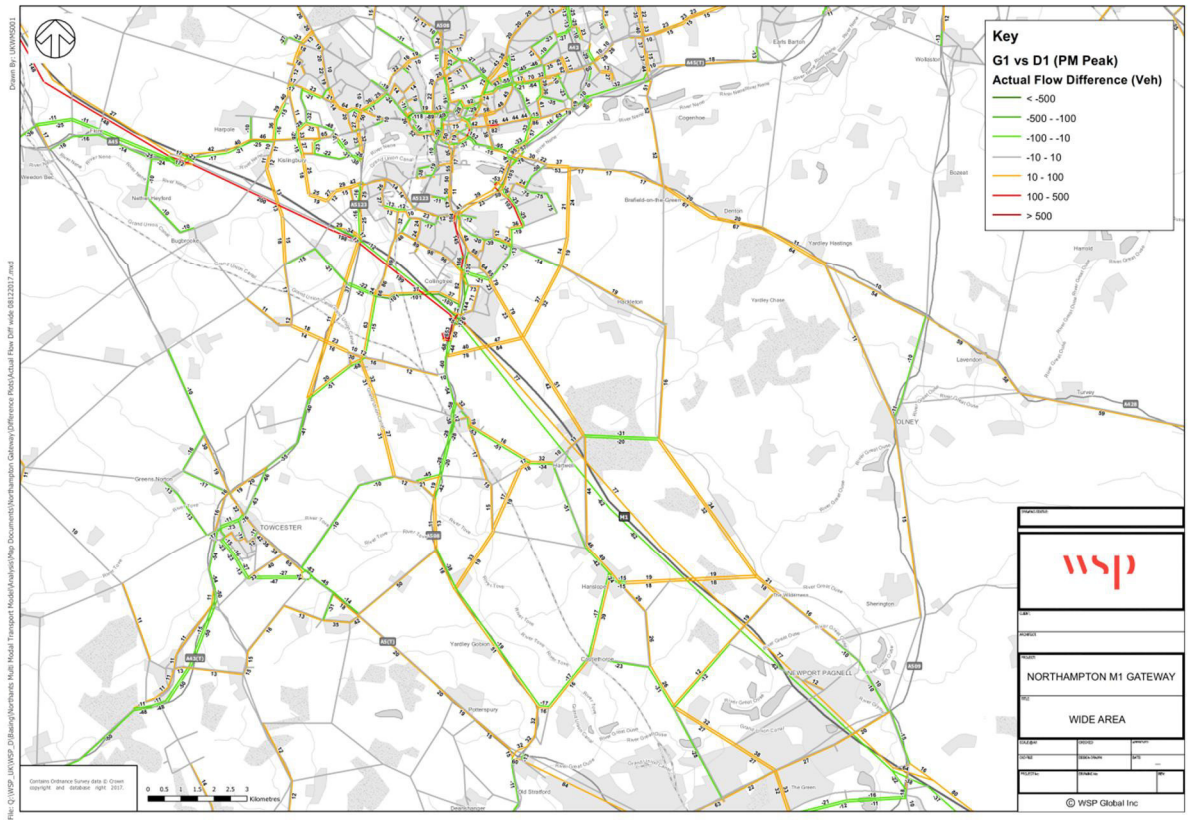
Figure 15 - Traffic reassignment scenario G1 to scenario D1 during the AM peak



4.2.21. As a result of the additional traffic generated by the development, there is notable reassignment of existing traffic in the AM peak away from routes which pass near to the development site and Junction 15 of the M1. Key routes affected include the A45/ A508 in both directions through Northampton and south of Junction 15 of M1, where there are decreases of up to 500 two-way vehicle trips on some sections. As with other scenarios and time periods, this reduction is offset by additional development traffic using the same route to access the development site.

4.2.22. Figure 16 and Figure 17 show the actual flow differences and traffic reassignment between scenario G1 and scenario D1, in the PM peak, respectively.

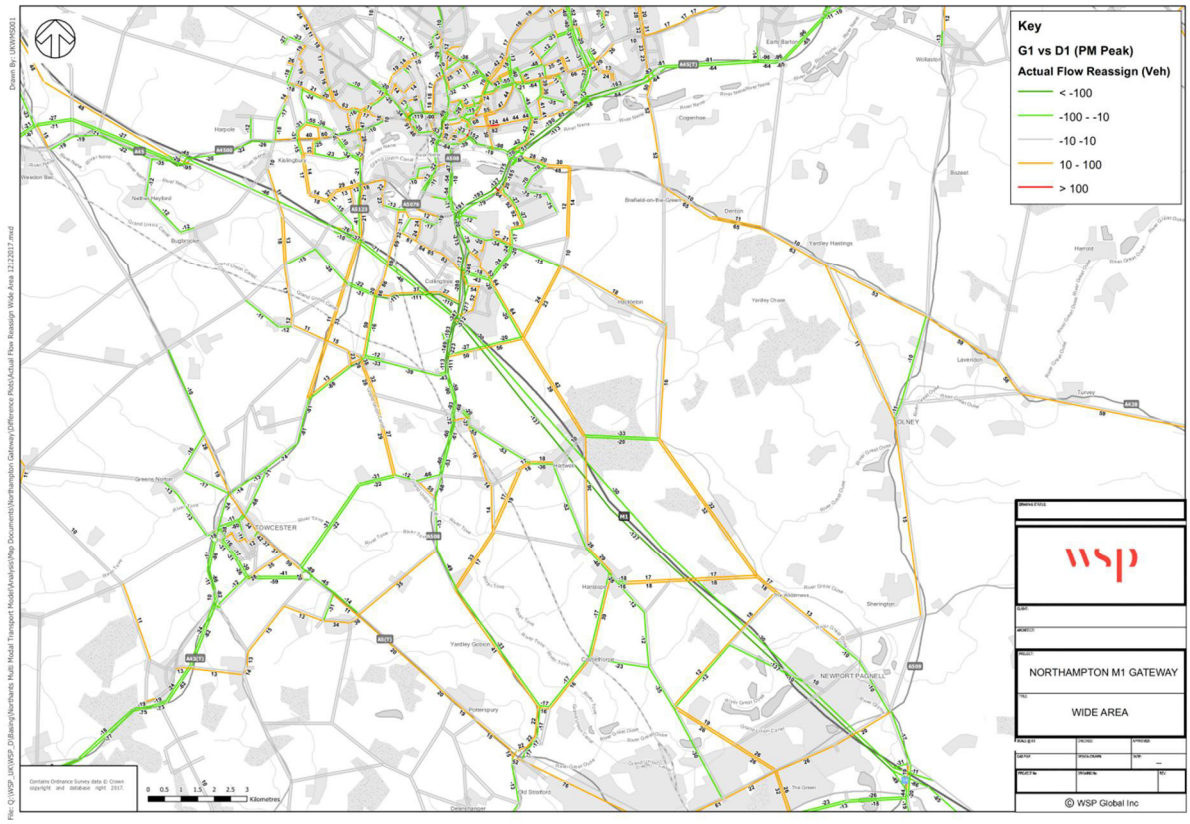
Figure 16 - Actual flow difference scenario G1 to scenario D1 during the PM peak



4.2.23. As with the AM peak, there are increases in actual flow in the PM peak observed on the M1, particularly northbound, west of Junction 15, where traffic flows increase by up to 200 additional vehicles. Southbound on the M1, east of J15, a smaller increase is also observed of up to 100 vehicles. The additional traffic is the result of development traffic entering the M1 at J15.

4.2.24. Other routes which experience increases in actual flow include the A45, north of Junction 15 of the M1, where there are increases of up 170 vehicles heading into Northampton, and Rowntree Road/ Towcester Road, where there is an increase of up to 90 vehicles heading westbound from the development site.

Figure 17 - Traffic reassignment scenario G1 to scenario D1 during the PM peak



4.2.25. As observed in the other scenarios, the impact of the additional development traffic results in the reassignment of existing traffic in the PM peak onto alternate routes which avoid the development access junction. This is most notable at Junction 15 of the M1 itself, where there is a reduction of up to 660 vehicles on the A45/ A508 as a result of additional delay and congestion brought about by the development traffic. The A45 to the north, also experiences reductions in existing traffic flows of up to 340 two-way trips. It appears that this traffic is being dispersed across a variety of other local routes primarily to avoid the A45/ A508 (i.e. M1 Junction 15).

4.3 JUNCTION VOLUME TO CAPACITY (V/C)

4.3.1. The following section sets out the results of a comparison of Volume to Capacity (V/C) between each development case scenario and respective Reference Case scenario, for the key junctions in the area around the Northampton Gateway developments.

4.3.2. V/C is a metric commonly used in the assessment of congestion at junctions, which considers the ratio of traffic volume to capacity for each turning movement. In this case, junctions have been assessed based on the worst performing turn, and classified according the bands set out in Table 8.

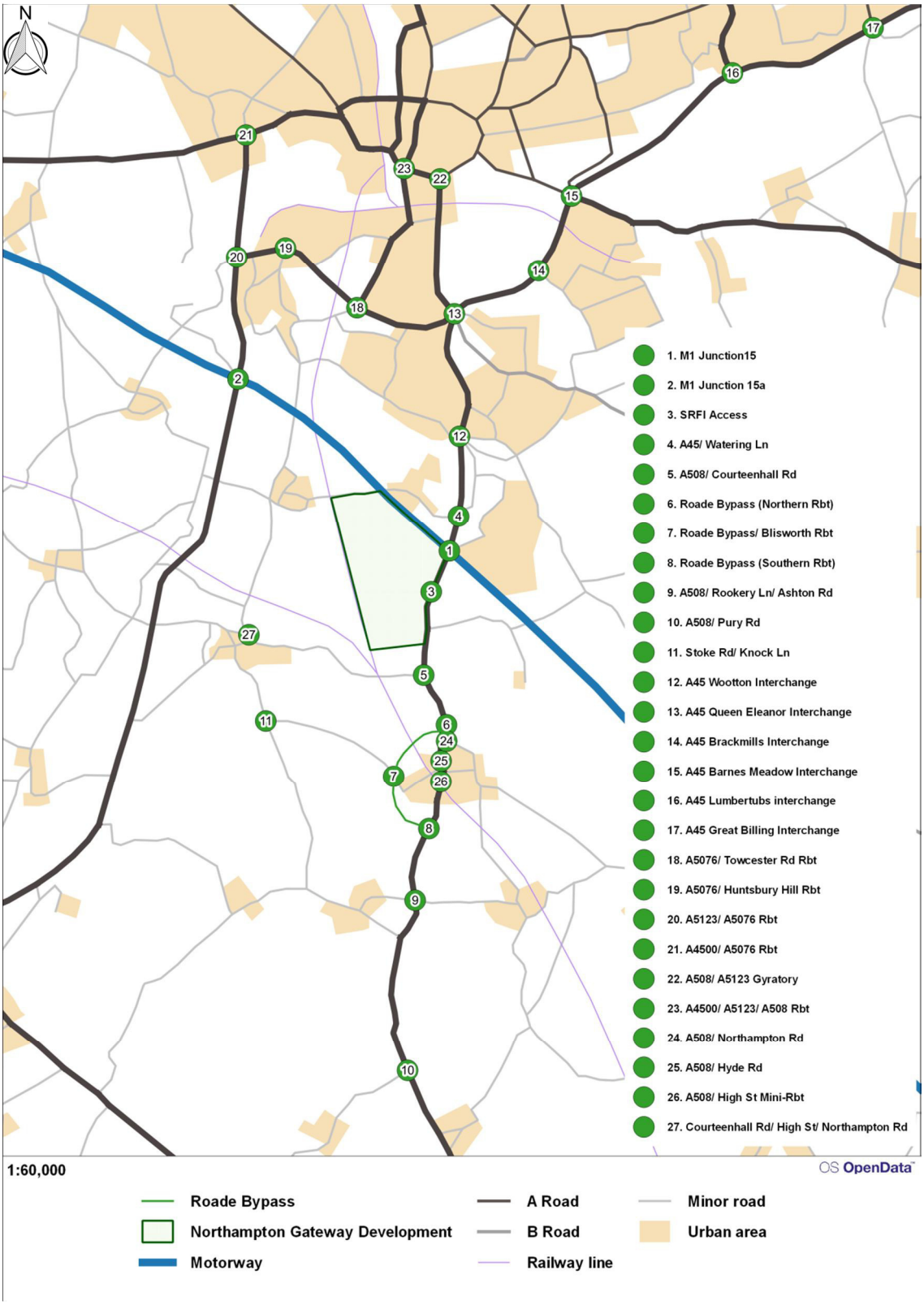
Table 8 - Junction Assessment Criteria

V/C Range	Congestion band
< 75%	
75% - 85%	
86% - 100%	
>100%	

4.3.3. Additional model plots showing the V/C changes described in this section can be found in Appendix A.

4.3.4. Figure 18 shows the location of the junctions around the Northampton Gateway development where an assessment of the junction performance has been carried out in respect to V/C.

Figure 18 - Junctions assessed in the vicinity of the development



4.3.5. Table 9 illustrates the results of the junction performance review for each Reference Case and Development Case scenario during the AM peak.

4.3.6. Junction 3 represents the access junction to the Northampton Gateway development and as such is not included in the Reference case scenarios. Junction 6, Junction 7 and Junction 8 are additional junctions included as mitigation in the development case with mitigation scenarios. Further details can be found in Section 3 of this report. V/C ratios for the DfT Circular Compliant scenarios are only shown for the SRN.

Table 9 - Junction V/C performance – AM peak (no highway mitigation)

ID	Junction	V/C (%)						% change where V/C > 0.75		
		B1	C1	D1	E1	F1	G1	E1-B1	F1-C1	G1-D1
1	M1 Junction 15	112	102	105	112	111	115	0%	9%	10%
2	M1 Junction 15a	109	112	115	109	114	115	0%	1%	0%
3	Site Access for Northampton Gateway development				58		10			
4	A45/ Watering Ln	69	71	80	70	71	79	n/a	n/a	-2%
5	A508/ Courteenhall Rd	93		99	96		101	4%		3%
9	A508/Rookery Ln/ Ashton Rd	53		91	58		101	n/a		10%
10	A508/ Pury Rd	100		101	101		101	1%		0%
11	Stoke Rd/ Knock Ln	28		33	28		37	n/a		n/a
12	A45 Wootton Interchange	70	102	100	70	102	101	n/a	-1%	1%
13	A45 Queen Eleanor Interchange	100	100	101	99	99	101	-1%	-1%	0%
14	A45 Brackmills Interchange	100	100	108	100	100	108	0%	0%	0%
15	A45 Barnes Meadow Interchange	112	111	112	112	111	112	0%	0%	0%
16	A45 Lumbertubs Interchange	111	108	115	111	109	116	0%	1%	1%
17	A45 Great Billing Interchange	109	108	111	109	108	111	0%	0%	0%
18	A5076/ Towcester Rd roundabout	93		104	92		104	-1%		0%
19	A5076/ Hunsbury Hill roundabout	102		104	102		105	0%		1%
20	A5123/ A5076 roundabout	78		75	78		75	0%		0%
21	A4500/ A5076 roundabout	79		90	81		90	1%		0%
22	A508/ A5123 gyratory	101		102	101		101	0%		-1%
23	A4500/A5123/A508	74		95	74		92	n/a		-3%
24	A508/ Northampton Rd	81		81	87		86	5%		5%
25	A508/ Hyde Rd	94		91	93		88	-1%		-3%
26	A508/ High St mini-roundabout	100		100	100		100	0%		0%
27	Courteenhall Rd/ High St/Northampton Rd	83		101	92		102	9%		1%

4.3.7. Junctions ID1, ID2, ID10, ID12, ID13, ID14, ID15, ID16, ID17, ID18, ID19, ID22, ID26 and ID27 exceed or are approaching capacity in all forecast scenarios, with and without the development in place. However, it is worth noting that Junction 15 of the M1 (ID1), in scenario F1 and G1, and the Courteenhall Road/ High St/ Northampton Road junction (ID27), in scenario E1, all experience an increase in V/C greater than 5%, compared with the respective Reference Case.

4.3.8. Junctions ID5, ID21, ID24 and ID25 are either constrained or approaching capacity in all forecast scenarios, with and without the development in place. The A508/ Northampton Road junction (ID24) experiences an increase greater than 5% in V/C in scenario E1 and scenario G1, with the Northampton Gateway development and no highway mitigation in place compared with Reference Case.

4.3.9. Junctions ID4, ID11 and ID20 are either constrained or have space capacity in all forecast scenarios, with and without the Northampton Gateway development. The A508/ Rookery Lane/ Ashton Road junction (ID9) and A4500/A5123/A508 junction (ID23) have spare capacity in the majority of scenarios with no highway mitigation with the exception of scenario D1 and scenario G1, where 2031 background growth, results in the junction approaching or exceeding capacity.

4.3.10. Table 10 below shows the results of the junction performance review for each Reference Case and Development Case scenario during the PM peak. In terms of V/C, the PM peak appears more constrained than the AM peak across all forecast scenarios.

Table 10 - Junction V/C performance – PM peak (no highway mitigation)

ID	Junction	V/C (%)						% change where V/C > 0.75		
		B1	C1	D1	E1	F1	G1	E1-B1	F1-C1	G1-D1
1	M1 Junction 15	100	103	103	101	104	105	1%	1%	3%
2	M1 Junction 15a	112	112	113	112	111	115	0%	-1%	2%
3	Site Access for Northampton Gateway development				55		13			
4	A45/ Watering Ln	79	73	82	81	80	82	2%	7%	1%
5	A508/ Courteenhall Rd	104		95	106		92	2%		-4%
9	A508/Rookery Ln/ Ashton Rd	38		74	40		83	n/a		9%
10	A508/ Pury Rd	65		95	67		97	n/a		2%
11	Stoke Rd/ Knock Ln	22		46	21		49	n/a		n/a
12	A45 Wootton Interchange	83	86	88	82	84	88	-1%	-1%	-1%
13	A45 Queen Eleanor Interchange	113	110	113	113	110	113	0%	1%	0%
14	A45 Brackmills Interchange	112	111	115	112	111	114	0%	0%	-1%
15	A45 Barnes Meadow Interchange	124	112	112	124	112	112	0%	0%	0%
16	A45 Lumbertubs Interchange	95	100	103	95	101	104	0%	0%	0%
17	A45 Great Billing Interchange	95	105	111	95	105	111	0%	0%	-1%
18	A5076/ Towcester Rd roundabout	107		103	108		102	0%		0%
19	A5076/ Hunsbury Hill roundabout	103		105	103		105	0%		0%
20	A5123/ A5076 roundabout	83		79	83		77	0%		-1%
21	A4500/ A5076 roundabout	69		76	70		78	n/a		2%
22	A508/ A5123 gyratory	97		102	97		102	0%		0%
23	A4500/A5123/A508	78		81	79		80	1%		-1%
24	A508/ Northampton Rd	90		101	92		102	2%		1%
25	A508/ Hyde Rd	84		87	86		87	2%		-1%
26	A508/ High St mini-roundabout	87		101	91		101	4%		0%
27	Courteenhall Rd/ High St/Northampton Rd	102		98	102		101	0%		2%

4.3.11. Junctions ID1, ID2, ID5, ID13, ID14, ID15, ID16, ID17, ID18, ID19, ID22, ID24, ID25, ID26, and ID27 are either approaching or exceeding capacity in all forecast scenarios, with and without the Northampton Gateway development without highway mitigation in place.

4.3.12. Junctions ID4, ID10, ID12, ID20 and ID23 are either approaching capacity or constrained in the majority of scenarios, with and without the Northampton Gateway development with no highway mitigation in place. The A45/ Watering Lane junction (ID4) experiences a notable increase in V/C of 7% in scenario F1, with the Northampton Gateway development in place, compared with scenario C1.

4.3.13. Junctions ID9, ID11, and ID21, are mostly unconstrained in the PM peak, although with 2031 background growth in place in scenarios D1 and G1, the A4500/ A5076 roundabout junction (ID21) are close to constrained. The A508/Rookery Ln/ Ashton Rd junction (ID9) experiences a notable increase in V/C of 9% in scenario G1, with the Northampton Gateway development with no highway mitigation in place, compared with scenario D1.

5 NORTHAMPTON GATEWAY MITIGATION SCENARIOS

5.1 OVERVIEW OF NORTHAMPTON GATEWAY MITIGATION SCENARIOS

5.1.1. This section of the report sets out the various mitigation scenarios that have been developed to test a number of different mitigation packages. Table 11 provides a breakdown of the different scenarios developed.

5.1.2. The development quantum used for all of the mitigation scenarios is the same as that tested for the development case forecast scenarios. The only difference between the development case with and without mitigation is the inclusion of various highway schemes in the modelled networks. Further details of the development quantum used in the Development Case scenarios can be found in Section 3.3.

5.1.3. For all peak periods, three Development Case with mitigation models have been prepared:

- Scenario H1 2021 Opening Year Development Case: as scenario E1, but with opening year highway mitigations included
- Scenario I1 2021 Circular Compliant Development Case: as scenario F1, but with a 100% of the Northampton Gateway development mitigations included
- Scenario J0, scenario J1a, scenario J1b and scenario J1c 2031 future assessment year development case, incremental mitigation: as scenario G1, but with an incremental selection of mitigation, gradually increasing towards scenario J1d
- Scenario J1d 2031 future assessment year development case: as scenario G1, but with a 100% of the Northampton Gateway development mitigations included.

5.1.4. Scenario H1, scenario I1 and scenario J1d are the final mitigation scenarios developed for this study. Scenario J0, scenario J1, scenario J1a, scenario J1b and scenario J1c represent incremental steps toward scenario J1d, which tests the full range of proposed mitigations in the future assessment year.

5.1.5. As such, the analysis of the model outputs generated from the mitigated scenarios will focus on the results from scenario H1, scenario I1 and scenario J1d, the development case with mitigation scenarios.

5.2 OPTIONS FOR APPRAISAL

5.2.1. A number of mitigation schemes have been proposed to mitigate the potential traffic impact of the Northampton Gateway development. Table 11 sets out the full range of mitigation schemes tested and identifies which is to be modelled in each mitigation scenario (scenario H1 through to scenario J1d).

Table 11 - List of all mitigation options appraised

Scheme	Description	Development case with mitigation scenario							
		H1	I1	J0	J1	J1a	J1b	J1c	J1d
M1 J15 improvement	New traffic signals and cut through for M1 northbound traffic heading northbound on the A45. Widening of some approaches.	✓	✓	✓	✓	✓	✓	✓	✓
A508 dualling	A508 dualled from M1 J15 to the Northampton Gateway development site access.	✓	✓	✓	✓	✓	✓	✓	✓
Site access HGV ban	Right turn ban for HGVs departing the Northampton Gateway development.	✓	✓	×	×	✓	✓	✓	✓
M1 J15a improvement	The approaches to the southern and northern arms of the junction widened to three lanes, signalisation of northbound entry, lane allocation changes.	×	✓	×	×	×	✓	✓	✓
A508/ Courteenhall Road junction improvement	Realignment of Courteenhall Road and junction changed to a left-in, left-out arrangement.	×	✓	×	×	×	×	✓	✓
Roade Bypass	New bypass to the west of Roade to provide an alternative route for through traffic using the A508.	×	✓	×	✓	✓	✓	✓	✓
A508/ Rookery Lane/ Ashton Road junction improvement	Upgraded staggered priority junction to include right turning lanes on the A508 into Rookery Lane and Ashton Road. This includes widening the A508 on the approach to the junction from the north and south to accommodate the additional traffic lanes.	×	✓	×	×	×	×	×	✓
A508/ Pury Road improvement	Widening of the A508 southbound on the approach to the A508/ Pury Road junction to allow for a right turning lane.	×	✓	×	×	×	×	×	✓

5.2.2. The mitigation schemes have been designed to address the potential impact of the Northampton Gateway development, in terms of congestion and delay, on a number of junctions and roads in the vicinity of the development. As such, the mitigation schemes consist of a variety of highway improvements, including upgraded road standards, junction improvements and new road infrastructure.

5.2.3. Details of the highway mitigation works listed above can be found in Chapter 4 of the Northampton Gateway SRFI Transport Assessment.

6 NORTHAMPTON GATEWAY DEVELOPMENT CASE WITH MITIGATION MODEL ASSESSMENTS

6.1 OVERVIEW

6.1.1. This section presents the results of modelling assessment of the development case with mitigation forecast scenarios. Table 12 provides an overview of the modelling assessment process used for the assessment. For further details regarding the specific schemes included in each scenario see Section 5.2.

Table 12 - Overview of the mitigation modelling assessment process

Mitigation scenario	Comparison scenario	Assessment year	Difference	Purpose
H1 opening year development case with highway mitigation	B1 opening year Reference case	2021	Includes partial build-out of the Northampton Gateway development to a 2021 forecast horizon plus some highway mitigation.	Partial mitigation, opening year: this shows the impact of some mitigation with partial build-out of the development in place, compared against Reference case.
I1 circular compliant development case with highway mitigation	C1 circular compliant Reference case	2021	Includes complete build-out of the Northampton Gateway development to a 2021 forecast horizon plus all highway mitigation.	Full mitigation, DfT 02/2013 Circular compliant: demonstrates the suitability of highway mitigation with all reassignment effects associated with the full build out of the development, compared against Reference case.
J1d future assessment year development case with highway mitigation	D1 future assessment year development case	2031	As above but includes all mitigation options.	Full mitigation, future year: demonstrates the suitability of highway mitigation with 2031 background growth and full build out of the development, compared against Reference case.

6.1.2. By comparing the development case with mitigation scenarios (with the Northampton Gateway development and mitigation) against the respective Reference case scenarios (without the Northampton Gateway development and mitigation), the impact of the proposed mitigation and the Northampton Gateway development, can be determined for the various forecast scenarios.

6.1.3. The results are presented in this report by way of the following outputs for the AM peak and PM peak periods for all Development Case with mitigation scenarios:

- Actual flow difference plots
- Reassignment plots
- Junction volume to capacity (V/C) differences.

6.1.4. High quality version of the all plots described in this section can be found in Appendix B.

6.1.5. To aid interpretation the Development Case with mitigation scenarios will be referred to as the “mitigated case” and the Development Case without mitigation scenarios will be referred to as the “unmitigated case”.

6.2 ACTUAL FLOW DIFFERENCE

6.2.1. The following section sets out the actual flow difference and reassignment plots generated from a comparison of the Development Case with mitigation scenarios against the respective Reference Case scenarios.

6.2.2. Further information regarding the generation and purpose of the actual flow plots can be found in Section 4.2. Specific details on the improvements included for each individual mitigation package can be found in Table 11.

SCENARIO H1: OPENING YEAR WITH MITIGATION

6.2.3. Scenario H1 includes the M1 J15 improvement, dualling of the A508 from the Northampton Gateway development site access to Junction 15 of the M1 and HGV right turn ban at the site access junction, with 2021 background growth and partial build out of the Northampton Gateway development in place.

6.2.4. Figure 19 and Figure 20 illustrate the actual flow differences and reassignment plots for the AM peak period.

Figure 19 - Actual flow difference scenario H1 to scenario B1 during the AM peak

6.2.5. There are some notable increases in traffic flow southbound on the A508 (up to 170 vehicles), on the A45 (up to 680 two-way trips), and on the northbound M1 on the approach to junction 15 (up to 210 vehicles), in scenario H1 (mitigated case) compared with scenario B1 (Reference Case), during the AM peak.

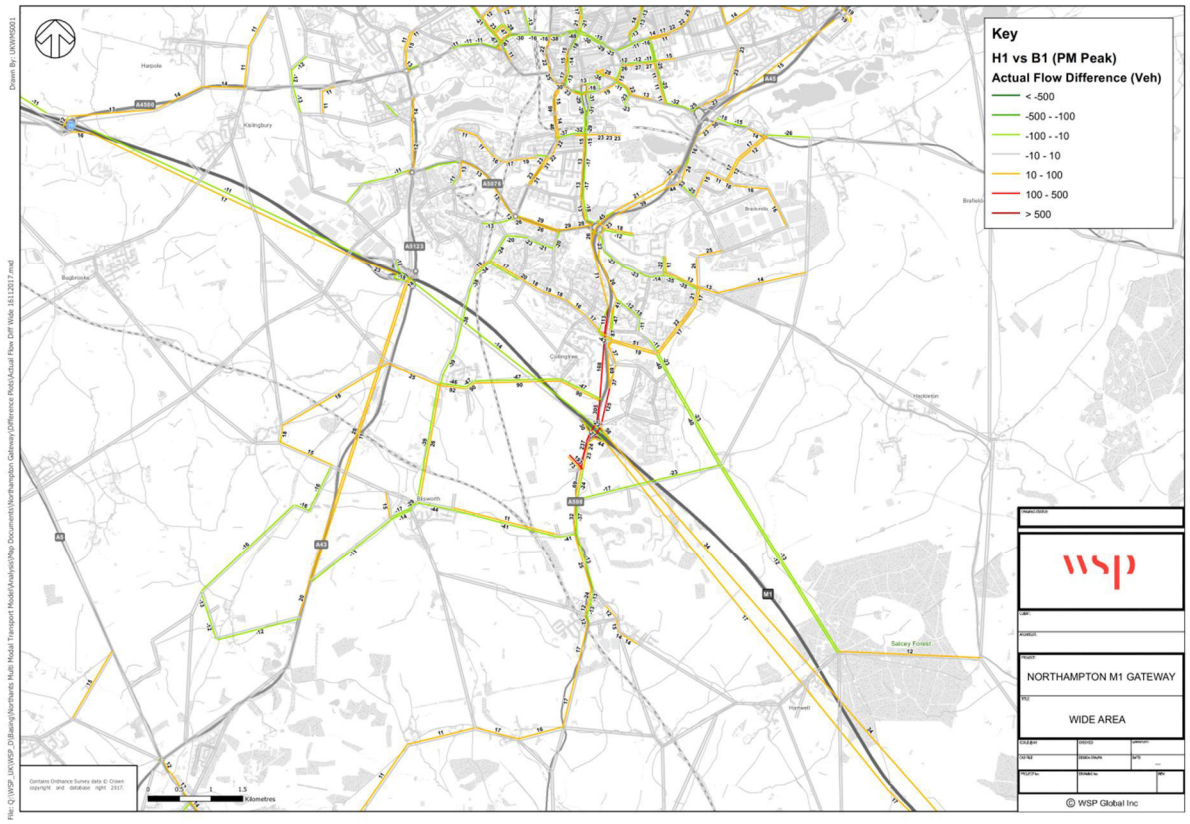
6.2.6. The actual flow increases observed in this comparison are greater than those observed between scenario E1 (unmitigated case) and Reference Case, on the above routes, as the additional capacity created by the mitigation schemes attracts not only development traffic, but also existing traffic from other routes.

Figure 20 - Traffic reassignment scenario H1 to scenario B1 during the AM peak

6.2.7. As can be seen from the above plot, the impact of the mitigation improvements in the AM peak leads to the reassignment of existing traffic to the southbound A508, the A45, north of the M1 Junction 15, and through the junction itself, to make use of the additional capacity created by the mitigation schemes in this area.

6.2.8. Figure 21 and Figure 22 show the actual flow difference and reassignment plots for the PM peak period.

Figure 21 - Actual flow difference scenario H1 to scenario B1 during the PM peak



6.2.9. In the PM peak there are notable increases in actual traffic flow on the A45, north of Junction 15 of the M1 (up to 430 two-way trips), and on the A508 northbound on the approach to Junction 15 of the M1 (up to 240 vehicles), compared with Reference Case. Actual flow increases on the M1 itself are less significant than those seen in the AM peak.

6.2.10. There is also an increase of up to 90 vehicles westbound on Collingtree Road/ Rectory Lane, through Milton Malsor, which is greater than the increases observed in the AM peak. This is likely due to additional traffic turning onto this road from the A45, as the mitigation improvements at Junction 15 of the M1 attract additional traffic, but is also offset by a reduction in eastbound traffic along the road of 47 vehicles.

Figure 22 - Traffic reassignment scenario H1 to scenario B1 during the PM peak

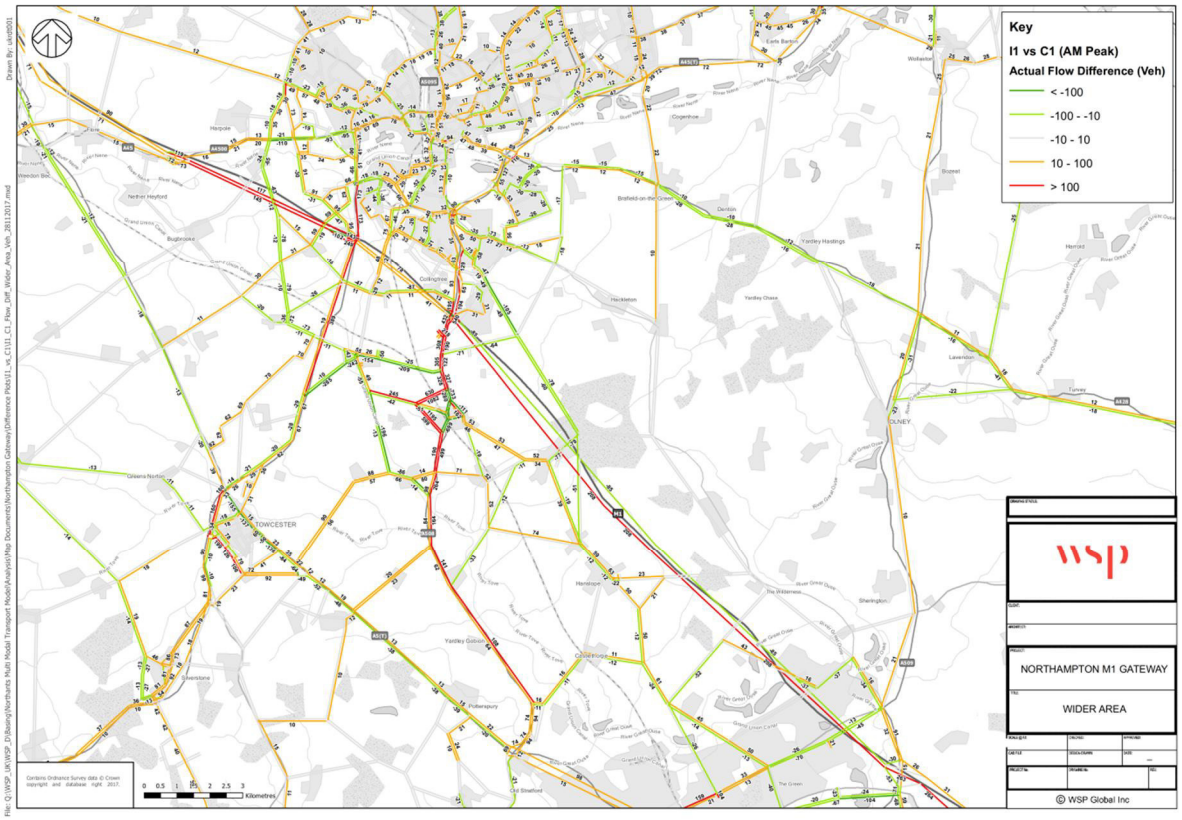
6.2.11. As with the AM peak, the inclusion of the mitigation scheme results in the reassignment of existing traffic to the A508, A45 and junction 15 of the M1, compared with Reference case, to make use of the additional capacity. However, the overall reassignment impact is less significant than observed in the AM peak in terms of the relative flow increases.

SCENARIO I1: CIRCULAR COMPLIANT WITH MITIGATION

6.2.12. Scenario I1 includes all potential mitigation schemes modelled for this study, with 2021 background growth and full build out of the Northampton Gateway development.

6.2.13. Figure 23 and Figure 24 show the actual flow difference and traffic reassignment between scenario I1 and C1, for the AM peak, respectively.

Figure 23 - Actual flow difference scenario I1 to scenario C1 during the AM peak

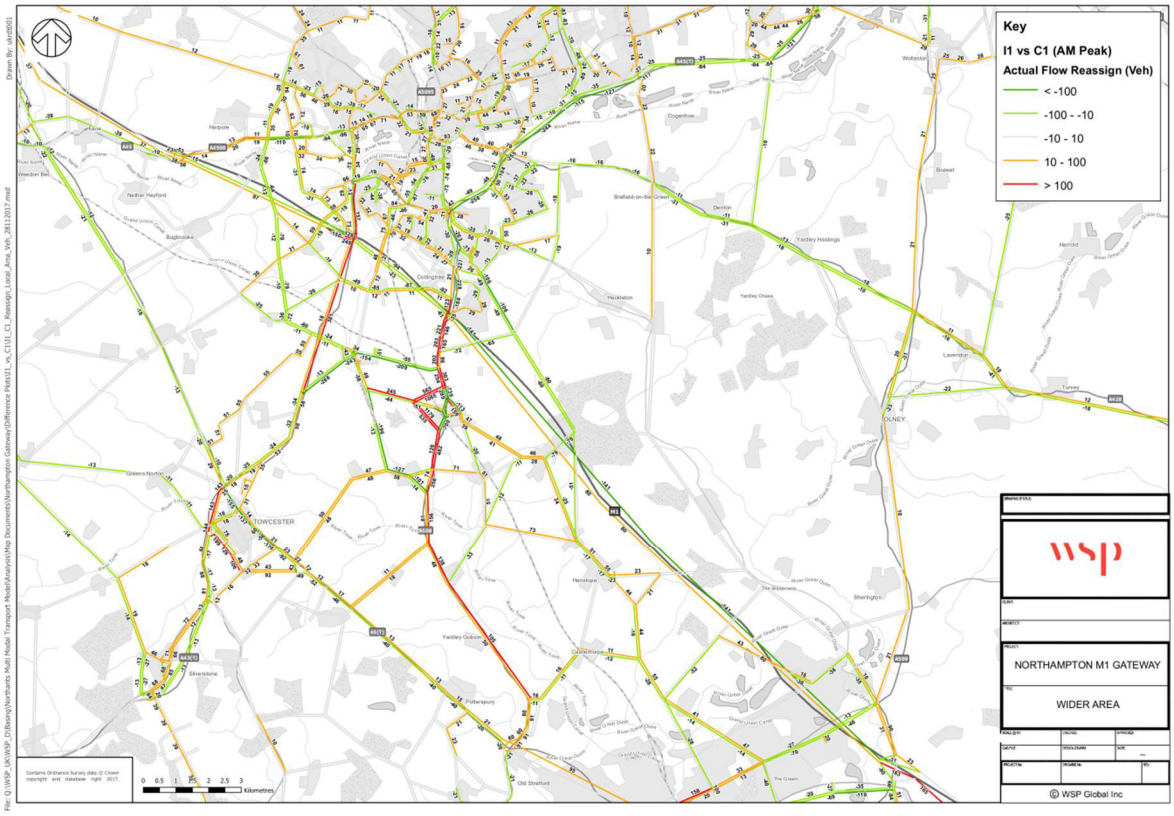


6.2.14. With all of the mitigation schemes in place along the A508 corridor, and at junction 15 and 15a of the M1, there are widespread increases in actual traffic flow in scenario I1 (mitigated case) compared with scenario C1 (Reference case). This includes the A508 in both directions (up to 700 vehicles), the A5123/ A43 southbound (up to 390 vehicles), the M1 northbound approach to Junction 15 (up to 210 vehicles), the M1 in both directions west of Junction 15a (up to 260 vehicles), and southbound on the A43 (up to 390 vehicles).

6.2.15. Traffic flows through the village of Roade are reduced by as much as 700 vehicles in each direction with the Roade Bypass in place, with the bypass itself attracting up to 1,800 two-way trips.

6.2.16. The actual traffic flow increases between mitigated case and Reference case, are generally higher on the majority of routes than between the equivalent scenario F1 (unmitigated case) and Reference case.

Figure 24 - Traffic reassignment scenario I1 to scenario C1 during the AM peak



6.2.17. The additional capacity and/or reduced delay provided by the mitigation schemes results in the reassignment of existing traffic particularly to the A508 corridor and A43 corridor, south of Junctions 15 and 15a, respectively.

6.2.18. However, the plots indicate that existing traffic on the M1 only increases by around 80 vehicles northbound, and is reduced by up to 140 vehicles southbound with the mitigation in place. This indicates that the actual flow increases observed on the M1 arise primarily from additional development traffic using the route.

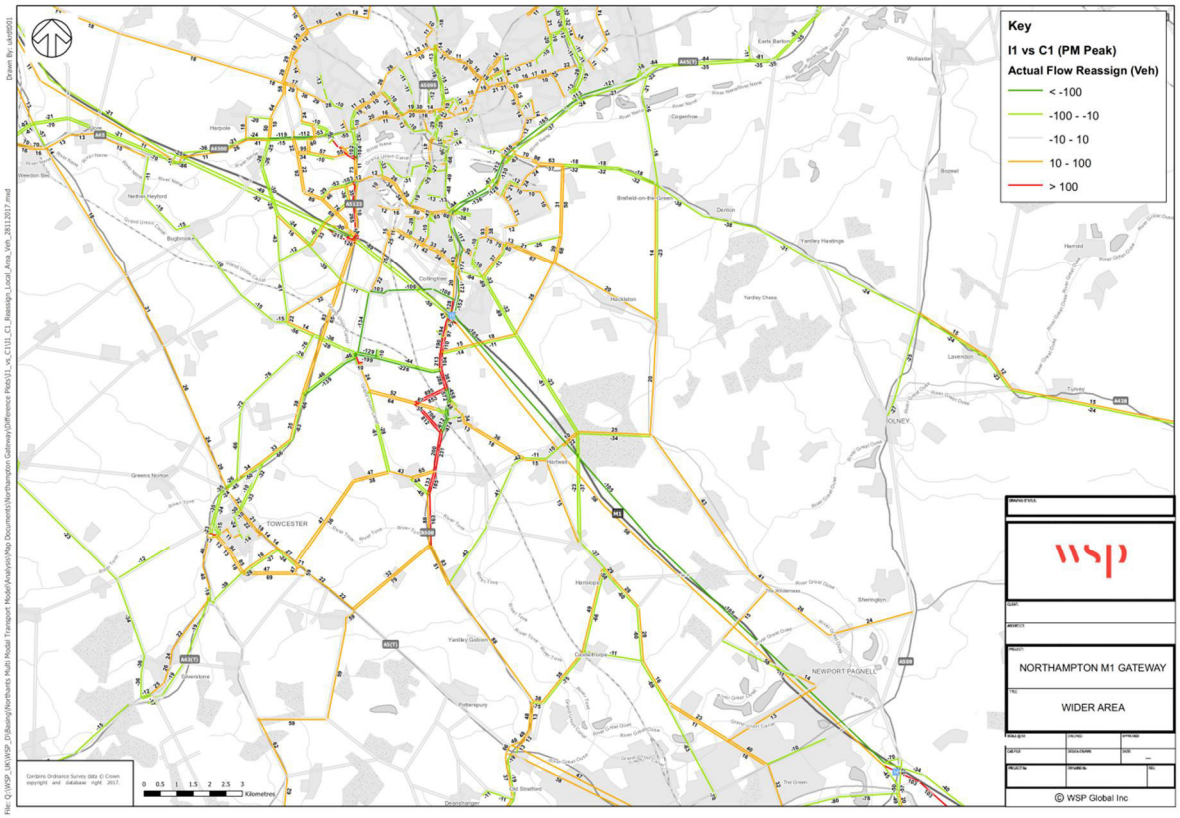
6.2.19. Figure 25 and Figure 26 show the actual flow difference and traffic reassignment between scenario I1 and C1, for the PM peak, respectively.

Figure 25 - Actual flow difference scenario I1 to scenario C1 during the PM peak

6.2.20. Actual flow increases in the PM peak occur on the same routes as in the AM peak, when comparing the mitigated case against the Reference case. Although, the direction that the greatest flow increases are observed is reversed in some cases, due to the time of day.

6.2.21. The corridors experiencing flow increases include the A508 (up to 790 two-way trips), A45 northbound (up to 521 vehicles), M1 northbound (up to 260 vehicles), A45 (up to 150 two-way trips), and A5123 northbound (up to 300 vehicles) and, with the exception of the M1 southbound, these increases are relatively greater than that observed in the unmitigated case compared with Reference case, for the same time period.

Figure 26 - Traffic reassignment scenario I1 to scenario C1 during the PM peak



6.2.22. The pattern of existing traffic reassignment in the PM peak is similar to the AM peak, when comparing the mitigated case against the Reference case. The route which is most affected by reassignment in terms of flow increases in this time period, is the A508, particularly in the vicinity of the development and Roade Bypass, where the mitigation capacity improvements has the effect of attracting additional traffic from alternate routes.

6.2.23. The increase in existing traffic flow on the A43 from reference to mitigated case is relatively low compared with the AM peak, although some traffic reassignment is occurring at this location as a result of the M1 Junction 15a improvements.

J0 - J1C FUTURE ASSESSMENT YEAR WITH INCREMENTAL MITIGATION

6.2.24. The following commentary is based on the actual flow difference plots generated for each of the incremental mitigation scenarios. For reference, these plots can be found in Appendix C. In all cases, the plots compare the mitigated case against scenario D1 (Reference Case).

6.2.25. Each of the incremental Development Case with mitigation scenarios includes 2031 background growth, and an increasing proportion of the mitigation schemes included for this study, moving toward the fully mitigated situation presented in scenario J1d.

6.2.26. Further information on the mitigation schemes included for each incremental scenario can be found in Table 11.

SCENARIO J0

6.2.27. Scenario J0 includes the M1 Junction 15 improvements and dualling of the A508. With these mitigation schemes in place, there are significant flow increases on A508, A45 and M1 in both peaks, compared with Reference Case.

6.2.28. The largest increases observed in the AM peak occur on the M1 northbound and southbound approaches to Junction 15, and in both directions south of Junction 15 on the A508. In the PM peak the largest increases are observed on the A45, into Northampton, north of Junction 15 of the M1, and on the M1 itself, to the south east of Junction 15.

SCENARIO J1

6.2.29. Scenario J1 includes scenario J0 mitigation plus the Roade Bypass. With the bypass in place the pattern of actual traffic flow changes, compared with Reference case, is similar to scenario J0. With the expected reduction in vehicle trips through the village of Roade, as the bypass provides a quicker alternative route.

6.2.30. However, the inclusion of the bypass also leads to a greater amount of existing traffic reassignment from alternative routes (such as other local routes), to the A508 south of the Northampton Gateway development. Therefore, the overall scale of flow increases in this area is greater than that observed in scenario J0, across both time periods.

SCENARIO J1A

6.2.31. Scenario J1a includes scenario J1 mitigation plus the development site access HGV ban. With the HGV ban in place in both time periods, the pattern of actual flow increases, compared with Reference Case, is consistent with scenario J1. This is to be expected as the proportion of HGV traffic to other user classes is relatively low and is therefore unlikely to have a large impact on the total actual flow changes.

SCENARIO J1B

6.2.32. Scenario J1b includes scenario J1a mitigation plus M1 Junction 15a improvements. With the Junction 15a improvements in place the pattern traffic flow increases 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 Junction 15a, compared with Reference Case, as improvements to the junction increase capacity, and in turn attract additional trips from the surrounding area.

6.2.33. In the AM peak, traffic flows to the north west of Junction 15a on the M1 increase in both directions compared with Reference case, and this increase is greater than that observed in the other incremental scenarios. There is also a relatively large increase in traffic flow on the northbound approach to the junction from the A43 and southbound approach to the junction from the A5123, compared with the other incremental scenarios.

6.2.34. In the PM peak, changes in traffic flow around the junction occur to a lesser extent. Although, traffic flows increases are observed southbound on the A43 and northbound on the A5123, compared with Reference Case, and this does not occur in the other incremental scenarios without the junction improvements.

SCENARIO J1C

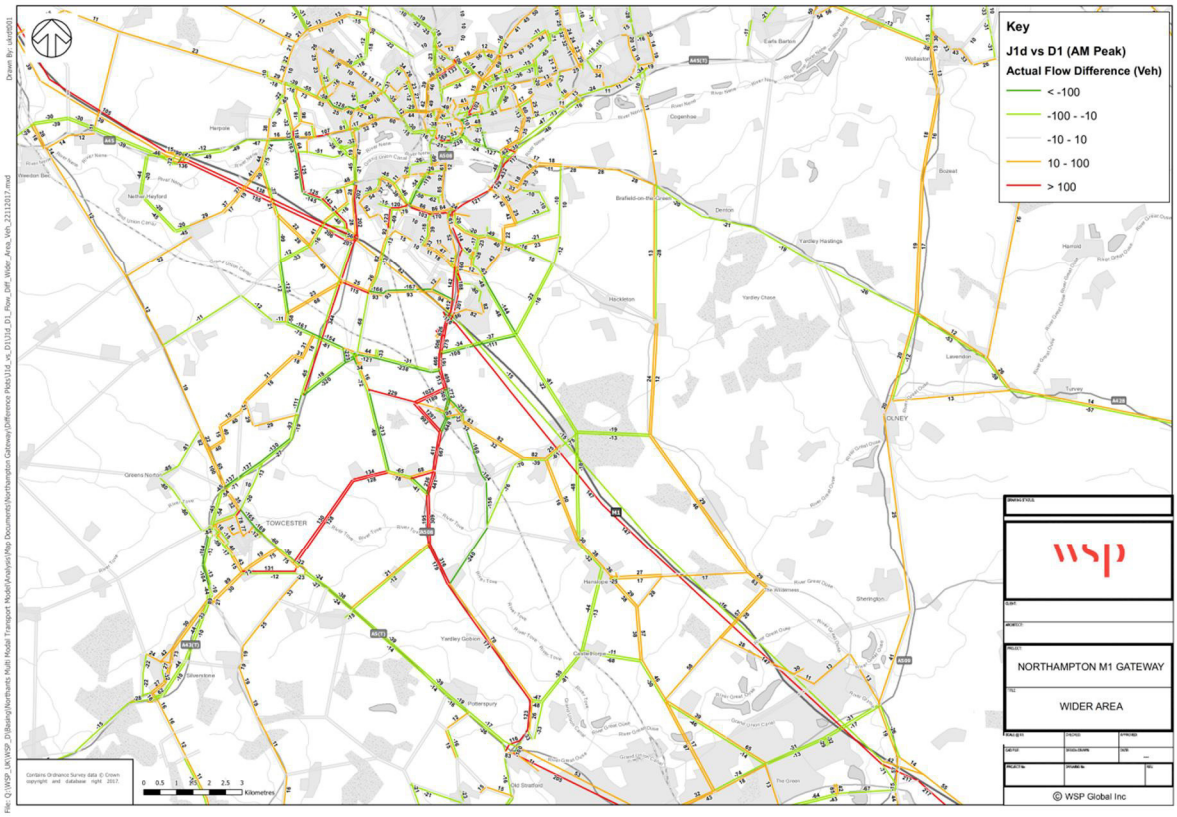
6.2.35. Scenario J1c includes scenario J1b mitigation plus A508/ Courteenhall Road Junction improvement. With the changes in place at the junction, traffic flows on Courteenhall Road are in most cases reduced compared with Reference Case, across both time periods. However, there is a small increase in traffic flow eastbound on the link during the AM peak.

SCENARIO J1D FUTURE ASSESSMENT YEAR WITH MITIGATION

6.2.36. Scenario J1d includes all potential mitigation schemes modelled for this study, with 2031 background growth and full build out of the Northampton Gateway development.

6.2.37. Figure 27 and Figure 28 show the actual flow difference and traffic reassignment between scenario J1d and scenario D1, for the AM peak, respectively.

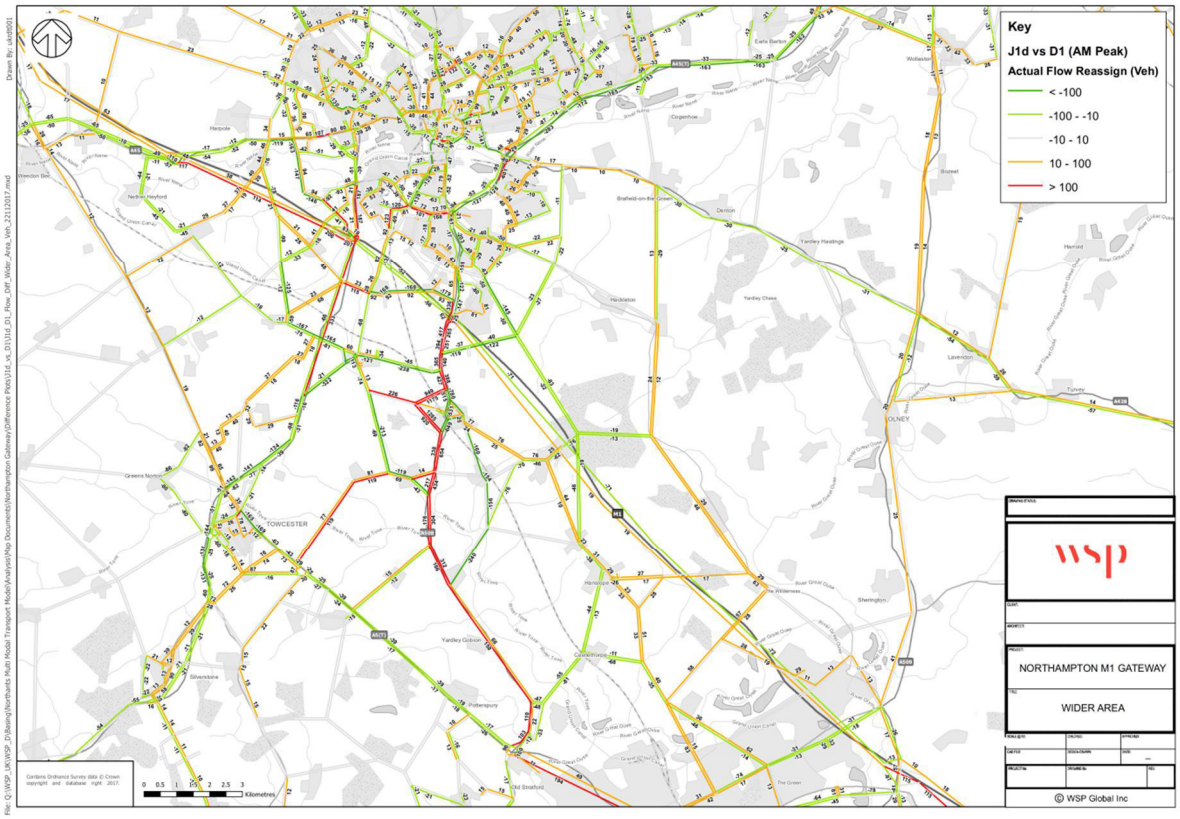
Figure 27 - Actual flow difference scenario J1d to scenario D1 during the AM peak



6.2.38. There are widespread flow increases in scenario J1d (mitigated case) compared with scenario D1 (Reference case) during the AM peak with all mitigation schemes in place. This includes the A508 (up to 1,000 two way trips), A45 (up to 600 two way trips), A5123 southbound (up to 200 vehicles), and A43 southbound (up to 350 trips). The M1 also experiences flow increases compared with Reference Case, on the northbound approach to Junction 15 (up to 150 vehicles), and in both directions to the west of Junction 15a (up to 290 two-way trips).

6.2.39. The flow increases experienced in the mitigated scenario, compared with Reference Case are in most cases greater than those observed in the unmitigated scenario, compared with Reference Case for this time period.

Figure 28 - Traffic reassignment scenario J1d to scenario D1 during the AM peak

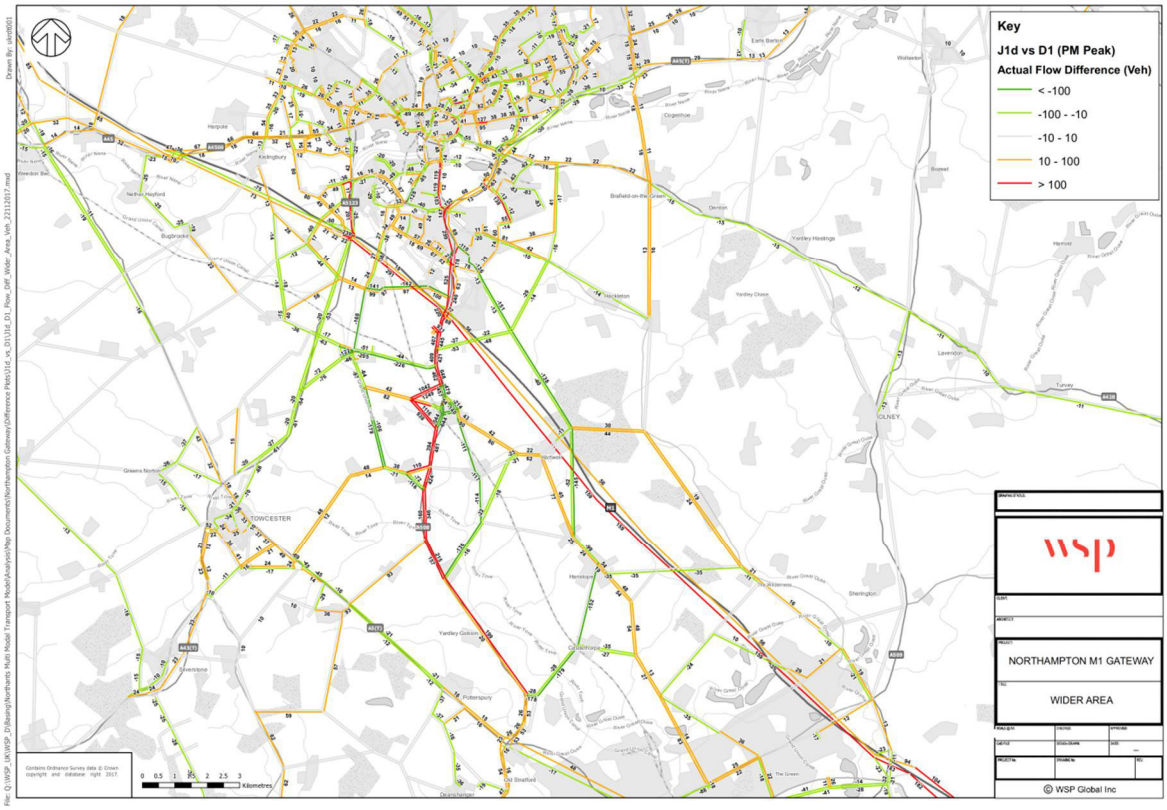


6.2.40. The observed increases in traffic flow which occur in the vicinity of Junction 15a, Junction 15 and the A508 south of the development, compared with the unmitigated scenario, occur due to the reassignment of existing traffic to the A508 corridor and through the M1 junctions. The mitigation schemes effectively increase the capacity of the road network in these areas which attracts additional traffic to the routes from the surrounding local area, where traffic flows reduce.

6.2.41. The pattern of reassignment is similar to scenario I1, which includes the same mitigation schemes but lower background growth.

6.2.42. Figure 29 and Figure 30 show the actual flow difference and traffic reassignment between scenario J1d and scenario D1, for the PM peak, respectively.

Figure 29 - Actual flow difference scenario J1d to scenario D1 during the PM peak



6.2.43. In the PM peak, the A508 and A45 corridors either side of Junction 15 of the M1 experience increases in traffic flow compared against Reference Case, of up to 1,300 two way trips and 770 two way trips, respectively. In addition, there are flow increases of up to 160 vehicles on the northbound approach to Junction 15 of the M1.

6.2.44. However, the traffic flow increases around Junction 15a, observed in the AM peak, are less significant, with an increase of up to 300 vehicles on the approach to the junction from the M1 northbound, and the exit from the junction on the A5123. The other arms do not experience any significant flow increases.

6.2.45. In general, as with the AM peak, flow increases from Reference Case to mitigated case, are greater than those observed from Reference Case to the unmitigated case.

Figure 30 - Traffic reassignment scenario J1d to scenario D1 during the PM peak

6.2.46. The reassignment of existing traffic in the PM peak is mostly focused on the A508 corridor, where the majority of mitigation schemes are situated, including the Roade Bypass. Traffic reassignment on the A43 and A5123, either side of Junction 15a, is less significant compared with the situation in the AM peak.

6.2.47. As with the AM peak, traffic reassignment to the A508 corridor occurs because the mitigation schemes provide additional capacity and this has the effect of drawing traffic from the surrounding local area, where traffic flows reduce.

6.3 JUNCTION VOLUME TO CAPACITY (V/C)

6.3.1. The following section sets out the results of a comparison of Volume to Capacity (V/C) between each development case with mitigation scenario (excluding the incremental scenarios) and respective Reference Case scenario, for the key junctions in the area around the Northampton Gateway developments.

6.3.2. Additional model plots showing the V/C changes described in this section can be found in Appendix B. Further information regarding the generation and purpose of the V/C outputs can be found in Section 4.3.

6.3.3. Table 13 and Table 14 present the V/C junction performance results for the AM peak and PM peak respectively.

Table 13 - Junction V/C performance – AM peak (with highway mitigation)

ID	Junction	V/C (%)						% change where V/C > 0.75		
		B1	C1	D1	H1	I1	J1d	H1-B1	I1-C1	J1d-D1
1	M1 Junction 15	112	102	105	96	89	95	-16%	-13%	-11%
2	M1 Junction 15a	109	112	115	108	103	103	-1%	-9%	-12%
4	A45/ Watering Ln	69	71	80	79	82	96	11%	11%	16%
5	A508/ Courteenhall Rd	93		99	94		102	1%		3%
6	Roade Bypass northern roundabout (mitigation)						88			
7	Roade Bypass/ Blisworth roundabout (mitigation)						78			
8	Roade Bypass southern roundabout (mitigation)						97			
9	A508/Rookery Ln/ Ashton Rd	53		91	52		95	n/a		4%
10	A508/ Pury Rd	100		101	101		108	1%		7%
11	Stoke Rd/ Knock Ln	28		33	30		33	n/a		n/a
12	A45 Wootton Interchange	70	102	100	79	101	100	9%	-1%	0%
13	A45 Queen Eleanor Interchange	100	100	101	96	102	101	-4%	2%	0%
14	A45 Brackmills Interchange	100	100	108	101	100	109	1%	0%	1%
15	A45 Barnes Meadow Interchange	112	111	112	112	112	112	0%	1%	0%
16	A45 Lumbertubs Interchange	111	108	115	111	109	116	0%	1%	0%
17	A45 Great Billing Interchange	109	108	111	109	108	110	0%	0%	-1%
18	A5076/ Towcester Rd roundabout	93		104	95		105	2%		1%
19	A5076/ Hunsbury Hill roundabout	102		104	101		104	-1%		0%
20	A5123/ A5076 roundabout	78		75	75		76	-3%		1%
21	A4500/ A5076 roundabout	79		90	79		90	0%		0%
22	A508/ A5123 gyratory	101		102	101		101	0%		0%
23	A4500/A5123/A508	74		95	77		93	3%		-2%
24	A508/ Northampton Rd	81		81	81		33	0%		-49%
25	A508/ Hyde Rd	94		91	93		29	-1%		-62%
26	A508/ High St mini-roundabout	100		100	100		24	0%		-76%
27	Courteenhall Rd/ High St/Northampton Rd	83		101	76		99	-7%		-3%

6.3.4. Junctions ID 1, ID 2, ID 5, ID 10, ID 12, ID 13, ID 14, ID 15, ID 16, ID 17, ID 18, ID 19, ID 22 and ID 27 exceed or are approaching capacity in the majority of forecast scenarios, with and without the mitigation and development in place. Notable junctions include the A508/ Pury Road, which experiences an increase in V/C of 7% in scenario J1d, despite mitigation in place to increase capacity, and the A45 Wootton Interchange, which experience an increase in V/C of 9% in scenario H1.

6.3.5. However, despite the M1 Junction 15 and Junction 15a exceeding or approaching capacity in all mitigated scenarios, there is still a notable decrease in V/C compared with Reference case, and the flow difference plots demonstrate that this is achieved whilst accommodating additional traffic. In addition, the Courteenhall Road/ High Street/ Northampton Road junction experiences a decrease in V/C greater than 5% in scenario H1.

6.3.6. Junctions ID 4, ID 9, ID 20, ID 21 and ID 23 are either constrained or approaching capacity in the majority of forecast scenarios, with and without mitigation and the development in place. The A45/ Watering Lane Junction, which is unconstrained in scenarios B1 and C1, experiences an increase in V/C of up to 16% in the mitigated scenarios.

6.3.7. Junctions ID 24, ID 25 and ID 26, which all have a V/C greater than 75% in the Reference case scenarios and scenario H1, see a notable reduction in V/C with the inclusion of the Roade Bypass in scenarios I1 and J1d. This occurs as traffic is displaced onto the new bypass link.

Table 14 - Junction V/C performance – PM peak (with highway mitigation)

ID	Junction	V/C (%)						% change where V/C > 0.75		
		B1	C1	D1	H1	I1	J1d	H1-B1	I1-C1	J1d-D1
1	M1 Junction 15	100	103	103	80	77	84	-20%	-26%	-19%
2	M1 Junction 15a	112	112	113	113	109	111	1%	-3%	-2%
4	A45/ Watering Ln	79	73	82	70	73	82	-9%	n/a	1%
5	A508/ Courteenhall Rd	104		95	106		96	2%		1%
6	Roade Bypass northern roundabout (mitigation)						95			
7	Roade Bypass/ Blisworth roundabout (mitigation)						79			
8	Roade Bypass southern roundabout (mitigation)						94			
9	A508/Rookery Ln/ Ashton Rd	38		74	38		101	n/a		27%
10	A508/ Pury Rd	65		95	66		101	n/a		6%
11	Stoke Rd/ Knock Ln	22		46	22		31	n/a		n/a
12	A45 Wootton Interchange	83	86	88	86	86	101	3%	1%	12%
13	A45 Queen Eleanor Interchange	113	110	113	113	111	114	0%	1%	1%
14	A45 Brackmills Interchange	112	111	115	112	111	114	0%	0%	-1%
15	A45 Barnes Meadow Interchange	124	112	112	124	112	112	0%	0%	0%
16	A45 Lumbertubs Interchange	95	100	103	95	101	104	0%	0%	0%
17	A45 Great Billing Interchange	95	105	111	95	105	111	0%	0%	0%
18	A5076/ Towcester Rd roundabout	107		103	108		106	1%		3%
19	A5076/ Hunsbury Hill roundabout	103		105	103		106	0%		1%
20	A5123/ A5076 roundabout	83		79	84		79	0%		1%
21	A4500/ A5076 roundabout	69		76	69		77	n/a		0%
22	A508/ A5123 gyratory	97		102	99		102	1%		0%
23	A4500/A5123/A508	78		81	78		79	0%		-2%
24	A508/ Northampton Rd	90		101	93		46	3%		-55%
25	A508/ Hyde Rd	84		87	86		36	2%		-51%
26	A508/ High St mini-roundabout	87		101	89		33	2%		-67%
27	Courteenhall Rd/ High St/Northampton Rd	102		98	103		103	1%		5%

6.3.8. Junctions ID 1, ID 2, ID 5, ID 12, ID 13, ID 14, ID 15, ID 16, ID 17, ID 18, ID 19, ID 22 and ID 27 all exceed or are approaching capacity in the majority of forecast scenarios with and without mitigation and the Northampton Gateway development in place. The A45 Wootton Interchange and Courteenhall Road/ High Street/ Northampton Road junctions experience an increase in V/C greater than 5% in scenario J1d, with the development and mitigation in place. As with the AM peak, the improvement to Junctions 15 of the M1 does result in a notable reduction in V/C in scenario I1 and scenario J1d, and in this case it also results in the junction no longer exceeding capacity.

6.3.9. Junctions ID 3, ID 4, ID 9, ID 10, ID 11, ID 20, ID 21 and ID 23 either have spare capacity or are constrained in the majority of forecast scenarios with and without development and mitigation. The A45/ Watering Lane Junction experiences a reduction in V/C of 9% in scenario H1 compared with Reference Case, resulting in the junction having spare capacity. A508/Rookery Ln/ Ashton Rd and A508/ Pury Rd Road junctions experience an increase in V/C greater than 5% in scenario J1d, with the development and mitigation in place.

6.3.10. Junctions ID 24, ID 25 and ID 26 are approaching or exceeding capacity in all three Reference case scenarios and scenario H1. However, with the Roade Bypass in place a lot of the traffic reassigns to the new route, and as a result in scenario J1d the junctions now have spare capacity in the PM peak, with a significant reduction in V/C compared with Reference Case.

7 SUMMARY

7.1 SUMMARY OF MODELLING PROCESS

7.1.1. WSP has been commissioned by ADC Infrastructure Ltd, on behalf of Roxhill (Junction 15) Ltd, to undertake transport modelling work in relation to the Northampton Gateway Strategic Rail Freight Interchange (SRFI) development, using the existing Northamptonshire Strategic Traffic Model (NSTM2).

7.1.2. The forecast scenarios developed using NSTM2 are based on a 2015 validated base year model. Further information regarding this model can be found in the associated Local Model Validation Report (LMVR), dated April 2017.

7.1.3. A number of different forecast scenarios have been developed for both a 2021 (development opening year) and 2031 (local plan timescale) forecast horizon. These scenarios include varying amounts of committed and allocated development, and associated highway improvements (including mitigated scenarios), as well as various build outs of the Northampton Gateway development.

MODELLED SCENARIOS

7.1.4. The models have been constructed to represent the most likely development levels in the respective forecast year, and incorporate all of the planned infrastructure improvements that are likely to occur. For all peak periods (AM peak, Inter-peak and PM peak), the following forecast models have been prepared:

- Scenario B1 2021 Opening Year Reference Case: all committed and allocated development and infrastructure in place by 2021
- Scenario C1 2021 Circular Compliant Reference Case: all committed development and infrastructure compliant in the DfT 02/2013 Circular
- Scenario D1 2031 Future Assessment Year Reference Case: all committed and allocated development and infrastructure in place by 2031.
- Scenario E1 2021 Opening Year Development Case: as scenario B1, but with a proportion of the Northampton Gateway development included.
- Scenario F1 2021 Circular Compliant Development Case: as scenario C1, but with a 100% of the Northampton Gateway development included.
- Scenario G1 2031 Future Assessment Year Development Case: as scenario D1, but with a 100% of the Northampton Gateway development included.

7.1.5. In addition, a number of development case with mitigation scenarios have been developed for all peak periods. These use the same development quantum from the respective development case scenarios and only differ in terms of the modelled network. The scenarios included are set out below:

- Scenario H1 2021 Opening Year Development Case: as scenario E1, but with opening year highway mitigations included.
- Scenario I1 2021 Circular Compliant Development Case: as scenario F1, but with a 100% of the Northampton Gateway development mitigations included.
- Scenario J0, scenario J1a, scenario J1b and scenario J1c 2031 future assessment year Development Case, incremental mitigation: as scenario G1, but with an incremental selection of mitigation, starting with that included for H1 and gradually increasing, as set out in Table 11.
- Scenario J1d 2031 future assessment year Development Case, full mitigation: as scenario G1, but with all mitigation included as set out in Table 11.

7.2 NORTHAMPTON GATEWAY DEVELOPMENT CASE RESULTS WITH NO HIGHWAY MITIGATION

TRAFFIC FLOWS

Actual flows have been extracted from each development case and Reference Case model, and compared to ascertain the flow differences between the ‘with’ and ‘without’ development scenarios.

7.2.1. The results of the modelling exercise shows an increase in traffic flow with the Northampton Gateway development in place with no highway mitigation compared against the respective Reference Case scenario. The increases in traffic flow get progressively greater as you move from scenario E1 through scenario G1, which takes the Northampton Gateway development from partial build-out to full build-out, and 2031 background growth.

7.2.2. Traffic flow increases associated with the new development are greatest in the vicinity of the site access, particularly on the A45, A508 and at junction 15 of the M1, which are the three main routes used by the additional development traffic accessing the Northampton Gateway development.

7.2.3. The model outputs also show the reassignment of existing, non-development traffic, away from the A45, junction 15 of the M1 and the A508, as a result of the traffic flow increases on these routes arising from the Northampton Gateway development. Traffic is instead diverting to alternative routes such as Wootton Road and Courteenhall Road, and other local routes in the surrounding area, to avoid the additional delay and congestion.

JUNCTION CAPACITIES

7.2.4. Volume to capacity (V/C) performance data has been reviewed for 27 junctions in the vicinity of the development, for each development case and Reference Case scenario. The results of which have been compared to aid an understanding of the impact of the Northampton Gateway development without highway mitigation in terms of junction performance.

7.2.5. The results indicate that more than half of the junctions examined are already approaching or exceeding capacity in the Reference case scenarios, without the development in place, and in most cases the V/C does not change by greater than 5% from Reference Case to Development Case i.e. the situation does not get significantly worse or better with the development in place.

7.2.6. However, there are some exceptions where V/C does increases by greater than 5% in the development case scenario, compared with the respective Reference Case, although in the majority of cases the junction was already constrained or approaching capacity in the Reference Case. These are listed below:

- M1 Junction 15 during the AM peak in scenarios F1 and G1
- A508/ Rookery Lane/ Ashton Road junction during the AM and PM peak in scenario G1
- A508/ Northampton Road junction during the AM peak in scenarios E1 and G1
- Courteenhall Road/ High Street/ Northampton Road junction in the AM peak in scenario E1
- A45/ Watering Lane junction in the PM peak in scenario F1.

7.3 NORTHAMPTON GATEWAY DEVELOPMENT CASE WITH MITIGATION RESULTS

TRAFFIC FLOWS

7.3.1. Actual flows have been extracted from each development case with mitigation model and compared against Reference Case flows to determine the differences with both mitigation and the Northampton Gateway development in place.

7.3.2. The results of the modelling work show a greater increase in traffic flows from Reference Case to mitigated case, compared against the same comparison with the unmitigated case. The areas most impacted by these traffic flow increases include the A508, M1, A43, A5123 and A45, particularly in scenario J1d, which also includes 2031 background growth.

7.3.3. The reassignment plots show that the cause of the traffic flow increases, compared with Reference Case, can be attributed to the reassignment of traffic from the surrounding network to the A508/ A45 corridor and A43/ A5123 corridor, as the mitigation in these areas has created additional capacity on the network. There are corresponding reductions in the traffic flows on the local roads.

JUNCTION CAPACITIES

7.3.4. Volume to capacity (V/C) data has been reviewed for the same 27 junctions, as with the unmitigated scenarios, and compared against the results from the Reference Case models.

7.3.5. As with the unmitigated scenario, over half of the junctions examined are still approaching or exceeding capacity with or without the development in place by 2031, and in most cases the V/C does not change by greater than 5% from Reference Case to Development Case with mitigation i.e. the situation does not get significantly worse or better with the development and mitigation in place.

7.3.6. The mitigation does reduce V/C for some junctions in both peak periods, including M1 Junction 15 and 15a, as well as the junctions through the village of Roade, with the bypass in place in scenario I1 and scenario J1d.

7.4 CONCLUSION

7.4.1. NSTM2 was updated to a 2015 base year, and as a result the model was subject to an extensive revalidation exercise. In addition, WSP has also undertaken further local validation work as part of the Northampton Gateway project, to improve validation around the development.

7.4.2. The model has the ability to quantify the potential benefits/ disbenefits of policy change or changes to transport infrastructure in Northamptonshire, enabling the testing and quantification of transport impacts arising from future transport proposals and housing/ employment developments (including developer led), in an efficient and consistent manner. As a result the model is considered fit for the purpose of examining the transport impacts associated with the Northampton Gateway development.

7.4.3. A comparison of the flow differences between Development Case (with development) and Reference Case (without development), has shown that with no highway mitigation in place, notable increases in traffic flow on the A508, A45 and M1 in the vicinity of the development, and associated reassignment of existing traffic to other local routes.

7.4.4. A review of junction performance has shown that over half of the junctions examined are considered to be approaching or exceeding capacity in the Reference Case scenarios, without the Northampton Gateway development in place, indicating that a number of junctions will show high congestion in future years, regardless of whether the development is brought forward. However, several junctions have also been identified as being negatively impacted by additional development traffic, in the Development Case no highway mitigation scenarios and this includes the M1 Junction 15.

7.4.5. With the highway mitigation in place, the actual flow increases on these corridors is greater than in the unmitigated case. This occurs because traffic reassigns to these routes from the wider network, as the mitigation creates additional capacity. There are corresponding reductions in traffic on the surrounding local roads.

7.4.6. In the mitigated scenarios, with the Northampton Gateway development in place, junction performance remains similar to the unmitigated situation. Some junctions like the M1 Junction 15 and M1 Junction 15a experience a reduction in V/C with mitigation in place, whilst still accommodating additional traffic demand at these locations due to reassignment.

7.4.7. In summary, it can be said that the inclusion of the Northampton Gateway development without highway mitigation results in a notable increase in traffic flow on the surrounding strategic and local road network, and also results in the reassignment of existing traffic to other routes without mitigation in place.

7.4.8. With mitigation in place, the reassignment effect is considerably less noticeable on the local network, and indeed for a number of locations the additional capacity provided by the mitigation draws in additional traffic from the surrounding network, until the junctions are again at capacity, but with a higher volume of traffic passing through during the peak periods.

Appendix A

NORTHAMPTON GATEWAY

DEVELOPMENT CASE MODEL OUTPUTS

Appendix B

NORTHAMPTON GATEWAY

DEVELOPMENT CASE WITH MITIGATION MODEL OUTPUTS

Appendix C

NORTHAMPTON GATEWAY

DEVELOPMENT CASE WITH MITIGATION INCREMENTAL MODEL OUTPUTS

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