Manchester North-West Quadrant Study

Date: 5th February 2016

Document Control

Document Title:	Manchester North-West Quadrant – Initial Report
Document Reference:	HE553231-HE-GEN-MNWQ-RP-PM-0007
Author	Stuart Robinson et al
Owner	Mark Corbin
Distribution	
Document Status	Draft

Record of Issue

Version	Status	Author	Date	Checked	Date	Authorised	Date
0.1	Draft	SJR / AW / JA / BJ / AG / GW	30/10/15				
0.5	Draft	SJR / AW / JA / BJ / AG / GW	30/11/15				
0.9	Draft	SJR / RC / JA / BJ / AG / GW	11/12/15				
1.1	Draft	SJR / RC / JA / BJ / AG / GW	04/01/16	SJR / RC / GP	04/01/16		
1.2	Draft	SJR / RC / JA / BJ / AG / GW / GP	08/01/16	SJR / GP	08/01/16		
1.3	Draft	SJR / RC / JA / BJ / AG / GW / GP	15/01/16	SJR / GP	15/01/16		
1.4	Draft	SJR / RC / JA / BJ / AG / GW / GP	22/01/16	SJR / GP	22/01/16		
1.5	Final	SJR / RC / JA / BJ / AG / GW / GP	05/02/16	SJR / GP	05/02/2016	DO	05/02/16

1 Executive Summary

1.1 Introduction

As part of its Road Investment Strategy: Investment Plan, December 2014 the Department for Transport (DfT) announced it was commissioning a series of six new strategic studies to address the biggest challenges facing the road network.

One of the studies announced was the Manchester North-West Quadrant strategic study which will explore options for improving the transport network around Manchester's North-West Quadrant between junctions 8 and 18 of the M60, part of the Strategic Road Network (SRN).

The strategic aim of this study is to identify and provide an initial appraisal of the improvements to the transport network across all modes that can underpin the vision for transforming and rebalancing the national economy and establishing the north as a global powerhouse, a core part of the Government's economic strategy. The study will look at options for improving the transport network around the North-West Quadrant. It will consider a range of different modal options, to make sure the local road network and public transport options play their part.

This study is co-sponsored by the DfT and Transport for the North (TfN) and the study area is shown bounded by the red line in the Figure 1 on page 10. This Initial Report addresses the first stage of the study programme to prepare a preliminary strategic case for considering further investment to the transport network in and around the north-west quadrant of Manchester.

1.2 The Strategic Economic and Planning Case

The North of England is home to 15 million people – nearly a quarter of the UK's population – and generates £290bn in economic output, accounting for more than one fifth of our national GDP. Individually, the economies of the City Regions of the North are strong but, despite this, the North continues to lag behind London and the South East in terms of its economic performance.

Employment rates and productivity levels are both lower in the North than they are in the South, with the gap in productivity widening over time. The Northern Transport Strategy report (The Northern Powerhouse: One Agenda, One Economy, One North) recognises that the North of England has a number of medium-sized cities that perform well individually, but lack the transport connectivity needed to drive improved output and employment. This is essential to creating a single and well-connected economy in the North, which is a key objective of the Northern Powerhouse.

This is further complemented by the One North report by the City Regions of Leeds, Liverpool, Manchester, Newcastle and Sheffield which presents a strategic proposition for transport in the North that aims to transform connectivity for economic growth through agglomeration of markets, improving access to skilled labour and stimulating business investment. The case for action, set out in the Highways Plan of the One North report, recognises that the number, capacity and reliability of east-west road connections is a constraint on the economy and acknowledges that there are areas of severe congestion on the existing network, together with a high level of demand for freight from northern ports.

The SRN, operated by Highways England, in Manchester's north-west quadrant forms part of a key east-west connection linking the city regions of Liverpool and Manchester across the Pennines to Leeds, Sheffield and on to the North East. It provides a key component linking the labour market to employment opportunities in the regional centre (the area bounded by the M60); provides business to business connectivity for both people and freight; and provides access to major leisure destinations such as international sporting venues and the Trafford Centre and its environs. In addition, Transport for Greater Manchester's (TfGM) Key Route Network (KRN) links the 10 key centres of economic activity and the airport within Greater Manchester and interfaces with the SRN at several points in the study area.

The case for change is therefore based on the interrelated transportation and economic needs of the North. Importantly, if the capacity constraints on the SRN in the Greater Manchester area (and their impact on the wider transport network in the North) are not addressed, they will hold back growth across the region and the wider policy towards creating a Northern Powerhouse will be harder to achieve.

In the context of the growing economic disparity between the North and South of England, the case for strengthening the economic connections and infrastructure between the North's great towns and cities has never been stronger. Greater Manchester is a major driver of economic activity but analysis suggests that its future development could be constrained by the transport network in the north-west quadrant.

In addition, there are a number of significant planned developments within and adjacent to the study area as well as substantive additional development proposals across the Greater Manchester area. These development proposals will create additional residential, employment and distribution trips and will further impact the SRN and local road network.

Given the importance of Greater Manchester to the economy of the North, and the role that the north-west quadrant performs, these constraints could have implications for the Northern Powerhouse.

1.3 Current Transport Problems

The M60 is no further than 6 miles from Manchester City Centre, as close as the North Circular Road is to central London. Since its completion in 2000, the M60 provides Manchester and surrounding areas with an orbital, strategic route, as the M25 does for London, however the M60 also provides a local function in a similar manner to the North Circular Road. In addition, the M60 in the north of the study area is part of the M62 trans-Pennine route linking northern city regions. These multiple functions lead to sections of the M60 having some of the highest daily flows outside of the M25 and the M1.

The high usage combined with challenging layouts and topography, characterised by close proximity of junctions and sections of narrow lanes and steep gradients, results in slow speeds, particularly for the large volumes of freight (some 15% overall) which uses the SRN in the study area, for through M62 movements, as well as in and around Greater Manchester.

These pan-northern, city region and local uses mean that the M60 in the north-west quadrant is heavily used in the peak and inter-peak periods as well as outside the peaks where traffic using the network for leisure and sporting event purposes can cause congestion and low speeds at the weekends.

The merging and diverging of traffic from the M62, M602, M61 and M66, which feed into the M60 in the north-west quadrant lead to considerable congestion at those junctions which has the knock-on effect of impacting through traffic from Liverpool and Warrington in the west, accessing destinations towards Rochdale and Leeds in the east.

Whilst considerable investment has been made in public transport in the region on rail, Metrolink and bus in the Greater Manchester area, it is challenging for these radial corridors and services to provide an attractive alternative for many of the commuter movements being made on the SRN in the study area.

Taking account of planned improvement both to the road network and to public transport, the anticipated impact of the forecast traffic growth over the next 20 years is that the majority of the SRN within the study area will experience significant speed decreases, which will lead to congestion and further reduced journey times.

1.4 Key Environmental Considerations

The Greater Manchester Air Quality Management Area (AQMA) covers the whole of the M60 and there are approximately 40 Noise Important Areas (NIAs) within the study area, many of which are located at junctions around the North West Quadrant of the M60 Motorway.

Given that air quality within close proximity to the M60 northwest quadrant is poor (with measured concentration well above the Air Quality Strategy (AQS) Objectives/EU Limit Values) and the fact that there are a large number of NIAs within the study area, the development of any interventions will have to carefully consider the environmental matters. The environmental considerations – particularly air quality and noise – are significant and have historically presented a barrier to road improvements in the study area and will constrain traditional highway solutions.

There are two ecological European sites within the study area; The Manchester Mosses Special Area of Conservation (SAC) and the Rochdale Canal SAC, both of which will need to be considered carefully as their locations may influence the location of any proposed interventions. In addition, there are a number of heritage assets within the study area of varying importance including Scheduled Monuments, listed buildings, conservation areas and Registered Historic Parks and Gardens. The development of interventions should be mindful of their locations as works that significantly affect these assets.

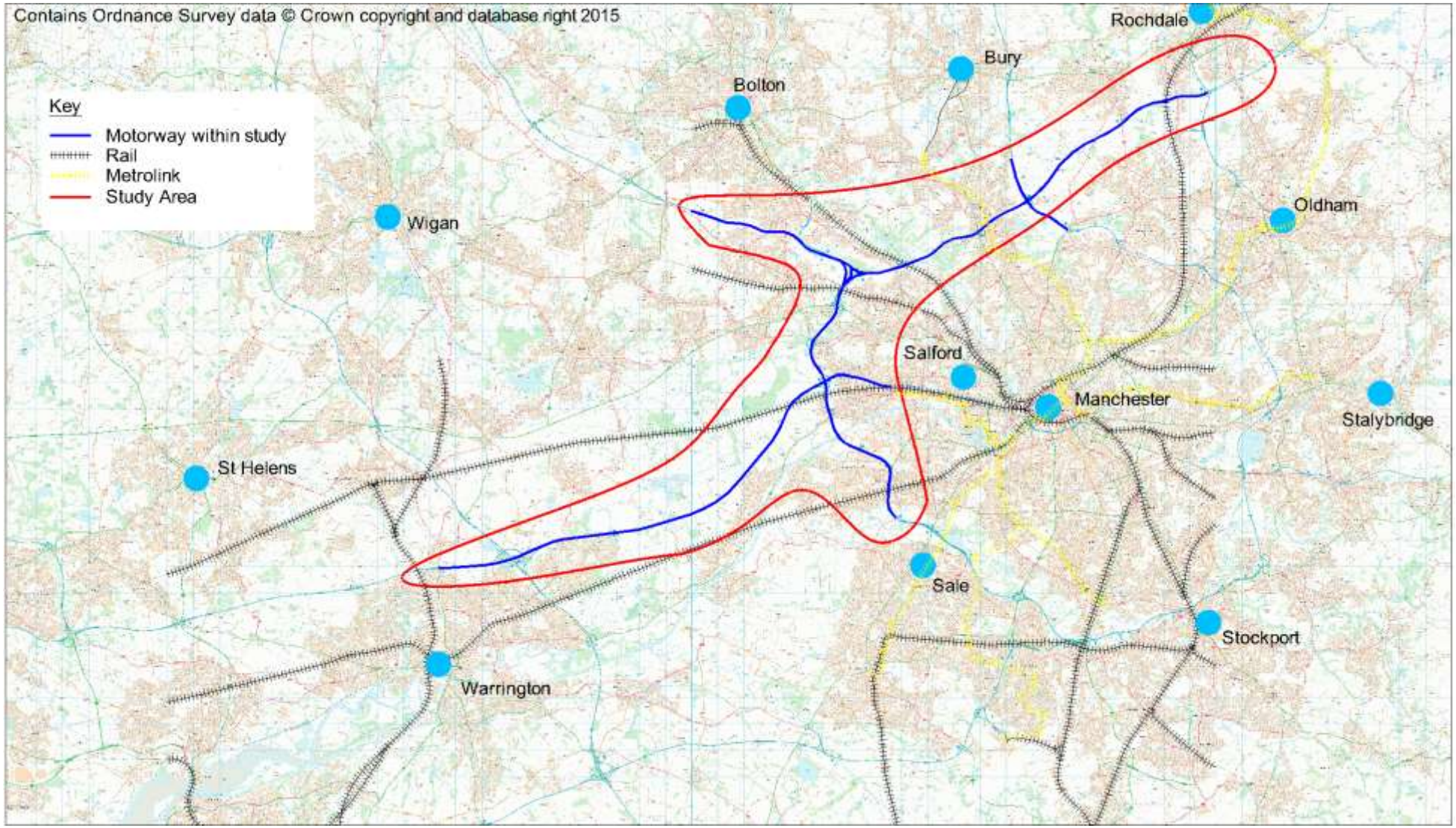
1.5 Key Preliminary Findings

The report presents a large amount of analysis and a number of preliminary findings. These can broadly be summarised into key findings which together form the preliminary strategic case for considering further investment, as follows:

- The SRN within the study area performs multiple functions, providing international, national, regional and local connectivity. Due to traffic volume, layout and topography it suffers from severe congestion with the majority of links falling within the worst 10% nationally in terms of journey speeds and journey time reliability;
- Freight traffic on the SRN within the study area comprises pan-northern, regional and local movements. The volume of freight (15%) and the road layout and topography means that freight can be slow moving, impacting on overall network performance;
- Given the nature of the existing radial public transport network, there are significant challenges for public transport to contribute to the reduction of commuter traffic using the SRN within the study area due to the disparate origins and destinations of commuters;
- In the context of achieving the Northern Powerhouse, Greater Manchester will be a major driver of economic activity, however, future performance will be constrained by its transport network, of which the SRN within the study area is a key element;

- The environmental considerations – particularly air quality and noise – are significant and have historically presented a barrier to road improvements in the study area. The subsequent stages of the study will consider carefully how to ensure that opportunities for a net improvement in air quality and traffic related noise are maximised;
- There are a significant number of road and public transport improvements already planned. Based on the forecasting work undertaken previously, it is evident that operating conditions will continue to deteriorate on the majority of the SRN despite these improvements, and
- If the economic aspirations of the Northern Powerhouse are to be achieved a number of radical transport interventions will be required, particularly on the SRN.

Figure 1 - The Study Area



2 Introduction and background

As part of its Road Investment Strategy: Investment Plan, December 2014[1] the Department for Transport (DfT) announced it was commissioning a series of six new strategic studies to address the biggest challenges facing the road network.

One of the studies announced was the Manchester North-West Quadrant study which will explore options for improving the transport network around Manchester's north-west quadrant between junction 8 and 18 of the M60 which is part of Highway's England Strategic Road Network (SRN).

The strategic aim of this study is to identify and provide an initial appraisal of the improvements to the transport network across all modes that can underpin the vision for transforming and rebalancing the national economy and establishing the north as a global powerhouse, a core part of the Government's economic strategy.

This Initial Report sets out the case for change and how an investment in the transport network in the north-west quadrant will deliver economic and strategic benefits to the region.

This study is co-sponsored by the DfT and Transport for the North (TfN) but there are other important stakeholders who will play a role in determining whether proposed schemes emerging from this study will be developed further.

2.1 Study Objectives and scope

The specific objectives of the North-West Quadrant study are significantly wider than those defined for previous studies in the area. They will consider the wider economic benefits to the region and any increased investment as a result of any proposed interventions. This wider approach may result in options that could not be previously justified, becoming viable interventions in tackling the challenges the network faces.

The study will consider all the work carried out by previous studies to develop a strategic case for investment and will consider a range of different modal options, to make sure that the SRN, local road network and public transport play their part in underpinning the vision for transforming and rebalancing the national economy and establishing the north as a global powerhouse.

The benefits and impacts of any interventions will be assessed in terms of congestion-relief, reliability, safety and environmental outcomes, and will consider a number of areas including;

[1] Road Investment Strategy: 2015 to 2020, https://www.gov.uk/government/collections/road-investment-strategy, Highways England, December 2014

- benefits to the highway network beyond the study area;
- improved rail connectivity across the Liverpool-Manchester-Leeds corridor;
- Manchester Airport growth plans, and
- effects on the local road network as a result of the study.

Key to forming a judgement on potential interventions will be the consideration of the wider economics benefits, in particular their impacts on the local labour market and productivity, and the economic geography of the northern transport area. Such an approach will allow; an understanding of how each of the interventions can act as an enabler to raising growth in the north; and identify which areas and groups will benefit as well as the associated impacts as a consequence of the interventions considered.

The study will reference the other northern strategic studies (Trans-Pennine Tunnel and Northern Tran-Pennine) and consider the risks arising from three major complex projects being undertaken within the same broad geographical area as well as having due regard for other schemes within the vicinity.

2.2 Study stages and reporting

The study is being carried out in three stages:

- Stage 1: will review previous study work, other relevant data, and current investment plans in order to understand current and anticipated future performance and constraints of the transport infrastructure (taking account of committed future improvements), and to prepare a preliminary strategic case for considering further investment to the transport network in and around the north-west quadrant of Manchester. This Interim Report addresses Stage 1 of the study;
- Stage 2: will define the transport objectives that will solve the problems identified and identify a long-list of options which could meet the transport objectives;
- Stage 3a: will involve a high level assessment of the different options to discard any options that will not meet the transport objectives nor fit with local, regional or national strategies, or would be highly unlikely to pass key viability and acceptability criteria. Based on the assessment, a short-list of potential options to be carried forward to Stage 3b would be identified for further development and assessment, and
- Stage 3b: will document the appraisal of the short-list of better performing potential options and allow the production of a strategic outline business case for each short listed option.

It will be important to engage with stakeholders, including local authorities, within and adjacent to the study to not only gain their insight and views as to the current issues and challenges but to involve them in helping defining those issues and considering associated options to address them.

2.3 Study area overview

The geographic scope of the study includes the M60 from junctions 8 to 18 and the M62 from junction 9 to 12 and 18 to 20. The study area includes the M61 from its junction with the M60 to Junction 4, the M602 between the M60 and Junction 2, the M66 between Junction 3 and its junction with the M60/M62 and the M60 between junctions 18 and 19. These routes all form part of the Highways England's SRN in the north west of England and all significantly influence the core study area.

The study area covers Bolton, Bury, Rochdale, Salford and Trafford which are all part of the Greater Manchester Combined Authority and Warrington Borough Council in the west. In addition, areas of Manchester, Bolton, Bury, Oldham, Stockport, Tameside and Wigan are likely to be affected by the issues of the transport network within the study area.

Figure 2 shows the study area in the context of Northern England and Figure 3 illustrates the study area graphically.

Figure 2 - Study area in the context of the North

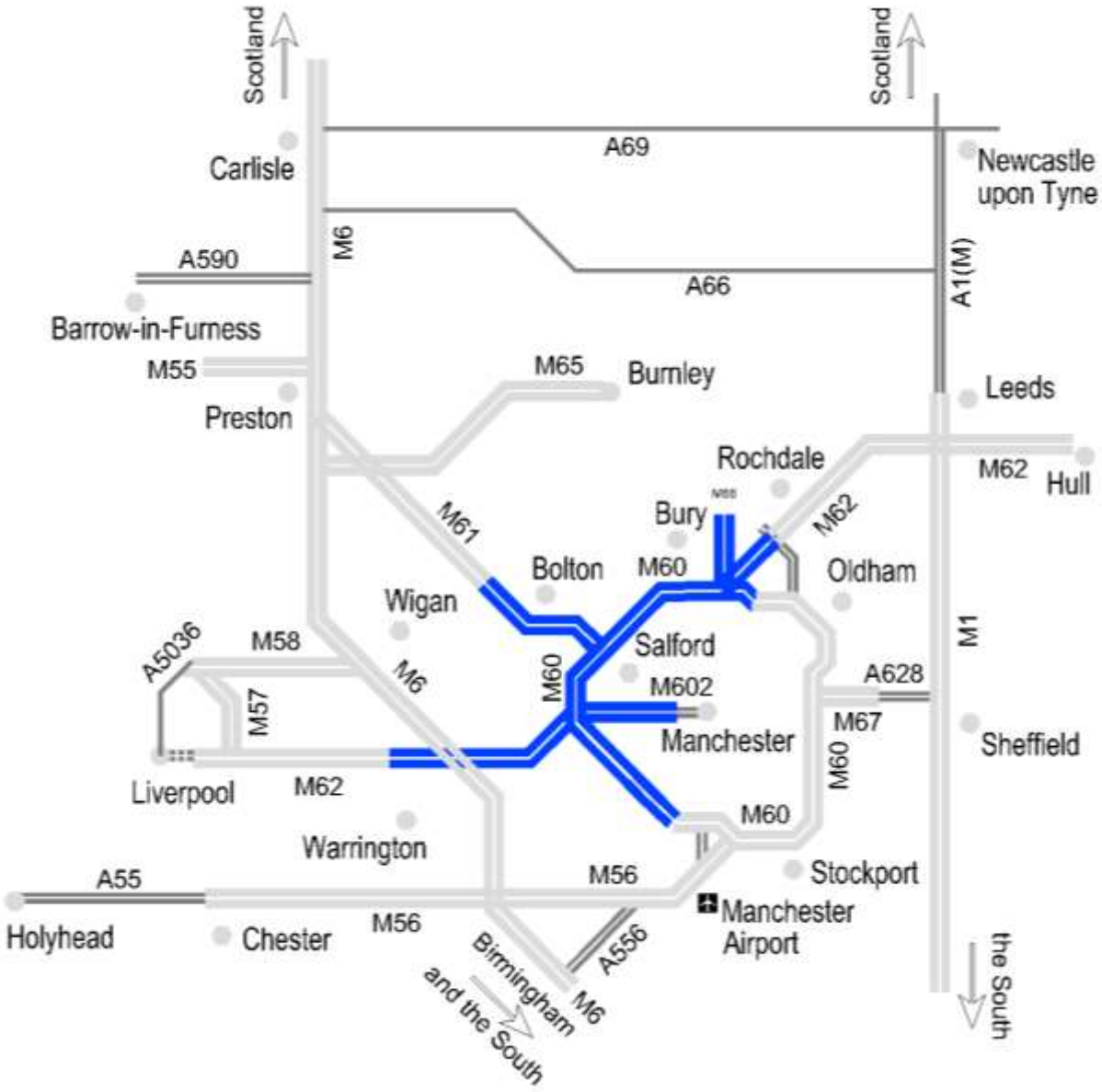
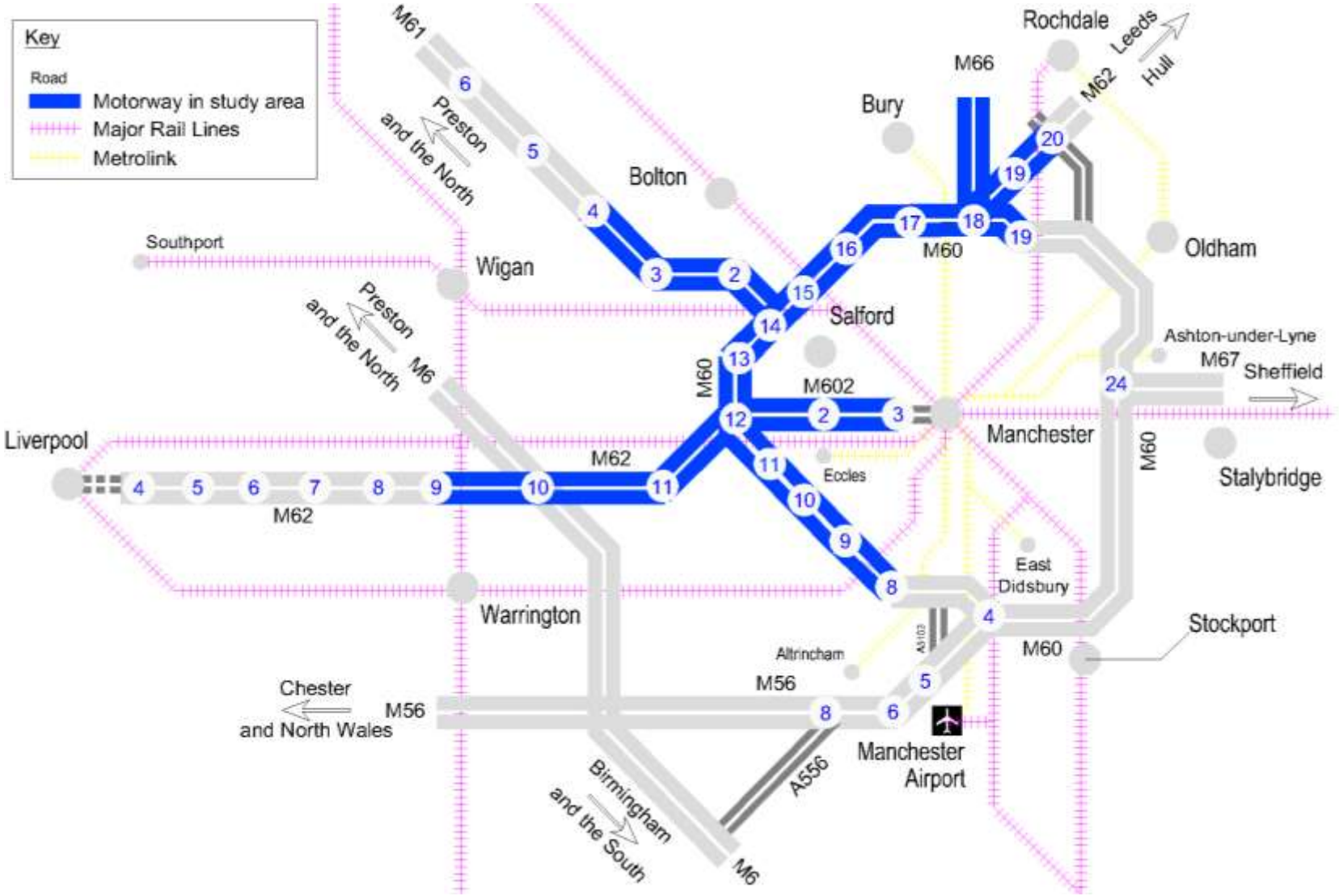


Figure 3 - Study Area



The M60 orbital motorway encompasses Manchester City Centre whilst traversing Salford and parts of Bury, Oldham, Tameside, Stockport and Trafford. The M62 is a through route on the northern section of the M60 linking Liverpool, Warrington, Salford, Bolton, Bury, Rochdale, Oldham and over the Pennines to Leeds. The M61 which joins the M60 in the north-west quadrant serves the corridor to Bolton and Preston and the M60 south of the M62 serves Trafford, Stockport and Manchester Airport.

The M60 is no further than 6 miles from Manchester City Centre, as close at the North Circular Road is to central London. Since its completion in 2000, the M60 provides Manchester and surrounding areas with an orbital, strategic route, as the M25 does for London, however the M60 also provides a local function in a similar manner to the North Circular Road. In addition, the M60 in the north is part of the M62 trans-Pennine route linking northern city regions. These multiple functions lead to sections of the M60 having some of the highest daily usage outside of the M25.

The most heavily used section between the junction of the M62 and M60 at Eccles and the M62, M66 and M60 at Simister has been upgraded over the years but features a number of long gradients, sections of narrow lanes and sections with closely spaced junctions.

The majority of the study area falls within the area covered by Transport for Greater Manchester (TfGM). Transport policies that affect the ten districts of Greater Manchester are set by the new Greater Manchester Combined Authority and its Transport for Greater Manchester Committee. TfGM is the delivery arm for the elected body, responsible for investing in improving transport services and facilities, supporting the largest regional economy outside London.

In addition to its role of co-ordinating public transport and investing in the network, TfGM is also responsible for the management of the Key Route Network (KRN) which consists of over 600km of non-motorway, local strategic roads linking Greater Manchester's ten districts and the airport.

Transport for the North (TfN) brings together local transport authorities and combined authorities across the North of England to allow the North to speak with a single voice to Government. The Northern city regions are acting collectively as TfN, working with the Local Enterprise Partnerships, Government, Highways England, HS2 Ltd. and Network Rail, through the TfN Partnership Board, to develop a Northern Transport Strategy.

The transport network in the study area forms a key part of the SRN in the north-west of England linking Liverpool and its ports, Knowsley, Huyton, St Helens and Warrington in the west, Preston and Bolton to the north, Rochdale, Oldham, Leeds and Humber ports in the west and Trafford, Stockport and the Airport in the south to each other, and to Salford and Manchester City Centre.

The study area contains major centres of activity including: Omega at Warrington in the west with a large number of distribution centres; Trafford Park and the Trafford Centre with its significant areas of retail, employment and manufacturing; Heywood distribution park; and, Kingsway business park in the east. In addition, whilst Manchester Airport is outside the study area it is a significant centre drawing traffic (employees, users and freight) from right across the city region and beyond.

Within the study area the SRN, the local road network (including the KRN), the rail network, Metrolink and bus services are all vital to those living, working, playing and trading in the area and are crucial to the city region's ongoing economic success.

Importantly, the M60 corridor also has a large number of environmental receptors that are exposed to some of the highest concentrations of Nitrogen Dioxide in the country, these concentrations are well in excess of the EU limits values. Therefore, any proposed interventions identified by the study must not result in a deterioration in local air quality.

The recent Roads Investment Strategy, published in 2014[1] commits to a number of proposed improvements to the network within the study area including upgrading Croft Interchange at the M62/M6, upgrading to smart motorway between Croft and the M60, and upgrades to Simister island. These proposals would supplement the existing smart motorway upgrade programme which is currently on site on the M60 and M62 in the study area.

2.4 Strategic Road Network

The geographic scope of the study includes the M60 from junction 8 to 18, the M62 from junction 9 to 12 and 18 to 20; the M61 from junction 4 to the M60. However, it is also important to consider M602 on its approach to Eccles Interchange (M60/62 J12) and the other M66 and M60 approaches to Simister Island (M60/62 junction 18).

M62 junctions 9 to 12

In the west of the study area, the SRN comprises junction 9, which is the main access for Warrington North and the A49. It should be noted that further west at junction 8 is the new Omega development comprising a number of large scale distribution hubs. Between junction 9 and junction 10, the Croft Interchange with the M6, the route comprises 4 lanes in each direction reducing to two through the junction.

Croft interchange provides an all movement connection with the busy M6 and has had a number of recent improvements including 'tiger tail' merges and diverges to / from the M6 towards Manchester.

From Croft through junction 11 (for Birchwood) the route comprises 3 lanes in each direction until the approaches to the Eccles interchange.

The approaches to the Eccles interchange from the east have been recently improved by effectively providing all lane running on the immediate approach with a long 'tiger tail' to separate M60 clockwise traffic from those going anti-clockwise towards the Trafford centre.

M602

M602 continues from the Eccles interchange with three lanes in each direction until junction 2 for Eccles where it is then two lanes in each direction as far as its final junction at Regent Road. Improvements have been made on the Regent Road approaches in recent years to improve capacity for queuing vehicles. It should be noted that the westbound approach to the Eccles interchange on the M602 regularly has standing traffic in lane 1 for those going clockwise or anti-clockwise on the M60.

Eccles interchange.

Junction 12 of the M62 / M60, the Eccles interchange, is an all movement multi-level interchange with tight radii links from the M62 to M60 anti- clockwise; M60 anti-clockwise to M62 westbound; M602 westbound to M60 clockwise; and M60 clockwise to the M602, resulting in reduced vehicle speeds. The 'outside' links (M62 to M60 clockwise; M60 anti- clockwise to M602; M602 westbound to the M60 anti-clockwise; and M60 clockwise to M62) are all of a more relaxed geometry but all feature diverges on the links themselves. The junction experiences high volumes of traffic, and regularly experiences flow breakdown and queues on the approaches. The Liverpool to Manchester railway crosses the M60 just south of the Eccles interchange.

M60 junction 8 to 18

The M60 between junctions 8 (Carrington) and 10 (Trafford Centre) provides three standard lanes in each direction. Traffic accessing the Trafford Centre uses either junction 9 or junction 10 (which are closely spaced) depending upon car park / delivery preference. A rail freight facility in Trafford Park is also situated close to junction 9 and other leisure facilities associated with the Trafford Centre are accessed by both junctions.

Barton High Level Bridge is located between junction 10 and 11 of the M60 and carries the M60 over the Manchester Ship Canal (MSC) at a height of around 30m over a length of 750m. The bridge has a reduced width hard shoulder making any routine maintenance activities on the structure difficult. Speed restrictions are regularly imposed due to high winds.

Immediately after the descent from Barton Bridge junction 11 provides access to the A57 Warrington to Salford / Manchester Road. The distance between junction 11 and the Eccles Interchange is short and suffers from weaving problems between those joining from junction 11; those heading northbound on the M60; and those turning westward (towards Warrington) and a smaller number eastward (towards Manchester) on the M62 and M602 respectively. South bound is an adjacent motorway distributor managing access from the M62 and M602 and egress from the M60 to junction 11.

The anti-clockwise merge from the M62 at junction 11 is a particular issue due the uphill gradient of the slip road resulting in a decreased speed of HGV's merging from the M62 with the M60 causing additional delay and congestion.

The M60 through the Eccles interchange is two lanes in each direction. The M60 between Eccles interchange and junction 13 Worsley is very short (under 500m) and comprises four narrow lanes in each direction. In both directions the section suffers from weaving manoeuvres between merging and diverging traffic exacerbated by the geography being uphill towards and beyond the junction northbound (clockwise).

Junctions 14 and 15 are interleaved with junction 14 providing access to / from the M61 and M60 to the A580 East Lancashire Road towards both Salford and Walkden. There are no south facing connections from the A580 to/from the M60.

Junction 15 is a fully grade separated interchange with free flow slips connecting to the M61 from the M60 and the slip roads from junction 14. Along this section, severe congestion is caused by high volumes from M61 merging with the high through traffic flow on the M60, particularly M60 anti-clockwise.

It should be noted that between junction 12 and 14 on the clockwise and junction 13 and 12 on the anticlockwise carriageway lane width is restricted, with both carriageways having four 3m lanes. This section rises from junction 12 – 14 with a noticeable gradient, and the junctions are closely spaced causing issues with traffic 'weaving' to either join or leave the motorway.

Between junctions 15 and 16 is a long section of merge where traffic from the M61 joins the M60 (clockwise) through traffic. At this point the route starts to descend towards junction 16 and the Phillip's Park Valley where it crosses the Bolton to Manchester railway.

Junction 16 provides east facing slips only to and from the A666 Manchester Road. The gradient anti-clockwise towards junction 16 is quite steep and traffic regularly queues for the junction diverge towards the M61 and A580. From junction 16, M60 the motorway 4 lanes in each direction from the M61 through to junction 18 Simister Island.

After climbing out of the valley on another relatively steep approach, junction 17 has four reduced width lanes and a reduced width hard shoulder due to constraints imposed by over-bridges and retaining walls through the grade separated junction with the A56 Bury New Road which provides direct access into Manchester City Centre.

The section between junction 17 and 18 is short and suffers from weaving manoeuvres between merging and diverging traffic from the A56 and the interchange with the M66 and M60 clockwise towards Chadderton. The Metrolink line to and from Bury crosses the M60 at junction 17 with a stop at Besses o' th' Barn.

Junction 18 is the intersection of the M60/M62/M66, and is a 3 level grade separated junction with circulatory carriageway. The M60 is not continuous through the junction and traffic travelling clockwise has to leave at the junction and negotiate three sets of traffic lights before re-joining the M60. This is also the case for all right turning movements at the junction, which creates queues that back up on to the mainline. The alignment includes free flow slip-roads for movements from the M60 clockwise to M66, M66 to M62, M62 to M60 clockwise and the M60 anti-clockwise through the junction. Some of these links have tight radii resulting in reduced traffic speeds.

M62 junction 18 to 20

The M62 designation restarts at junction 18 and the section between junction 18 and 20 is currently being upgraded to Smart motorway, which will provide a 4 lane All Lane Running (ALR) section between junction 18 to 20 including through the services at Birch. The most notable junction on this section is junction 20 which is a grade separated junction with the A627(M) providing access to Oldham to the south and Rochdale to the north.

A627(M)

From junction 20, the A627(M) provides a dual carriageway, motorway standard link to Edinburgh Way (the A664 west of Rochdale) and via a couple of grade separated junctions to the A664 at Slattocks, the A627 Chadderton Way and A663 Broadway west of Oldham. It should be noted that this link from the M62 eastbound to the M60 clockwise via the A627(M) and A663 Broadway is used an alternative to the lengthier Simister Island route via the motorway for traffic M62 westbound to the M60 clockwise.

M61 junction 4 to M60

From junction 4, which provides access to the adjacent A6 the M61 comprises three lanes on the approach to Junction 3, the junction with the A666, which itself provides dual carriageway access to Bolton.

Junction 3 has northbound diverge to the A666 and is then interleaved in a complex grade separated junction (junction 2) which manages the merges and diverges between the M60, A666 and M61. There is a section of tunnel within the grade separated junction and the whole area comprises four lanes in each direction to cater for the weaving manoeuvres.

The following schematic Figure 4 illustrates the layout the motorway network within the study area and identifies the number of lanes available to traffic. Figure 5 below shows the approximate distances between the centres of each junction within the study area in kilometres.

Figure 4 – Schematic Layout and Lane Provision

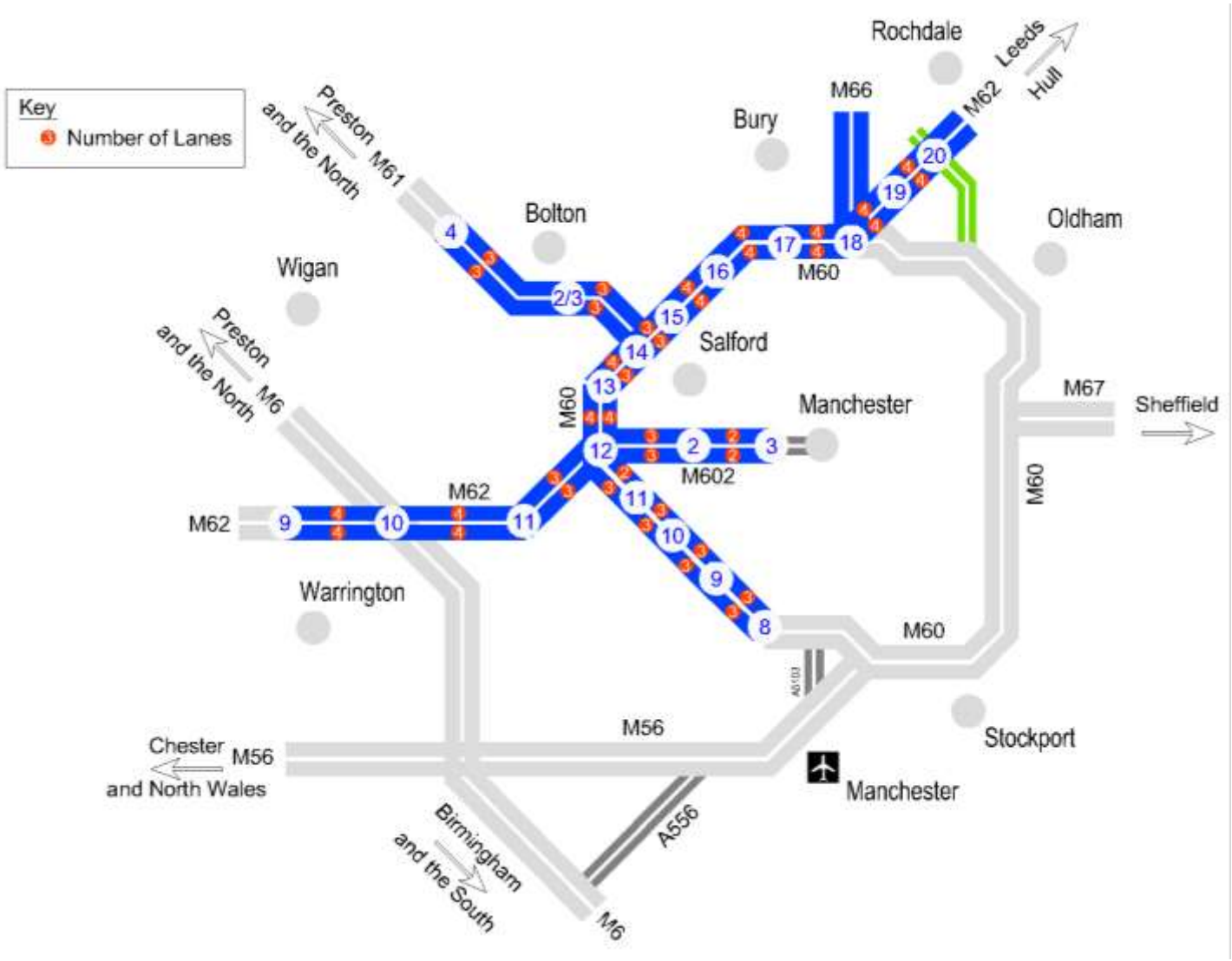
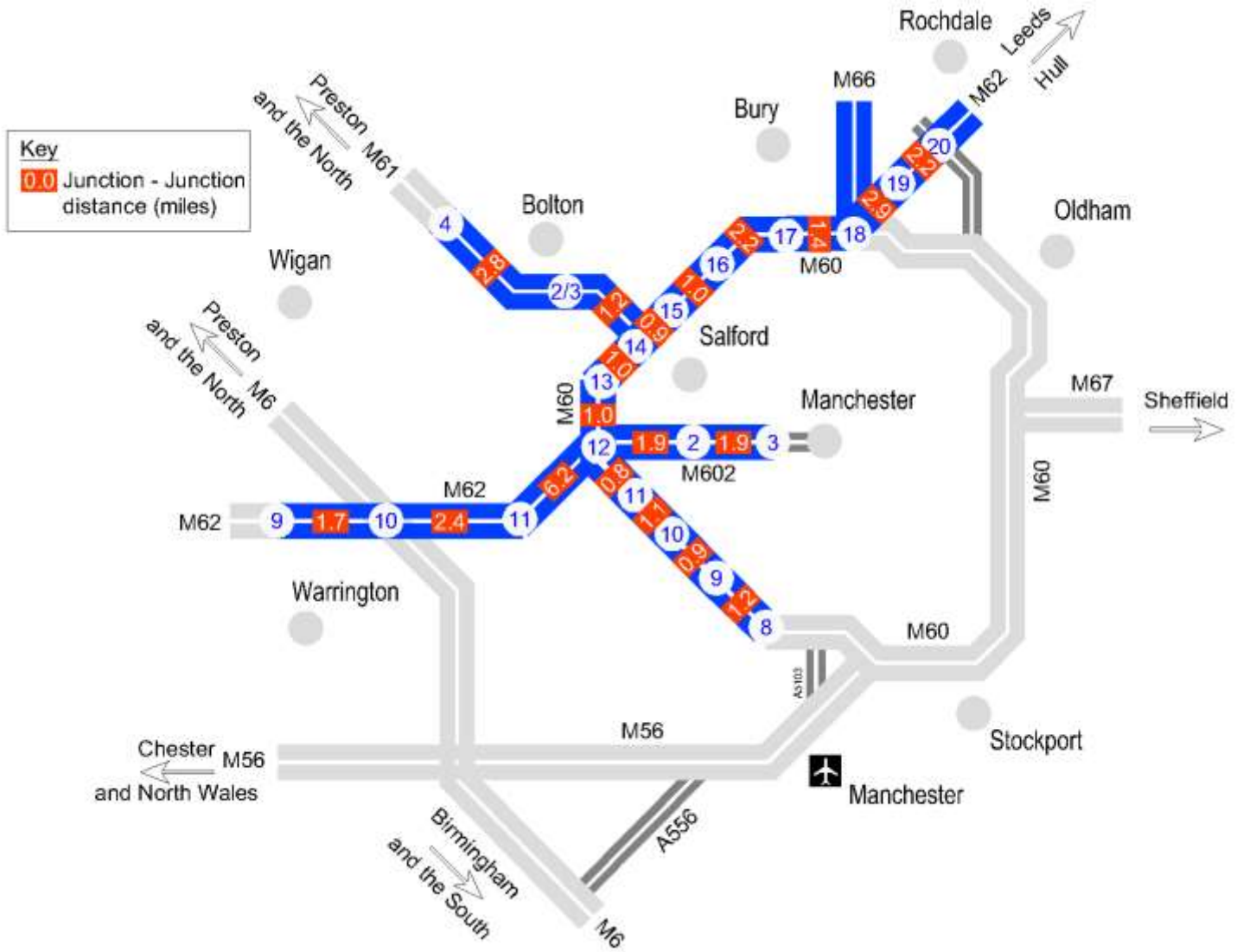


Figure 5 - Approximate distances between junctions



2.5 The TfGM Key Route Network (KRN).

The KRN is based on the Primary Route Network, which are those A-roads identified previously by the Greater Manchester highways authorities as forming the core road network linking all key centres of activity. This has been reviewed and added to by TfGM so as to include the following:

- significant road-links to strategic employment sites and to adjacent areas outside GM boundary;
- bus priority corridors and high frequency bus routes; and
- links from the KRN to adjacent motorway junctions and Ship Canal crossings.

Within Greater Manchester, the KRN encompasses about 650km of network, which is 7% of all local authority roads in Greater Manchester, but critically 48% of A and B roads. The volume of traffic on the KRN represents 64% of all traffic on A and B roads. It should be noted that the KRN does not include SRN motorway and trunk roads which are operated by Highways England.

TfGM has signed a Memorandum of Understanding with Highways England which will see the two bodies work in partnership to develop shared priorities and a long-term vision for motorways and key roads across the city-region. Similar working arrangements also exist between TfN and Highways England.

Within the study area the following roads are currently designated as part of the KRN and includes where they bisect the M62/M60;

- A671 Rochdale Road
- A664 Manchester Road / Rochdale Road
- A6046 Middleton Road / Hollin Lane (M62 junction 19)
- A665 Bury Old Road
- A56 Bury New Road (M60 junction 17)
- A666 Manchester Road (M60 junction 16)
- A6 Manchester Road
- A580 East Lancashire Road (M60 junction 14)
- A672 Leigh Road / Worsley Road (M60 junction 13)
- A57 Liverpool Road (M60 junction 11)
- B5214 Trafford Boulevard (M60 junction 10)
- A5081 Park Way (M60 junction 9)
- A6114 (m) Carrington Spur (M60 junction 8)

On 1 April 2015, the Greater Manchester Combined Authority (GMCA) became the accountable body responsible for performance of the KRN. TfGM is now responsible for the strategic management of the KRN on behalf of GMCA.

Within the Greater Manchester area the performance of the KRN is essential in ensuring reliability and resilience of the network for public transport services, those accessing key centres by car and the

distribution of goods and services. The interface between the KRN and the M60 is critical and there are a number of radial corridors from junctions within the study area which serve Manchester City Centre including J12 Eccles Interchange (via the M602), J18 southbound from the M60 and J17 north of Prestwich.

2.6 Public transport

The study area is served by a large number of local bus services, the Metrolink network and the rail network. These are described below;

Bus network

The bus network is extensive in the study area comprising predominantly commercial services with a smaller number of subsidised services. The network largely radiates out from Manchester and the district centres of Warrington, Wigan, Bolton, Bury and Rochdale with a number of services converging on the Trafford Centre. Within the study area the bus network bisects the SRN at the following locations;

- Rochdale Road, Castleton (A664) – services to Castleton and Rochdale;
- Middleton Road (A6046) – services to Heywood and Bury;
- Bury New Road (A56) – express and local services to Bury;
- Manchester Road (A666, Clifton) – local services to Kearsley and Bolton;
- Manchester Road (A6, Wardley) – local services to Walkden and Bolton;
- East Lancashire Road (A580) – express services, Manchester to Atherton, Leigh and Wigan including the Leigh Guided Busway. A park and ride is currently being constructed under the M60 near to junction 14 (but not accessed from it);
- Worsley Road (A572 / A575) – local services to Boothstown and Atherton;
- Liverpool Road (A57) – Warrington and Irlam to Eccles and Manchester services, and
- Trafford Boulevard – services to the Trafford Centre

In addition to the above the Trafford Centre and Airport are also major public transport nodes.

A small number of services use the M61. M62 and M60 motorway primarily for accessing the Trafford Centre and there are regular frequent services linking East Lancashire and the Rossendale Valley with Manchester City Centre which operate via the M66 motorway.

Presently under construction, the Leigh Guided Busway and associated bus priority corridor traverses under the M60 using the A580 alignment with a new park and ride facility although this isn't designed for access from the M60.

Metrolink

The Manchester to Bury Metrolink line bisects the M60 near to junction 17 with a station at Besses o' th' Barn and nearby Prestwich, both of which have car parks. The Eccles line also runs parallel to the

M602 from Salford Quays and Media City to Eccles with a number of intermediate stops. There is a 250 space park and ride site at Ladywell, which is signposted from the M602 providing services directly into Salford Quays, Media City and Manchester City Centre. TfGM are currently developing an extension of the network to serve the Trafford Centre. Rochdale and Oldham are served with a line from Manchester Victoria and the second city crossing which is currently being constructed will allow for increased capacity on all lines. Direct interchange between Metrolink and the main line railway is available at Manchester Victoria and Rochdale.

Rail

The rail network crosses the study area in a number of places:

Manchester to Bolton (and Preston / Wigan)

Trains from Manchester Victoria, Salford, Deansgate and Manchester Piccadilly serve the Bolton to Wigan / Southport and Preston/ Blackpool routes. Whilst the railway bisects the M60 in the valley between junctions 17 and 18 there are only a small number of stations in the study area at Farnworth, Kearsley and Clifton which only have limited local stopping services. A new tunnel has recently been opened to facilitate the electrification of the line which will provide for electric services from Manchester to Bolton, Wigan, Preston, Blackpool and destinations north on the west coast mainline.

Manchester to Newton le Willows (and Liverpool / Warrington)

The 'Chat Moss' route from Manchester towards Liverpool carries electrified services from Manchester Airport, Piccadilly and Victoria to Newton-le-Willows and Liverpool as well as the North Wales coast service from Manchester Piccadilly to Warrington and Chester. The line crosses the M62 and M60 west and south of the Eccles interchange. The only stations in the study area are at Patricroft and Eccles both of which have a local stopping service

Trafford Park railway

The Trafford Park estate was once served by a vast internal rail network but over recent decades this has been significantly scaled back. A small freightliner terminal is located to the south of the Trafford Centre where containers are loaded and tripped to the larger terminal at Old Trafford before onward distribution. A freight spur connects the north of the Trafford Park area to Eccles station and it is this spur which is proposed to be used to access Port Salford.

Manchester to Rochdale / Burnley / Leeds (Calder Valley Line)

Trains from Manchester Victoria serve Rochdale, the Calder Valley and Bradford / Leeds. Through the recent re-opening of a curve at Todmorden, trains now also operate to Burnley and Blackburn. The railway crosses the M62 near to Castleton, where a station is located. This railway also provides a connection to the East Lancashire preserved railway at Heywood with heritage services to Bury and Rawtenstall. A Manchester facing bay platform is currently being constructed at Rochdale to permit improved services to and across Manchester.

Recent franchise announcements will see significant service improvements for the existing Northern and Trans Pennine franchises with through services across Manchester to connect the Calder Valley and Rochdale with Warrington and Chester. Once the Ordsall Curve is constructed trains will also serve the Airport. In addition, new trains will enhance capacity on all services described above.

2.7 Cycling and Walking

Active modes are often overlooked, cycling and walking have a key role to play not only in transport terms but as part of contributing to social well-being and a healthy lifestyle.

2.7.1 Cycling

TfGM has a strategic responsibility for cycling across the city region. With aspirations to achieve at least a 300% increase in the levels of cycling across the city region by 2025, TfGM's plans for cycling are contained in the Greater Manchester Cycling Strategy[2].

The strategy builds on previous policy and investments secured through the Local Sustainable Transport Fund and the Cycle City Ambition Grant. It sets out a regional approach to prioritise future investment in cycling, and challenges policy makers to ensure that programmes are in place to influence, enable and encourage individuals, families and communities to take part in physical activity and adopt active travel choices. The strategy envisages 10% of all trips made by bike in 2025 leading to outcomes of; healthier people; a strong economy; greater accessibility; and, a greener environment.

The existing cycle network in Greater Manchester builds upon the Sustrans national cycle network and there is ongoing study work investigating a city centre infrastructure plan for Manchester to link the incoming radial corridors (existing and planned) with destinations within the inner ring road.

Greater Manchester has been awarded £20 million national funding to support plans to make cycling safer and easier. Vélocity 2025[3], the longer term strategy envisages a sustained and strategic

[2] Greater Manchester Cycling Strategy, http://cycling.tfgm.com/pages/pdfs/Cycling-Strategy-summary.pdf
[3] Velocity 2025, http://cycling.tfgm.com/Pages/velocity/Velocity2025_vision.pdf

programme of investment in cycling, from both the public and private sectors, that within a generation will deliver a cycling culture and infrastructure across Greater Manchester that will make cycling a mainstream, everyday and aspirational form of transport for all, regardless of their age or ability.

Vélocity 2025 sets out a proposed network of radial corridors to all of Greater Manchester's districts with orbital links between as well as links to the national network.

2.7.2 Walking

Walking is an essential part of nearly every trip, particularly at trips ends and needs careful consideration in the design of any interventions from a transport and connectivity / leisure point of view. The role of walking within a sustainable transport network is important and encourages an active lifestyle.

Transport for Greater Manchester (TfGM), on behalf of the Greater Manchester Authorities, has been awarded funding from the Department of Health for a 12 month walking project which aims to get more people active and healthier. Working with existing services, community groups and healthcare providers TfGM is currently developing a programme of leisure walks and a programme of structured health walks in six districts of Greater Manchester, with further areas being added.

2.8 Previous Studies

The Manchester orbital motorway was constructed over a period of 50 years as a series of bypasses and links the first being the M63 Stretford to Eccles bypass (J7 to 13) which opened in 1960, to the most recent, the M60 Denton to Middleton (junctions 19 to 24) which in 2000 completed the Manchester orbital motorway. Earlier in 1998, the whole of the orbital motorway, which then included sections of the M63, M62 and the M66, was renumbered as the M60 with the junction numbers aligned to those of the M62 through the northern section.

There have been a number of improvements undertaken over the years to the SRN including localised widening, junction improvements at Eccles for traffic joining the M60 from the west and junction improvements at Simister Island (J18) for west to north and east to south movements.

There have been a significant number of studies looking at providing additional capacity to the SRN within the study area, a list of these is included within Appendix B of this report. The three most recent and significant within the study area are:

- M60 Junction Eighteen to Twelve Transport Study (JETTS) Multi-modal Study (MMS) [2001 - 2007];
- Manchester Smart Motorway [2011 – Current], and

- M60 J18-15 Capacity Enhancement Scheme [2014 – 2015].

2.8.1 JETTS MMS

The JETTS study was introduced from the Government's integrated transport and trunk road review paper 'A New Deal for Trunk Roads' published in 1998. The JETTS study considered a suite of interventions around the M60 to relieve congestion and provide additional capacity, these varied from more minor interventions at junctions through to the provision of parallel motorways.

As part of the study a series of short, medium and long term interventions were recommended, with the main highways proposals in each category being:

- Short term - Elements of Active Traffic management including mandatory variable speed limits (controlled motorway); and 4th lane (anti-clockwise) Junctions 15-13;
- Medium term - Segregated lanes (Junctions 18-12), incorporating Junction 12 Bypass Slip Roads, and Completion of Active Traffic Management, including use of hard shoulders during peak times, maintenance or incidents, and
- Long term - Area-wide road user charging complemented by charging on motorways as part of a national charging strategy. A public consultation rejected this proposal.

The short and medium term proposals were reviewed and developed into the Manchester Smart Motorway scheme detailed in section 2.8.2.

2.8.2 Manchester Smart Motorway

The Manchester Smart Motorway (MSM) scheme started development in 2011 and examined the provision of additional capacity on the M60 between junctions 8 and 20 using smart motorway technology. Following the Environmental Assessment Report (EAR) in January 2013, it was concluded in the air quality assessment (AQ) that the impacts of the scheme were significant on the M60 from Junction 8 to Junction 15. As a result, following a presentation to the Minister in July 2013, the scheme was to be progressed in two phases. The first was the provision of a controlled motorway between junctions 8 to 18 which would remove the significant impact on AQ and allow the scheme to progress. The section of the M62 from junction 18 to 20 was to remain as a Smart Motorway All Lane Running section. The MSM scheme is currently being constructed, and is due for completion in Autumn 2017.

2.8.3 M60 J8 – 15 Capacity Enhancement Scheme

Following the Ministerial presentation of the MSM scheme in July 2013, a second phase was progressed as the M60 junction 8 to 15 Capacity Enhancement Scheme (CES) which identified a range of options to provide additional capacity on the M60 from junction 8 to junction 15.

The M60 junction 8 to 15 CES scheme identified a number of options including junction improvements, the provision of additional lanes between junctions 12 to 15 and the provision of a bypass of M62/M60 junction 12. The options identified as part of the CES will be considered as part of this Study.

Historical schemes developed to solve the problems associated with congestion within the study area, particularly those between junctions 8 and 18 of the M60, have identified significant environmental impacts. Overcoming these impacts to deliver a scheme that relieved congestion and was acceptable in terms of its environmental impacts was not achievable for a variety of reasons including value for money, programme, available finance or deliverability.

3 Strategic Economic & Planning Context

3.1 Strategic Context

The North of England is home to 15 million people – nearly a quarter of the UK's population – and generates £290bn in economic output[4], accounting for more than one fifth of our national GDP. Individually, the economies of the City Regions of the North are strong but, despite this, the North continues to lag behind London and the South East.

In July 2014, The *One North* report[5] presented a strategic proposition for transport in the North, with the aim of transforming connectivity and maximising economic growth. Findings indicated that further improvements to the strategic highway network in the North will be needed in order to address the emerging air quality problems around specific sections and to complement HS2 plans in specific locations. The proposals in *One North* linked the need to transform connectivity in the North with the potential to deliver significant economic benefits by achieving agglomeration economies, stimulating business investment, enabling businesses to access a larger labour supply and strengthening existing comparative advantages. *One North* states that better east-west connectivity would be an important growth multiplier for the North and nationally. Citing evidence from a study by SERC, published as part of the Northern Way in 2009, *One North* expects that improved east-west connectivity could deliver similar benefits to HS2.

One North also proposed that, in terms of the strategic highway network, an approach should be taken which combines innovative approaches to achieving greater capacity from the network and removing strategic pinch points, with more transformational approaches to the use of the highway network for freight and passengers. This includes managing congestion by filling in the gaps in managed motorways across the M62/M60/M56 network and on the M1 and the M6/M61 north-south corridors, work which is expected to be completed by 2024. The aim is to address strategic gaps in the network with a particular emphasis on improving reliability for freight and business and other traffic. *One North* also highlights the opportunities created by HS2, including the provision of new services on the main lines where capacity is released by HS2.

In August 2014, the Chancellor set out his vision for the Northern Powerhouse[6], outlining growth targets that would realise the Government's ambition to rebalance the UK economy. There would be significant gains if a Northern Powerhouse grew in line with the rest of the UK over the next 18 years,

[4] Sub-regional GVA, ONS, 2013

[5] Leeds, Liverpool, Manchester, Newcastle and Sheffield city regions, One North*: A Proposition for an Interconnected North,* July 2014

[6] HM Treasury and The Rt Hon George Osborne MP (2014). *Northern Powerhouse*, *: Chancellor set out pathway*, 2014 (at:https://www.gov.uk/government/news/northern-powerhouse-chancellor-sets-out-pathway)

that is by 4.6% (Office for Budget Responsibility (OBR) forecast[7]) – compared with historical performance, the Northern Powerhouse would be worth an additional £56 billion in nominal terms or £44 billion in real terms, which is equivalent to £1,600 per individual in the North. Enhanced connectivity between the different regions of the North will be a fundamental part of achieving these objectives.

The *National Policy Statement for National Networks* (2014)[8] sets out a vision and strategic objectives for networks that:

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

The DfT and TfN have outlined their vision for transforming connectivity in the North through their *Northern Powerhouse: One Agenda, One Economy, One North*[5] report. The report was compiled by the northern city regions, HM Government and the national delivery agencies and sets out how enhancing transport linkages between northern cities is essential to boosting productivity, investment and employment, and delivering the Northern Powerhouse. The case for action in the Northern Powerhouse Highways Plan[9] puts forward two key arguments:

- there are areas of severe congestion on the road network, with high demand for freight from northern ports. Congestion on the strategic road network is worst where it is also heavily used by local commuter traffic, such as the M60 in Greater Manchester, and
- the number, capacity and reliability of east-west road connections is a constraint on the northern economy.

This plan also includes a shared roads vision for the future, which includes:

- a core free-flow network with mile-a-minute journeys becoming increasingly typical on expressways and motorways in the North of England;
- improved east-west major road links to ensure better, more reliable journey times between the major cities in the North;
- effective road connections to the country's major ports in the North of England;
- future-proofing the northern road network so that it can support the next generation of low-emission vehicles, and

[7] Long term economic plan for the north-west set out by Prime Minister and Chancellor, January 2015. https://www.gov.uk/government/news/long-term-economic-plan-for-the-north-west-set-out-by-prime-minister-and-chancellor

[8] DfT. *National policy statement for national networks*, December 2014

[9] Transport for the North. *The Northern Powerhouse: One Agenda, One Economy, One North, A report on the Northern Transport Strategy*, HMSO, March 2015

- better planning of investment in road enhancements, maintenance and renewals between the different organisations.

In addition to the highways plan, the Northern Powerhouse report includes a plan for integrated and smart travel, which aims to simplify travel in and between city regions. The plan includes:

- Developing a smart ticketing solution across the North that simplifies travel by public transport for local trips and for longer journeys, and
- Promoting an integrated Northern travel area, and providing pan-Northern customer travel information, allowing people to plan, choose and purchase travel both within and between Northern cities in as easy a manner as possible.

Smart ticketing will help reduce the interchange penalties between modes offering customers seamless public transport journeys within a single ticking solution.

The Northern Powerhouse report also includes a plan for local connectivity, which aims to seamlessly link modes including road, rail, tram (Metrolink in Greater Manchester), bus, walking and cycling within city regions, to improve connectivity and drive growth. The plan includes:

- Improving connectivity between communities and key employment growth areas, links to and from high speed rail stations and international gateways, increased local rail/metro/quality bus capacity and frequency improvements and network extensions. Bus services to play a much stronger role as part of an integrated network, and
- City regions where people and goods can travel reliably on road and public transport networks, helped by better real time traffic management and driver information, well maintained roads, metro and local rail, and simplified fare structures.

The DfT's strategy to enhance connectivity in the North is aligned with its overall strategy for transport investment in that these should provide capacity and connectivity between cities, while ensuring environmental objectives are also met. It is also aligned with wider Government policy and regional economic strategies, including:

- HM Treasury's *Reducing the Deficit and Rebalancing the Economy*[10], which explores spatial patterns of investment and employment in the North and seeks improvements by plugging infrastructure gaps, and
- HM Treasury's *Fixing the Foundations*[11], which is specifically focused on boosting productivity in the UK through infrastructure investment, in particular road infrastructure.

[10] HM Treasury. *Reducing the Deficit and Rebalancing the Economy*, April 2015
[11] HM Treasury. Fixing the foundations: creating a more prosperous nation, July 2015

At a sub-national level, Greater Manchester's *Strategic Economic Plan*[12], which identifies priorities for growth and regeneration, also has transport sitting at the heart of its ambitions to boost economic growth, well-being and the environment. The *Plan for Growth and Reform in Greater Manchester*[13], indicates the potential to create another 80,000 jobs during the period to 2020, while the Greater Manchester *Strategic Economic Plan* highlights the potential to deliver an additional 120,000 new jobs over the next 20 years and includes a target to deliver more than 60,000 new homes between 2013 and 2020. It also includes aspirations for continued investment in Greater Manchester's strategic transport network to link people and neighbourhoods with jobs, and businesses to their supply chains and markets.

TfGM have recently consulted on The 'Greater Manchester Transport Strategy 2040 Our Vision'[14]. It sets out a vision for a transport network that TfGM believes Greater Manchester needs by 2040 to support economic growth and prosperity.

The Vision sees Greater Manchester at the heart of a globalised Northern Powerhouse economy with an increasingly skilled workforce. With an expanding population it envisages a more economically active population with more diverse transport needs.

The 2040 Vision builds on the existing Greater Manchester strategy and has four key elements to support its overall aim of providing "World class connections that support long-term, sustainable economic growth and access and opportunity for all", namely;

- Supporting economic growth;
- Protecting the environment;
- Developing an innovative city-region, and
- Improving the quality of life for all

The vision considers the interlinked spatial themes of connected neighbourhoods, travel across the wider city region, getting into and around the regional centre, city-to-city links and, a globally connected city. In addition, the Vision proposes a number of interventions associated with each of these spatial themes across all modes and envisages improved outcomes as a result to 2040.

A full draft Transport Strategy and associated Delivery Plan is due to be published for consultation in 2016 with the intention of it replacing the current Greater Manchester Local Transport Plan.

[12] Greater Manchester Local Enterprise Partnership and Greater Manchester Combined Authority. *Stronger Together: Greater Manchester Strategy,* 2013

[13] Greater Manchester Combined Authority, Greater Manchester Local Enterprise Partnership & Association of Greater Manchester Authorities. *A Plan for Growth and Reform in Greater Manchester*, March 2014

[14] Greater Manchester Transport Strategy 2040 Our Vision, http://www.tfgm.com/2040/Pages/default.aspx, TfGM

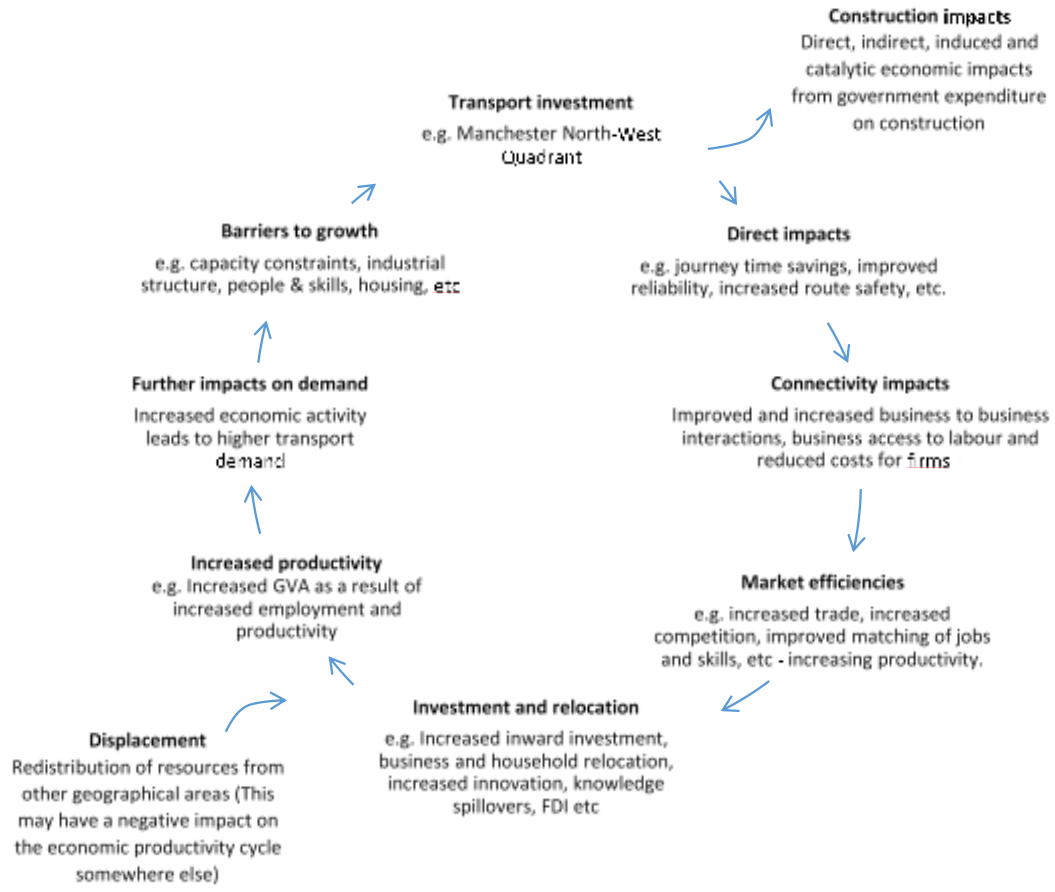
3.2 Economic Context

In the context of the growing economic disparity between the North and South of England, the case for increased investment in the economic infrastructure of the North has never been stronger.

By strengthening the economic connections between the North's great towns and cities, the Chancellor's vision is to create a single interconnected economic area – a Northern Powerhouse - to boost economic growth and prosperity in the North and create an economic counterweight to London and the South East.

Figure 6 (overleaf) illustrates the ways in which transport investment, under the right circumstances, drives economic outcomes. In particular, the flow highlights how direct impacts from a transport investment such as the Manchester north-west Quadrant could create market efficiencies leading to investment and relocation decisions, which in turn can grow the economy. This continues until transport demand generated by increases in economic output leads to new barriers to growth, which need to be addressed by further investment in infrastructure and other policy measures.

Figure 6 - Economic productivity virtuous cycle



Source: KPMG analysis

The relationships between transport investment and economic performance are complex and can be quite wide ranging. Following Venables, Laird and Overman[15] the impacts can be structured under:

- **Direct impacts**: Time and cost savings change traffic flows in the network, leading to increased flows in some parts of the network and possibly less traffic elsewhere;
- **Market efficiencies**: Transport investment can increase proximity by reducing the effective distance between firms and workers. This can generate economies of scale and density, increasing productivity and reducing costs, and
- **Investment and relocation**: At a wider spatial scale there may be changes in the level and distribution of investment, and hence in the spatial pattern of employment and incomes in the economy. Importantly, inward investment and relocation decisions may have a negative impact on economic performance elsewhere and resources are displaced.

In addition to potentially changing the structure and performance of the local economy over the long term, the construction of large infrastructure projects provides an injection of resources during construction. Whilst this government expenditure may simply be redirected from other activities elsewhere, the local impacts could be both significant in the short term and catalytic over the longer term.

3.2.1 The economic potential of the North

The following observations suggest that the North may not have reached its full economic potential:

- The five city regions in the North have a population of 10.2 million and 4.2 million jobs, compared to London which has a population of 8.2 million and 4.6 million jobs;
- Trends in GVA growth show that the North has been growing at a slower pace compared to the national average (3.8% vs. 4.3%)[16];
- GVA per job across the five city regions ranges from 82% to 90% of GVA per job across England as a whole[17] with median wages lower than the national average[18];
- Unemployment levels range from 5.9% to 7.6% across the North compared to the national average of 5.6%[19];

[15] Venables, A., Laird, J. and Overman, H. (2014) Transport Investment and Economic Performance, Report to the Department for Transport.
[16] ONS (2015) Regional GVA 1997/98-2012/13 for the North East, North West and Yorkshire and the Humber compared to England.
[17] ONS (2015) Sub-regional Productivity at NUTS 2 level in 2013.
[18] Annual Survey of Hours and Earnings (2012).
[19] Census (2011), Business Register and Employment Survey (2013) and Annual Population Survey (2015) mode-based unemployment.

- A high proportion of students from Northern universities migrate to the southeast after graduation[20];
- Only 23% of the North's population have Level 4 qualifications compared to the national average of 27%[21], and
- There is significant land capacity with both house prices and commercial rateable values significantly lower than those in London[22].

This economic potential was recognised by the Chancellor in his vision to create a Northern Powerhouse by bringing northern cities 'closer' together, so that their combined economic mass generates market efficiencies, improved competitiveness and increased economic output relative to the existing situation.

Improving transport connectivity within Greater Manchester and between Greater Manchester and the rest of the North is likely to be necessary for the creation of the Northern Powerhouse:

- Greater Manchester generates 40% of the GVA in the North West and 20% of the North, the most productive region in the Northern Powerhouse. This is similar to the proportion of the London economy to England (26%)[23];
- GVA forecasts for Greater Manchester indicate higher than average growth compared to the North West, and more in line with UK figures[24];
- Greater Manchester has one of the largest student populations in Europe[25] with the University of Manchester being the largest Russell Group University in the UK[26];
- Greater Manchester has a high concentration of knowledge intensive jobs. These jobs are the fastest growing and most productive of all employment sectors[27.];
- Outside of London, Greater Manchester is the UK's main centre for business, financial and professional sectors, and also has the UK's largest cultural and creative cluster[28];

[20] Centre for Cities (2014) Cities Outlook.
http://www.centreforcities.org/wp-content/uploads/2014/01/14-01-27-Cities-Outlook-2014.pdf
[21] Census (2011)
[22] Valuation Office Agency (2012) Rateable values for industrial, office, retail and other space.
Department for Communities and Local Government (2014), Ratio of median house price to median earnings in 2013.
[23] ONS (2015) Regional GVA in 2013.
[24] New Economy (2015), Greater Manchester Key Facts
http://neweconomymanchester.com/stories/1776-key_facts/
ONS (2015) Regional GVA in 2013.
[25] New Economy (2015) Greater Manchester Key Facts
http://neweconomymanchester.com/stories/1776-key_facts/
[26] HESA (2015) Education statistics for the United Kingdom 2013/14
[27] Greater Manchester Combined Authority (2014) A Plan for Growth and Reform in GM: transport strategy and investment plan
http://www.tfgm.com/ltp3/Documents/GMGRP-Transport-Strategy.pdf
[28] New Economy 2015, Greater Manchester Key facts (p. 2)
http://neweconomymanchester.com/media/1035/ne_key_facts_march_15-1.pdf

- Greater Manchester's industrial structure favours high technology sectors, comprising Technology Media and Telecommunications, Life Sciences, Graphene/Advance Materials and Financial services.[29];
- The economic benefits of HS2 are forecast to be significant to Greater Manchester, with planned and additional activity estimated as supporting up to 180,000 new jobs in Greater Manchester by the early 2040s.[30], and
- The tourism industry plays a key role in Greater Manchester, where it generates £7 billion in economic impact including direct and indirect impacts through the extended supply chain, supporting over 80,000 FTE jobs[31.] In 2014/15, the North West received close to 13m visits[32]. International tourism is also highly relevant to Greater Manchester, which is the third most visited city in the UK by visitors from outside Britain, attracting close to 1m visits every year[33.] This is partly due to hosting high profile events such as football, rugby and cricket matches and a wide range of cultural events like Manchester International Festival.

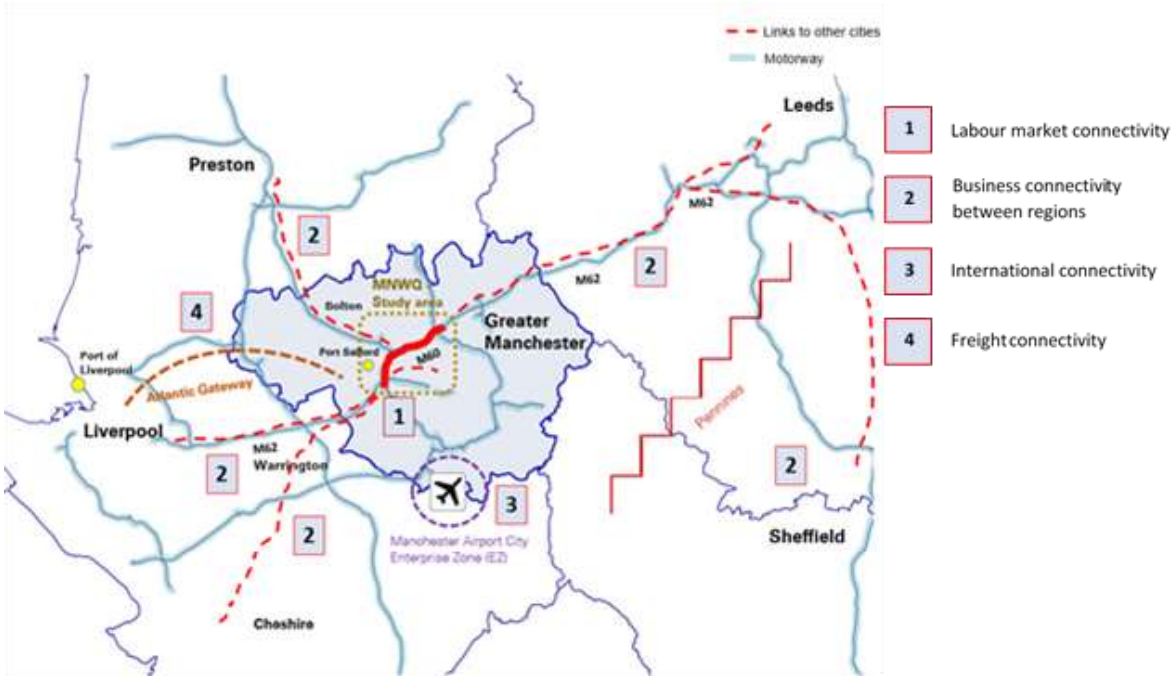
Greater Manchester is a major driver of economic activity but its future development could be constrained by its transport network. Given the importance of Greater Manchester to the economy of the North, these constraints will likely have important implications for the development of the Northern Powerhouse.

3.2.2 Barriers to economic growth

Greater Manchester's North West Quadrant has some well documented transport and transport related problems that could present barriers to economic growth. The barriers arise from a lack of transport capacity within Manchester itself, a relative lack of connectivity to other cities in the North and the rest of the UK and access to international ports for passenger and freight traffic.

[29] Greater Manchester Combined Authority (2014) A Plan for Growth and Reform in GM: transport strategy and investment plan
http://www.tfgm.com/ltp3/Documents/GMGRP-Transport-Strategy.pdf
[30] Greater Manchester Combined Authority (2014) A Plan for Growth and Reform in GM: transport strategy and investment planhttp://www.tfgm.com/ltp3/Documents/GMGRP-Transport-Strategy.pdf
[31]http://www.marketingmanchester.com/media/83677/greater%20manchester%20leisure%20visitor%20survey%202014%20-%20key%20findings.pdf
[32]https://www.visitengland.com/biz/resources/insights-and-statistics/market-size-and-value/domestic-overnight-tourism-gbts/great-britain-tourism-survey-2014/domestic-tourism-overview-2014
[33] https://www.visitbritain.org/town-data

Figure 7- Transport barriers to economic growth



Source: KPMG analysis

Figure 7 provides an illustration of some of the key transport barriers with MNWQ. These barriers translate into loss of economic output by inhibiting:

1. Labour Market Connectivity – the access of workers to jobs and firms' ability to draw from a larger pool of skilled labour
2. Business to Business Connectivity – the ease of connections between firms
3. International Connectivity - businesses place greater importance on good air links, which is closely linked to levels of foreign direct investment
4. Freight Connectivity – the ease and cost of trade requiring the physical transfer of goods.

These barriers are considered further below.

Labour market connectivity

Labour market connectivity and capacity constraints increase the costs associated with commuting. This creates barriers to the movement of labour not only in Greater Manchester, but also possibly affecting commuting trips near the M60 through network effects. The greatest impact of removing these barriers is expected to occur within Greater Manchester, with smaller impacts expected in other locations such as Preston. Greater Manchester has the largest travel-to-work area of any conurbation in the UK outside of London with 7 million people living within one hour's drive of the city centre. Commuting costs constrain productivity by preventing business from attracting the right skills. Forecasts indicate an underlying job growth of 120,000 new jobs over the next 20 years, with almost half of these jobs expected in Manchester alone and a large proportion of them located in the Regional

Centre[34]. In addition, a lack of internal networks and trading links within the city region may be preventing innovation[35]. Traffic congestion travelling south on M61 and joining M60 eastbound (clockwise) are examples of how labour market connectivity into Manchester is already being inhibited. There is a risk that transport barriers such as heavy congestion may be constraining future growth.

Business connectivity between regions

The North suffers from limited inter-city and intra-city business-to-business connectivity restricting the frequency and efficiency of business interactions within the North and across the rest of the UK. The North in particular suffers from limited regional connectivity preventing the region from becoming a single functional economic area currently preventing the region from reaching its economic potential.

Across the study area there are both physical and economic barriers restricting trade and business interactions. These barriers limit clustering of businesses, i.e. agglomeration economies, causing underutilisation of the potential knowledge/innovation spill-overs resulting from improved efficiencies.

The strategic routes within the study area include the M60 and M62 – some of the most congested areas on the SRN – and are the key transport links between Manchester, Leeds and Liverpool. These strategic roads connect these markets as well as extend connectivity to international markets - with the provision of access to the Port of Liverpool, as well as Manchester International Airport. This combined with physical barriers, such as the Pennines, limits connectivity between businesses in Sheffield with Greater Manchester, ports and the airport.

International connectivity

Manchester Airport is the main airport in the North and third largest airport in the UK in terms of passenger numbers[36], serving over 200 destinations worldwide. It will be subject to £1bn investment over the next 10 years[37]. The Airport City Enterprise Zone will also bring significant investment including a World Logistics Park. Capacity on the transport network is constraining access to the airport and therefore international connectivity of the Northern Powerhouse, as well as limiting the

[34] Greater Manchester Combined Authority (2014) A Plan for Growth and Reform in GM: transport strategy and investment plan
http://www.tfgm.com/ltp3/Documents/GMGRP-Transport-Strategy.pdf
[35] Manchester Independent Economic Review (2009)
http://www.manchester-review.org.uk/
[36] CAA (2014) UK Airport Statistics
[37] http://www.manchesterairport.co.uk/about-us/media-centre/fact-sheets/airport-summary

potential of the Enterprise Zone - 84% of passengers[38] arrive at the airport by car including taxi. The capacity of the transport network may also be restricting demand in the North for Manchester Airport, which has an impact on the flight frequencies it can support and resulting international connectivity. International connectivity affects not only business and leisure travel, but also freight and logistics - the airport has a World Freight Terminal and currently handles around 100,000 tonnes of import and export freight and mail annually[39]. In addition, the provision of good transport links for international visitors is a key issue, as Manchester Airport expands to grow from 20m in 2013 to 55m passengers by 2050[40], thus indicating substantial growth potential of the visitor economy.

TfN has recently commissioned a work stream to consider International Connectivity of the North, the findings of this will be considered during future stages of this study.

Freight connectivity

Freight movements are key for the economy of the North and will become increasingly important with major investments planned and underway. Important developments in the freight sector in the North include new warehousing facilities and business parks, like Omega Park in Warrington and Kingsway Business Park near Rochdale, as listed in section 4.6

Some of these developments are located directly within the study area and will therefore have a considerable impact on the use of the transport network. For instance, Port Salford, a freight terminal currently under construction located on the banks of the Manchester Ship Canal between the M60 and M62, will put increasing pressure on these roads as freight is distributed from the Port to the rest of Greater Manchester.

Port Salford is part of the Atlantic Gateway, a redevelopment strategy for the North West of England, backed by £50 billion investment over 50 years[41]. The economic impacts of this programme of investments, which includes major investments at the Port of Liverpool and the Port of Warrington, could be significantly limited by current transport barriers, as road congestion within Manchester's north-west quadrant area restricts connectivity and freight movements from/to these ports.

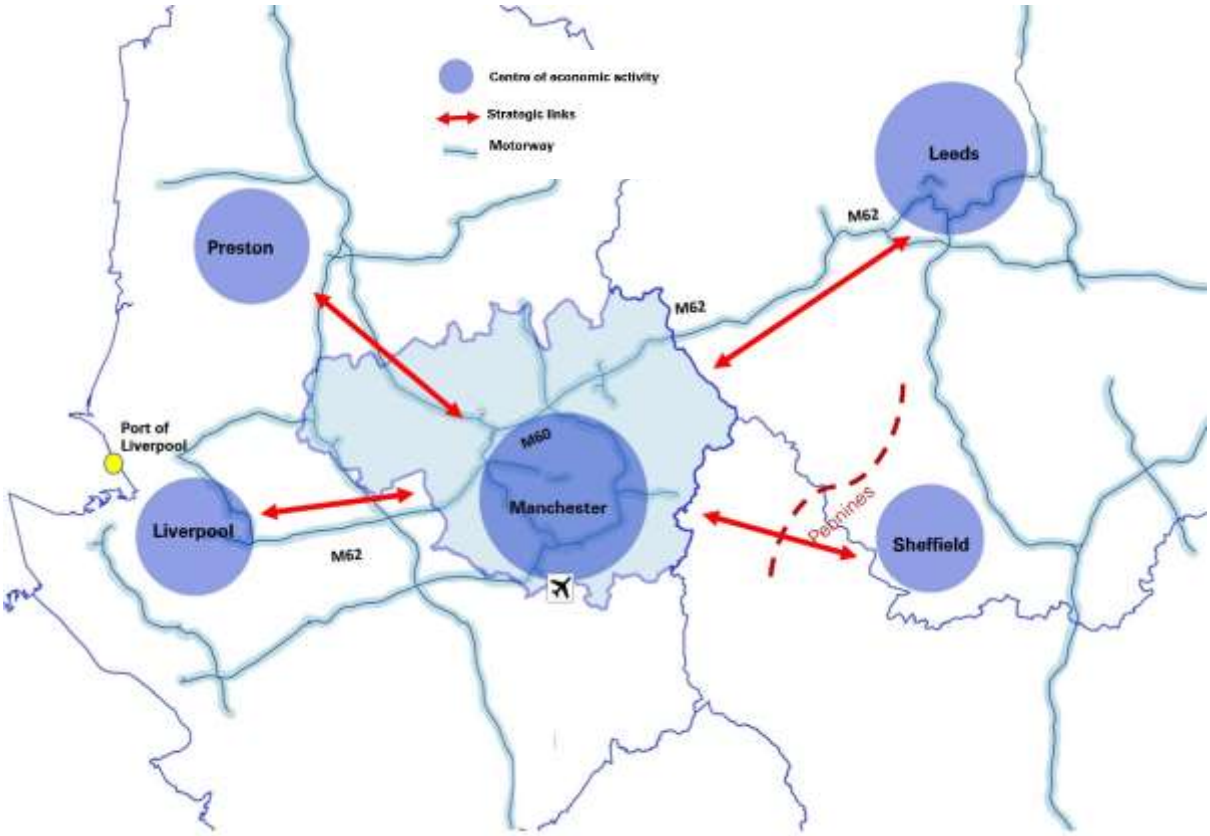
In summary, overall freight connectivity in the North could to be affected by limited connectivity in the study area, which will be aggravated by major investments in the study area and surrounding regions requiring increasing transport network capacity.

[38] CAA Mode Share Statistics (2014) https://www.globalairrail.com/images/content/publications/brochures/UK%20AirRail%202015%20Ebook3.pdf
[39] http://www.manchesterairport.co.uk/about-us/
[40] http://www.constructionenquirer.com/2015/06/02/manchester-airport-rolls-out-1bn-expansion-plan/
[41] http://www.atlanticgateway.co.uk/latest-news?&p=2

3.2.3 The expected impacts resulting from the MNWQ

The vision for a Northern Powerhouse is based on the belief that by strengthening the transport connections within and between the cities of the North, their combined 'economic mass' could rival that of London and the South East.

Figure 8 - Agglomerations and super-agglomerations



Source: KPMG analysis

As shown in Figure 8 above given its location within the axis of cities forming the Northern Powerhouse, Manchester has a key role to play in the Northern Powerhouse.

Estimation of the scale and geographical location of changes in economic output brought about by investment in transport infrastructure will require relatively innovative approaches to modelling and appraisal based upon empirical evidence on the strength of the relationship between economic productivity and transport connectivity. Given the uncertainties surrounding the strength of that relationship, the impacts of investment on the performance of the transport network and the impact of other initiatives of the success of the Northern Powerhouse agenda, careful development of a range of potential future scenarios will be needed to illustrate the scale and distribution of potential outcomes.

- The proposals to improve the highways networks around Manchester within the MNWQ should enhance labour market connectivity. For example, schemes which add capacity to heavily congested sections of the M60 and M61 motorways can be expected to increase reliability for workers living outside of Manchester, who are seeking access to jobs;
- Improving business connectivity between regions will increase business interactions across the region. This reduces costs incurred, increases business efficiency and increases clustering of business activity leading to knowledge/innovation spill-overs. Improved access to domestic markets such as access between Leeds and Manchester, and access to international markets through improved access to Manchester airport and Liverpool seaport would increase trade and productivity that is truly additional to the Northern Economy;
- Investment in the MNWQ will bring additional connectivity to Manchester Airport resulting in improved international connectivity of Manchester and the North and having a positive impact on the visitor economy and businesses in the wider regions;
- Increased transport capacity in the MNWQ area could benefit freight significantly by reducing the cost and delay to freight movements and supporting the growth in freight that major investments such as the Atlantic Gateway will bring, and
- Increased transport capacity could help to underpin the importance of the Greater Manchester region as a retail, leisure and sporting destination.

3.3 Planning context

Within and adjacent to the study area there are significant growth aspirations. The Greater Manchester Combined Authorities are currently developing the Greater Manchester Spatial Framework (GMSF) which will produce a plan to manage the supply of land for jobs and new homes across Greater Manchester. It is currently anticipated that the GMSF will be finalised in 2017 and adopted in 2018. Future stages of the Manchester North-west Quadrant study will need to take account of the GMSF in the development of any interventions.

The GMSF has identified three options to cover the broad range of growth levels over the period 2014 - 2035 to which Greater Manchester could aspire, these options are set out below:

Option 1 – Identifies sites across Greater Manchester that could meet the development needs over the period that would be broadly compliant with existing planning policies. This option would deliver the following levels of development over the period:

152,800 net additional dwellings (7,300 dwellings per annum)
2,526,000m^2 of new industrial and warehousing floor space (120,300m^2 per annum)
2,573,300m^2 of new office floor space (122,500m^2 per annum)

Option 2 – Reflects the scale of population, household and economic growth that should be planned for having regard to the positive vision for a successful Greater Manchester. This option would deliver the following levels of development over the period:

217,350 net additional dwellings (10,350 dwellings per annum)
3,542,000m^2 of new industrial and warehousing floor space (164,400m^2 per annum)
2,399,000m^2 of new office floor space (114,200m^2 per annum)

Option 3 – Reflects higher growth aspirations than Option 2 to rebalance the national economy and reflects and increased level of new housing and an increased rate of economic growth associated with this rebalancing. This option would deliver the following levels of development over the period:

336,050 net additional dwellings (16,000 dwellings per annum)
4,050,000m^2 of new industrial and warehousing floor space (192,900m^2 per annum)
2,725,000m^2 of new office floor space (129,800m^2 per annum)

The GMSF only covers development proposals within the Greater Manchester area, adjacent areas also have future development proposals which will impact upon the study area.

The proposed developments associated with Manchester Airport will also have a major bearing on the study. Significant industrial and office developments are planned within the vicinity of the airport and these are accounted for within GMSF. The airport has ambitious plans to grow its passenger market from the current 22million trips per annum in 2014/15 to 45 million. The full potential of Manchester Airport and its associated benefits to the economy of the north will only be realised if suitable surface access to the airport is provided.

KEY FINDINGS - Strategic Economic & Planning Context

3a	The SRN within the study area performs multiple functions, providing international, national, regional and local connectivity.
3b	The Northern Transport Strategy demonstrates that strengthening the transport connections within and between the cities of the North, their combined 'economic mass' could rival that of London and the South East. The SRN within the study area is key to connecting particularly Liverpool, Manchester, Preston, Leeds, and Hull.
3c	In the context of achieving the Northern Powerhouse, Greater Manchester will be a major driver of economic activity however future performance will be constrained by its transport network, of which the SRN within the study area is a key element.
3d	The Greater Manchester Spatial Framework (GMSF) is currently considering three options to determine how Greater Manchester will deliver growth within the period 2014 – 2035, The developments associated with the GMSF and those of adjacent will impact upon the study area.
3e	Significant developments not currently included in the current modelling are Port Salford and Liverpool 2.
3f	The (economic) consequences of not addressing the connectivity problems across the North particularly within the study area, could mean the constraints identified within this report will likely have important implications for the development of the Northern Powerhouse agenda.
3g	The estimation of the scale and geographical location of changes in economic output brought about by this investment will require innovative modelling approaches to illustrate the potential scale and distribution of the impacts.

4 Current Transport Problems

The study area comprises the SRN, local roads including the KRN, rail and Metrolink lines, a large number of bus routes and freight movements. There is an interdependency between these various networks and from a customer point of view they are used as a cohesive network. A description of the current transportation provision within the study area is given earlier in section 2 of this report.

4.1 Traffic Flows on the SRN

Traffic flows on the SRN are detailed in Figure 11 to Figure 15.

Figure 11 shows Average Annual Daily Flows AADF flows and %HGV for the study area.

Figure 12 to Figure 15 show average hourly flows and %age HGVs for the weekday AM peak (0700 – 1000), inter peak (1000 – 1600), PM peak (1600 – 1900) and off peak periods. In this context off peak refers to the overnight period between the end of the PM peak period one day until the commencement of the AM peak period the following day.

Key observations for weekdays are:

- between junctions 12 and 18, where the M60 and M62 are coincident, two way AADF's range from 150,000 to 181,000. As can be seen from Figure 9 AADF flows of this magnitude exceed those anywhere else on the motorway network with the exception of the western section of M25 and the southern end of the M1;
- the proportion of HGV's is generally in excess of 15% of the total traffic throughout the AM and inter-peak periods. This proportion then reduces during the PM peak period before increasing again to between 15% and 20% off-peak (overnight). The M25 has a typical HGV percentage of 8% (of AADF) ;
- average hourly two-way volumes are up to 10% higher in the PM peak compared with the AM peak although, as noted above, the proportion of HGVs is lower, and
- total traffic volumes remain very high throughout the working day with average inter-peak flows between 85% and 90% of average peak flows.

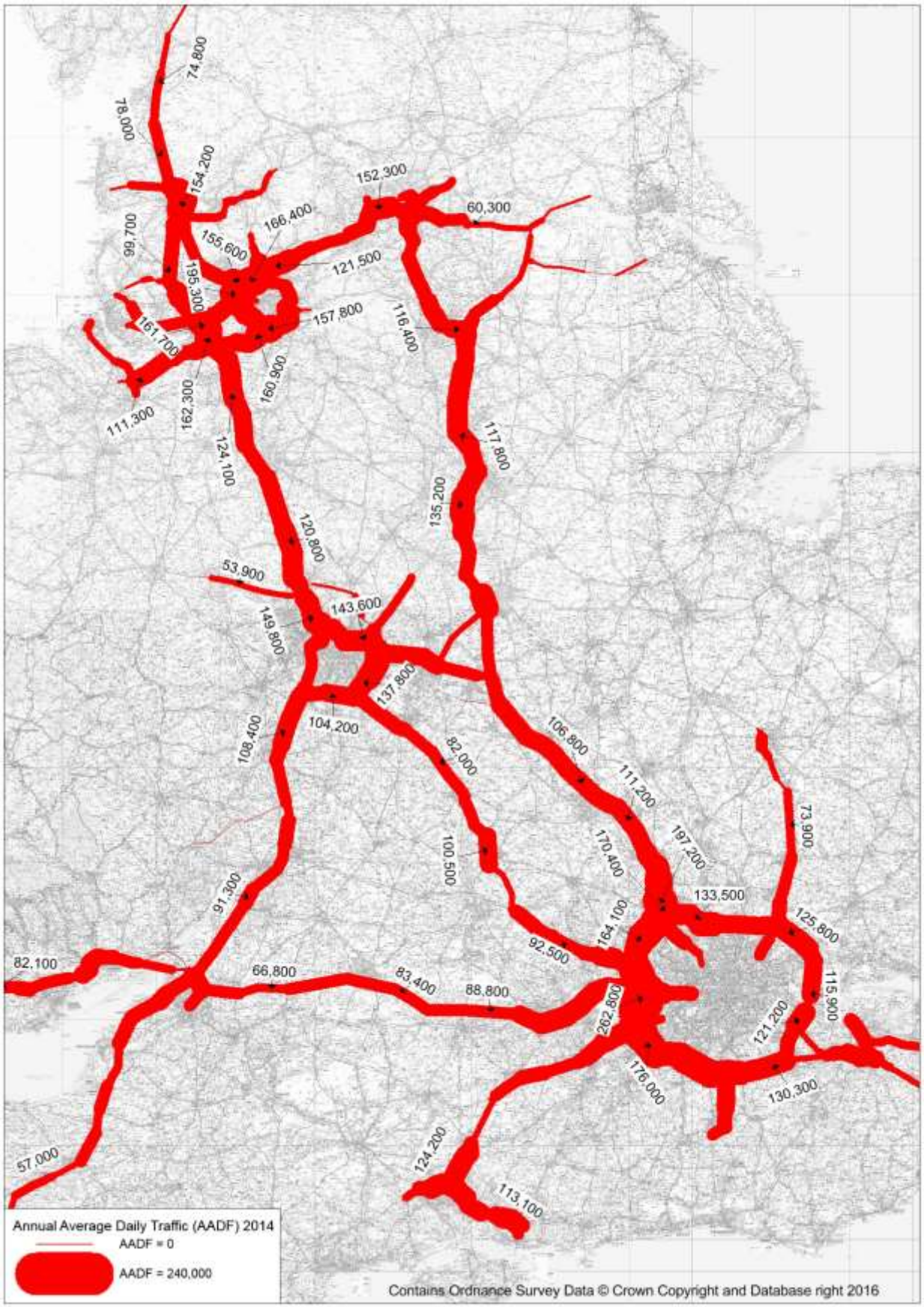
Figure 16 shows weekend flows averaged over the period 1200 to 1900 on a Saturday.

Key observations at weekends are:

- on the M60, between junctions 8 and 18, average hourly flows are generally similar to those observed in the weekday inter-peak period, and

- the proportion of HGVs is generally less than 4% and significantly lower than weekdays. The proportion of HGVs on M62 west of junction 12 and east of junction 18 is around 5% indicating a continuation of strategic freight movements over the weekend.

Figure 9 - Two-way annual average daily traffic volumes (AADF) for the motorway network, 2014[42]



The top 25 SRN motorway links in terms of traffic flows are shown in Table 1 below

Table 1 - Top 25 motorway links by AADF

No	Road Name	Section	Two way AADF
1	M25	M25 J14 - J15	262,800
2	M1	M1 J7 - J8	197,200
3	**M60**	**M60 J13 - J12**	**195,300**
4	M25	M25 J13 - J14	186,900
5	M25	M25 J12 - J11	185,300
6	M25	M25 J18 - J19	177,400
7	M25	M25 J11 - J10	176,000
8	M25	M25 J16 - J15	174,900
9	M25	M25 J12 - J13	174,200
10	M1	M1 J6A - J7	170,400
11	**M60**	**M60 J16 - J17**	**166,400**
12	**M60**	**M60 J17 - J18**	**165,900**
13	M25	M25 J8 - J7	165,600
14	M25	M25 J17 - J18	164,100
15	M6	M6 J20 - J21	162,300
16	M8	M8 J16 - J15	161,800
17	M6	M6 J21 - J21A	161,700
18	M56	M56 J4 - J3	160,900
19	M4	M4 J4B/M25 - J4	159,500
20	**M60**	**M60 A34 - M60 spur**	**157,800**
21	**M61**	**M61 J2 - J3**	**155,600**
22	**M60**	**M60 J14 - J15**	**155,400**
23	M1	M1 J8 - J9	155,000
24	M1	M1 J9 - J10	154,600
25	M6	M6 J30 - J31	154,200

From table 2 it can be seen that out of the top 25 motorway links in terms of traffic flow, five of these are located within the study area, with the section of the M60 between junctions 13 and 12 carrying the 3rd highest motorway flow in England.

Figure 10 and Table 2 compare average hourly volume data for weekdays in 2005 and 2014 for M60 between junctions 12 and 13, the most heavily trafficked section of the SRN within the study area. The source of this data is TRADS 2005 being the earliest available year and 2014 the most recent for which complete data is available. As the data presented represents Average Annual Weekday Traffic (AAWT), the two way daily totals are higher than the AADF totals presented previously.

[42] DfT, https://data.gov.uk/dataset/gb-road-traffic-counts

Figure 10 - Hourly traffic profile, M60 junction 12 to 13 both directions

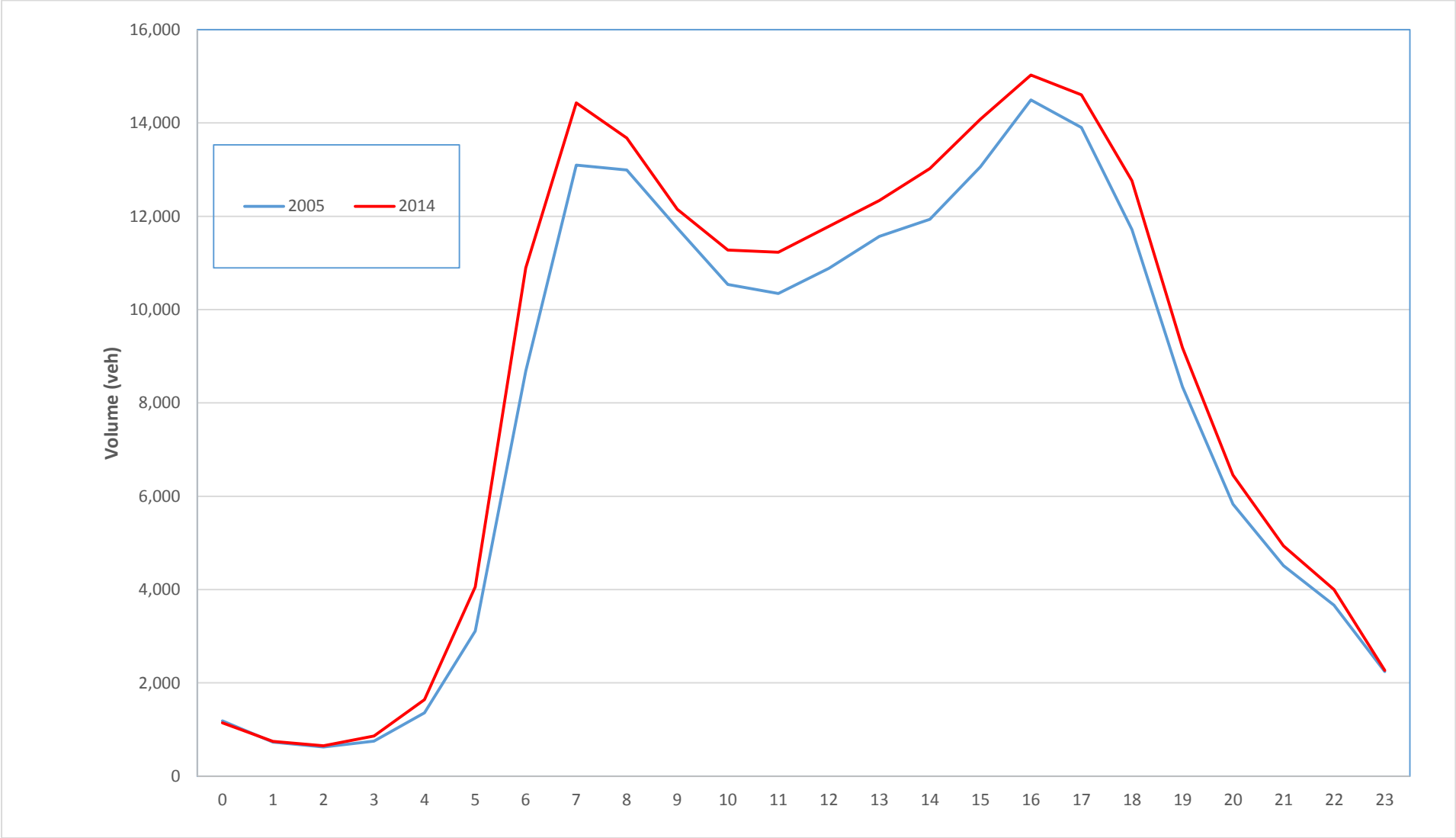


Table 2 - Hourly traffic profile, M60 junction 12 to 13 both directions

Hour Starting	Clockwise		Anti-Clockwise		Both Directions		
	2005	2014	2005	2014	2005	2014	
0	704	710	479	434	1,183	1,144	
1	436	428	294	317	730	744	
2	349	347	278	304	627	651	
3	355	366	398	497	752	862	
4	512	603	847	1,036	1,359	1,639	
5	1,132	1,378	1,979	2,681	3,111	4,060	
6	3,146	4,149	5,536	6,745	8,682	10,894	
7	5,672	6,987	7,427	7,445	13,099	14,431	AM Peak
8	5,838	6,590	7,157	7,087	12,995	13,676	
9	5,134	5,507	6,614	6,644	11,748	12,151	
10	4,713	5,003	5,828	6,272	10,540	11,274	Inter-peak
11	4,981	5,358	5,363	5,874	10,345	11,231	
12	5,465	5,941	5,420	5,841	10,885	11,783	
13	5,888	6,371	5,682	5,969	11,570	12,339	
14	6,518	7,198	5,420	5,825	11,938	13,024	
15	7,452	7,953	5,607	6,130	13,059	14,083	
16	8,196	8,194	6,297	6,836	14,493	15,030	PM Peak
17	7,725	7,877	6,176	6,728	13,901	14,604	
18	6,481	6,972	5,237	5,788	11,719	12,761	
19	4,522	5,095	3,826	4,088	8,347	9,182	
20	3,361	3,814	2,468	2,642	5,829	6,456	
21	2,741	3,045	1,772	1,892	4,513	4,937	
22	2,361	2,642	1,306	1,361	3,667	4,003	
23	1,388	1,452	855	817	2,243	2,269	
Total	**95,069**	**103,978**	**92,267**	**99,252**	**187,336**	**203,230**	

Table 3 and Table 4 then present average hourly traffic volumes as a proportion of the daily volumes and average inter-peak volumes. For this exercise the AM peak period is 07.00 to 10.00; the Inter-peak period is 10.00 to 16.00; and the PM peak period is 16.00 to 19.00.

Table 3 - Hourly traffic as a proportion of daily total – M60 junctions 12 to J13 both directions

Hour Starting	2005	2014
00.00	0.6%	0.6%
01.00	0.4%	0.4%
02.00	0.3%	0.3%
03.00	0.4%	0.4%
04.00	0.7%	0.8%
05.00	1.7%	2.0%
06.00	4.6%	5.4%
07.00	7.0%	7.1%
08.00	6.9%	6.7%
09.00	6.3%	6.0%
10.00	5.6%	5.5%
11.00	5.5%	5.5%
12.00	5.8%	5.8%
13.00	6.2%	6.1%
14.00	6.4%	6.4%
15.00	7.0%	6.9%
16.00	7.7%	7.4%
17.00	7.4%	7.2%
18.00	6.3%	6.3%
19.00	4.5%	4.5%
20.00	3.1%	3.2%
21.00	2.4%	2.4%
22.00	2.0%	2.0%
23.00	1.2%	1.1%

Table 4 - Average hourly inter-peak two-way volumes as a proportion of average hourly peak volumes – M60 junction 12 to J13 both directions

	Both Directions	
	2005	2014
AM Peak	12,614	13,419
Inter-peak	11,389	12,289
PM Peak	13,371	14,132
Inter-peak / AM Peak %	90.3%	91.6%
Inter-peak / PM Peak %	85.2%	87.0%

A number of observations can made from this data presented above:

- Traffic volumes have increased significantly for all time periods between 2005 and 2014;
- Traffic is building up earlier in the morning – the proportion of the daily total for the hour commencing 06.00 has increased from 4.6% to 5.4% (Table 3);
- Figure 10 shows the manner in which the volumes either side of the PM peak have increased over time (peak spreading), and
- Table 4 shows that in 2014 average inter-peak volumes had increased to 91.6% of AM Peak and 87.0% of PM peak volumes compared with 90.3% and 85.2% respectively in 2005.

Figure 11 - AADF Flows and % HGV

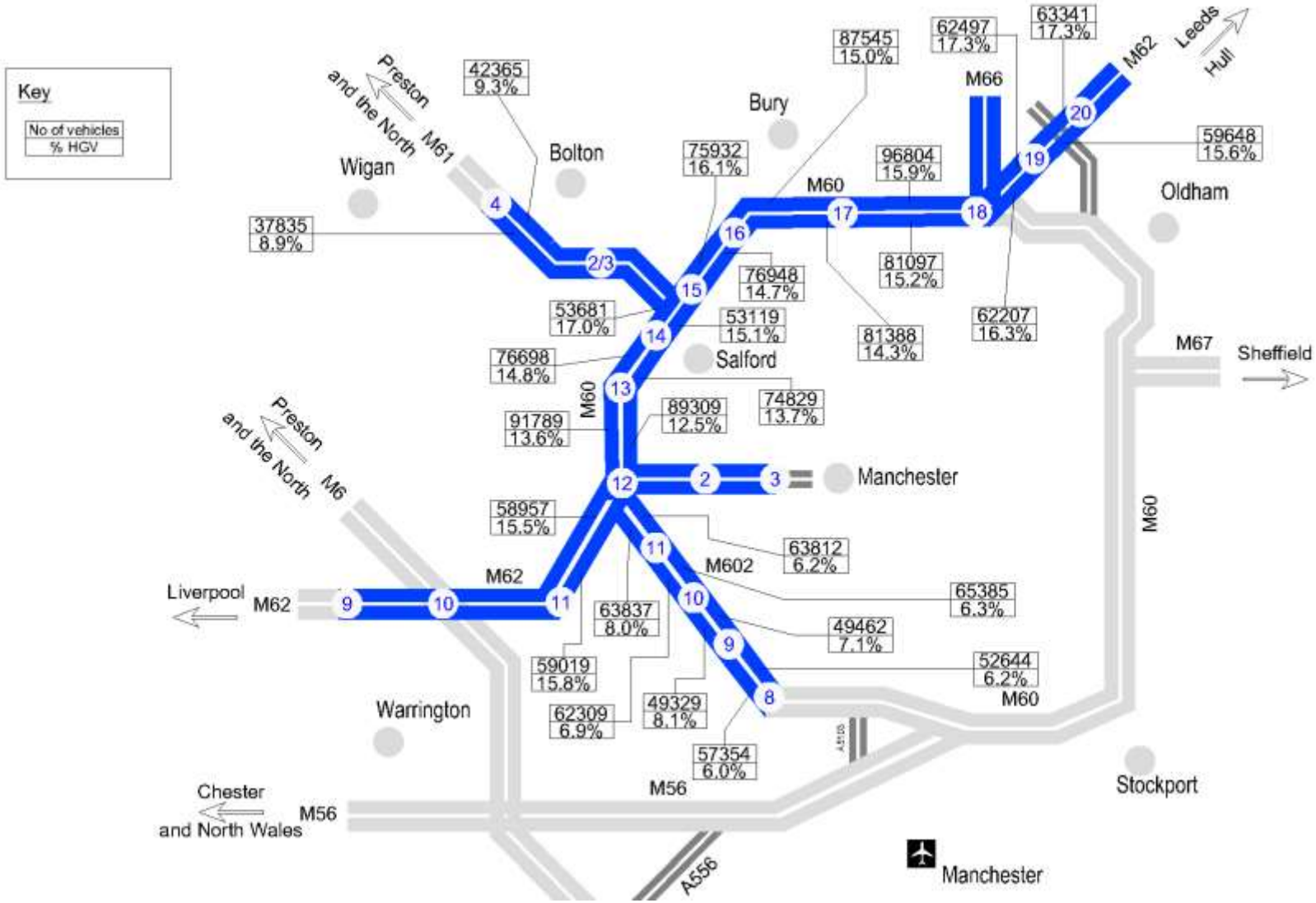


Figure 12 - AM Peak Average Hourly Flow and % HGV's (07.00 – 10.00)

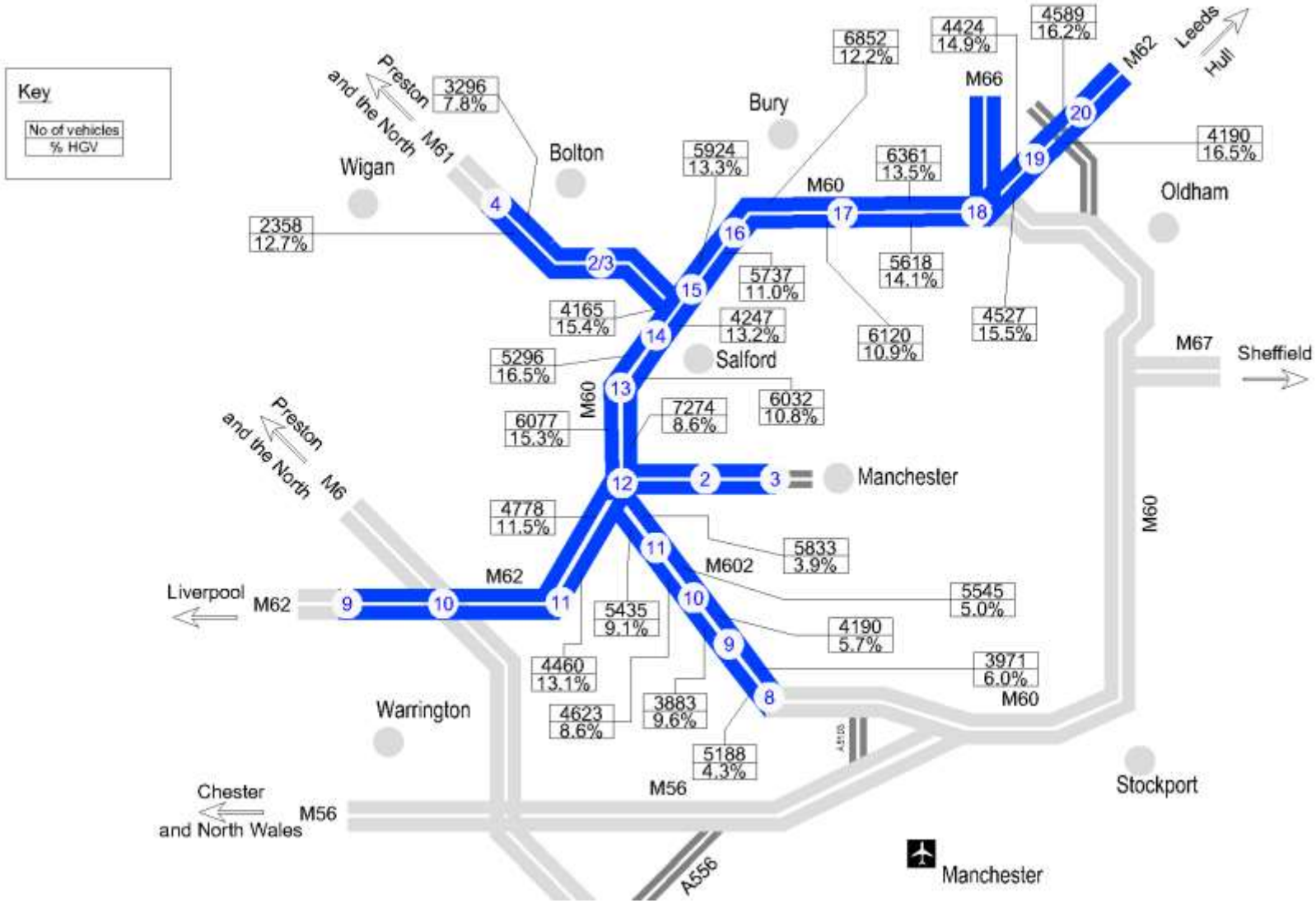


Figure 13 - Inter Peak Average Hourly Flow and % HGV's (10.00 – 16.00)

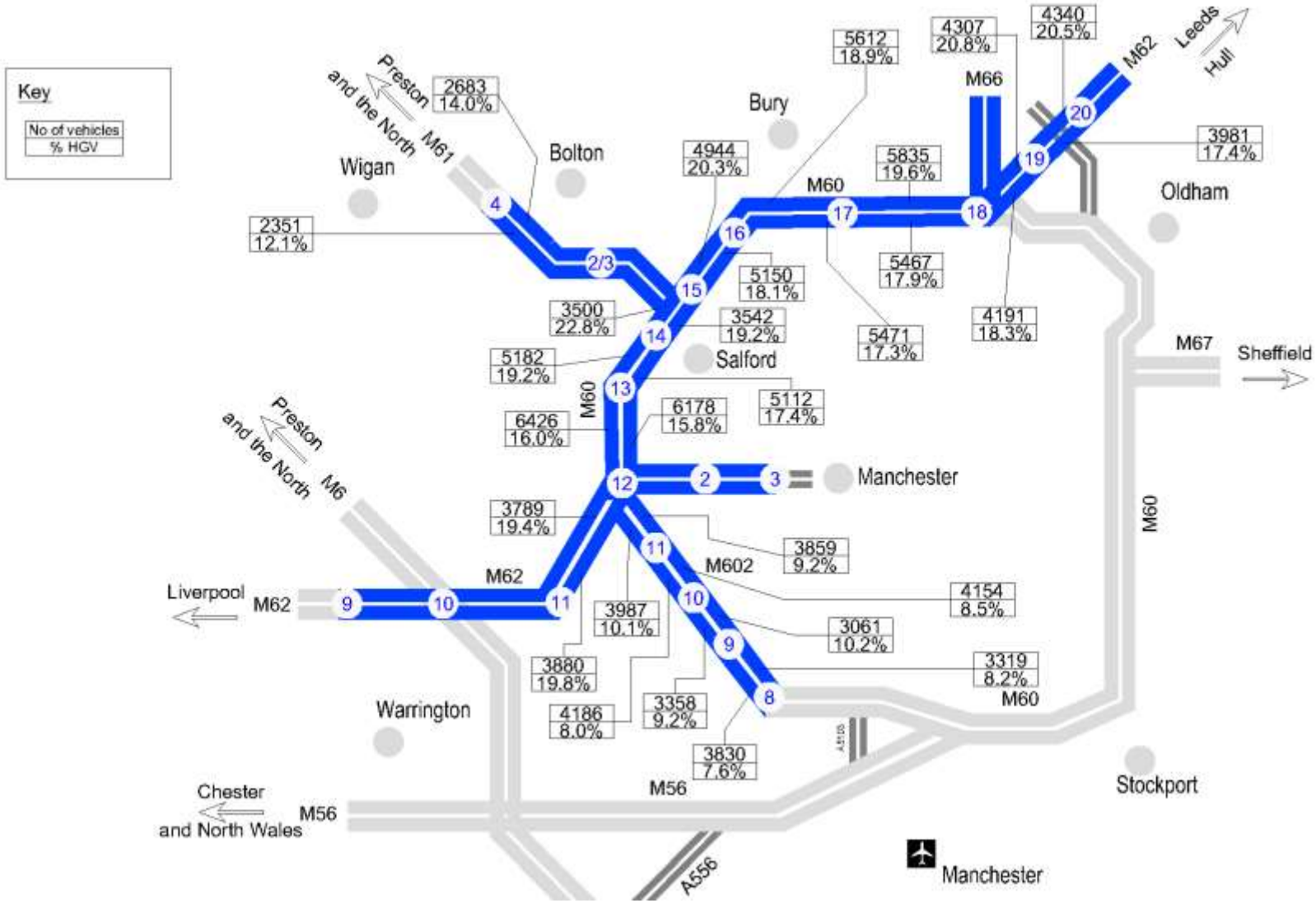


Figure 14 - PM Peak Average Hourly Flow and % HGV's (16.00 – 19.00)

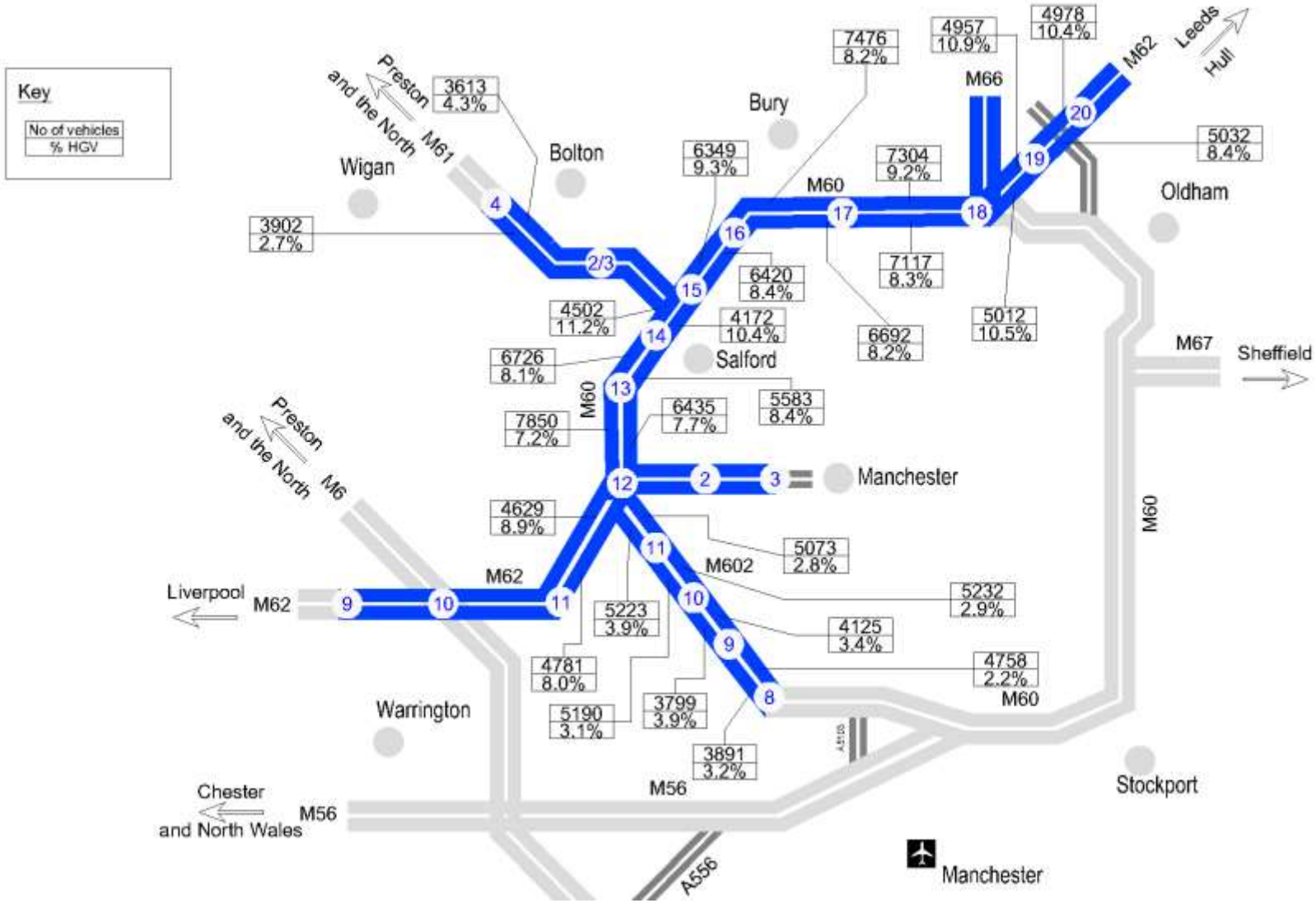


Figure 15 - Off Peak Average Hourly Flow and % HGV's (19.00 – 07.00)

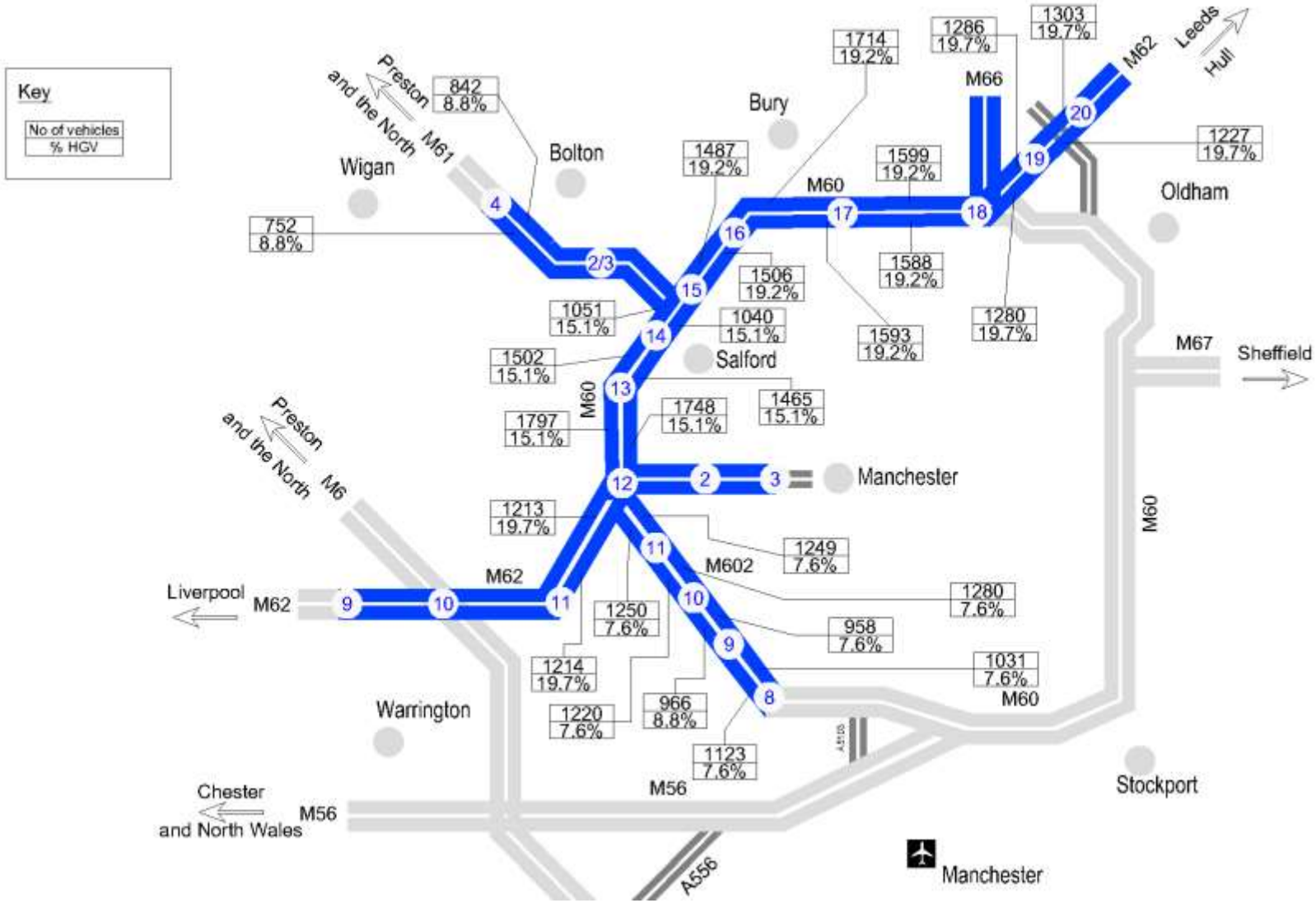
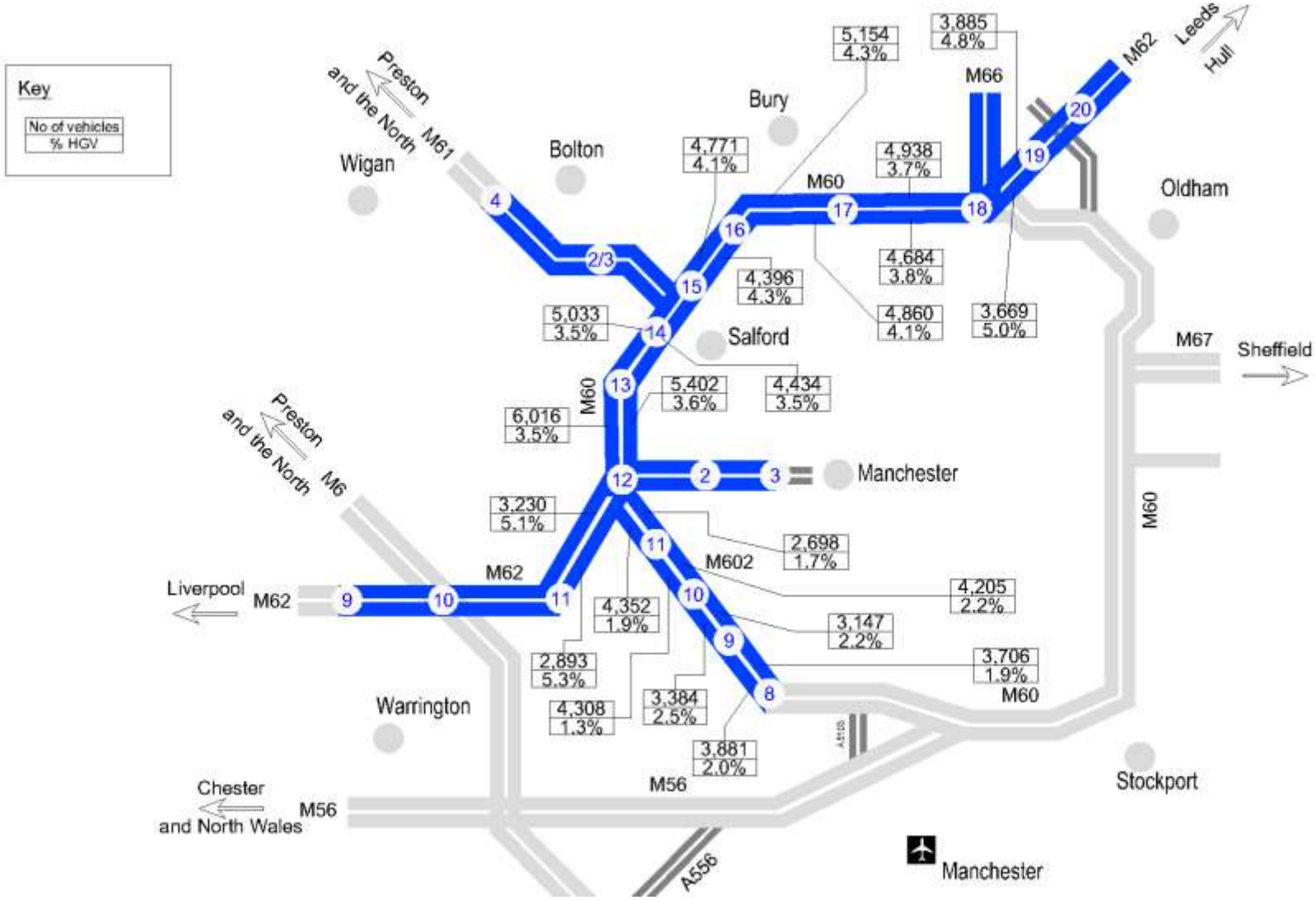


Figure 16 - Weekend Max Flows and % HGV's (12.00 – 17.59)



4.2 Journey Times & Speeds

Figure 17 to Figure 21 show average journey speeds on the SRN within the study area for each of the following time periods:

- AM Peak: Weekday 0600 to 1000
- Inter Peak: Weekday 1000 to 1500
- PM Peak: Weekday 1500 to 1900
- Off Peak: Weekday 1900 t0 0600
- Weekend: Weekend 0700 to 1900

The figures are based on journey time data from TRADS for the month of May 2014. This is the latest neutral month for which data was available prior to work commencing on the SMART motorway upgrade within the study area. The figures depict the observed average journey speeds in miles per hour (mph).

Figure 17 - AM Peak Average Speeds (06.00 – 10.00)

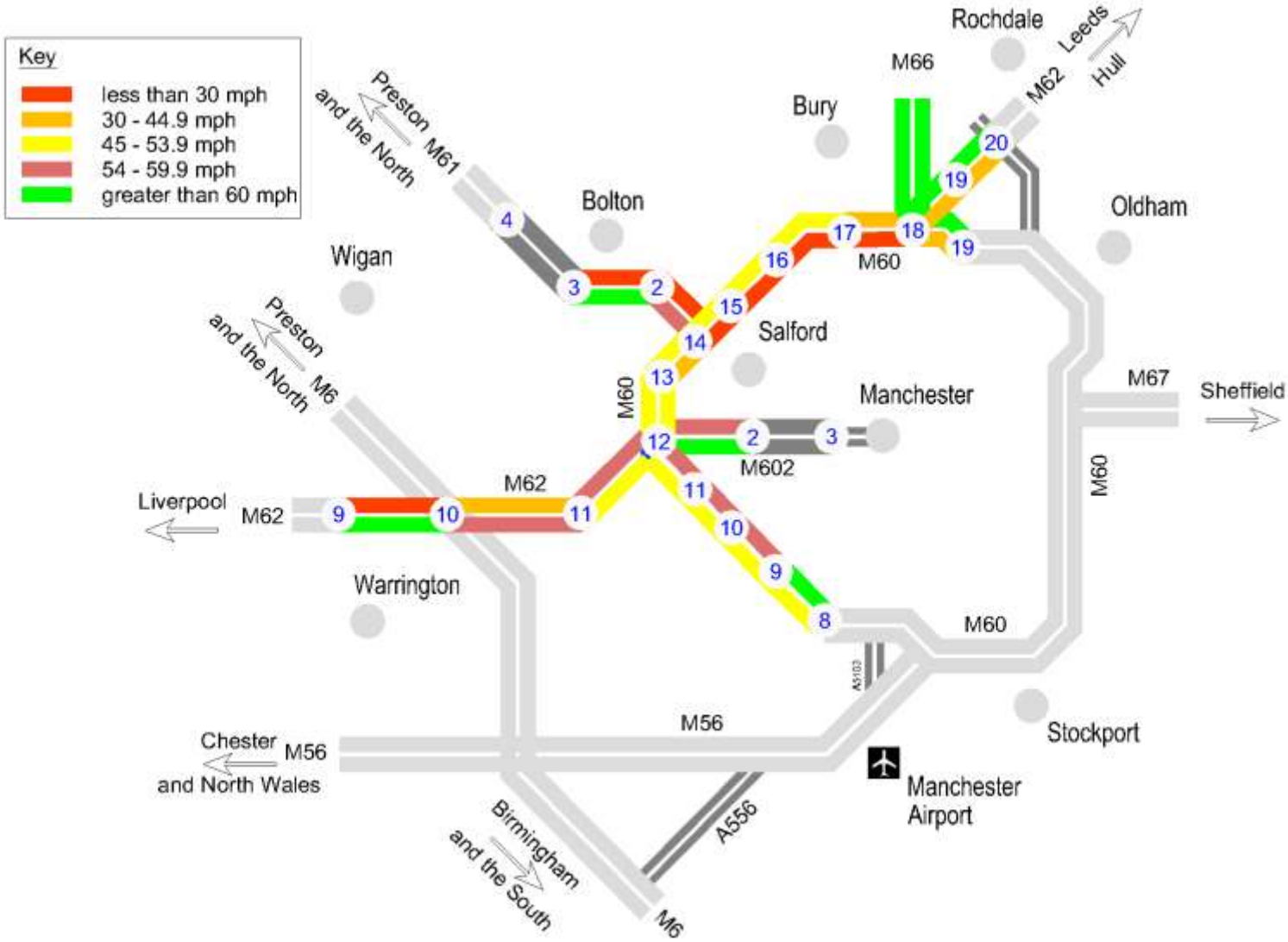


Figure 18 – Inter-peak Average Speeds (10.00 -15.00)

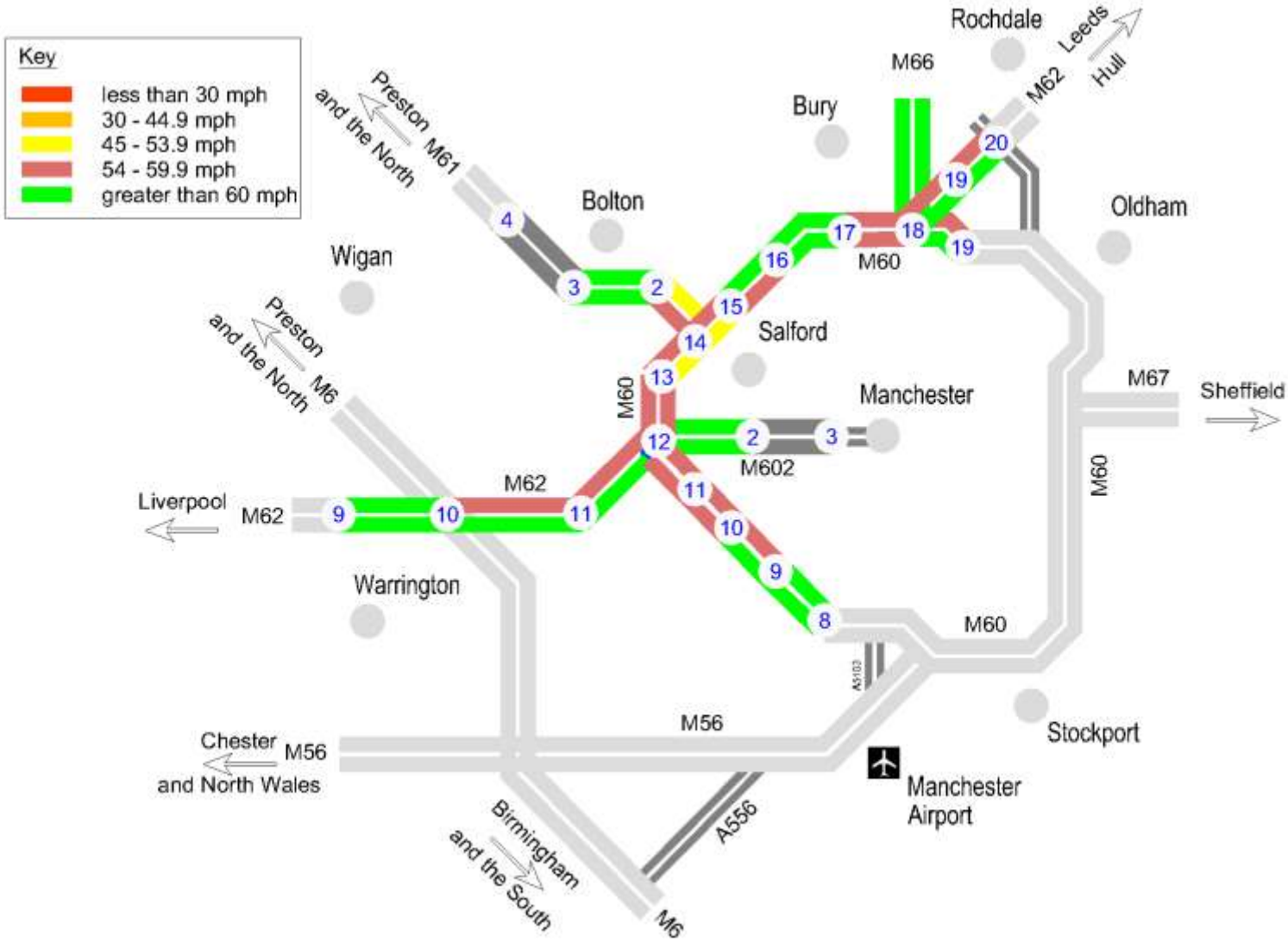


Figure 19 - PM Peak Average Speeds (15.00 – 19.00)

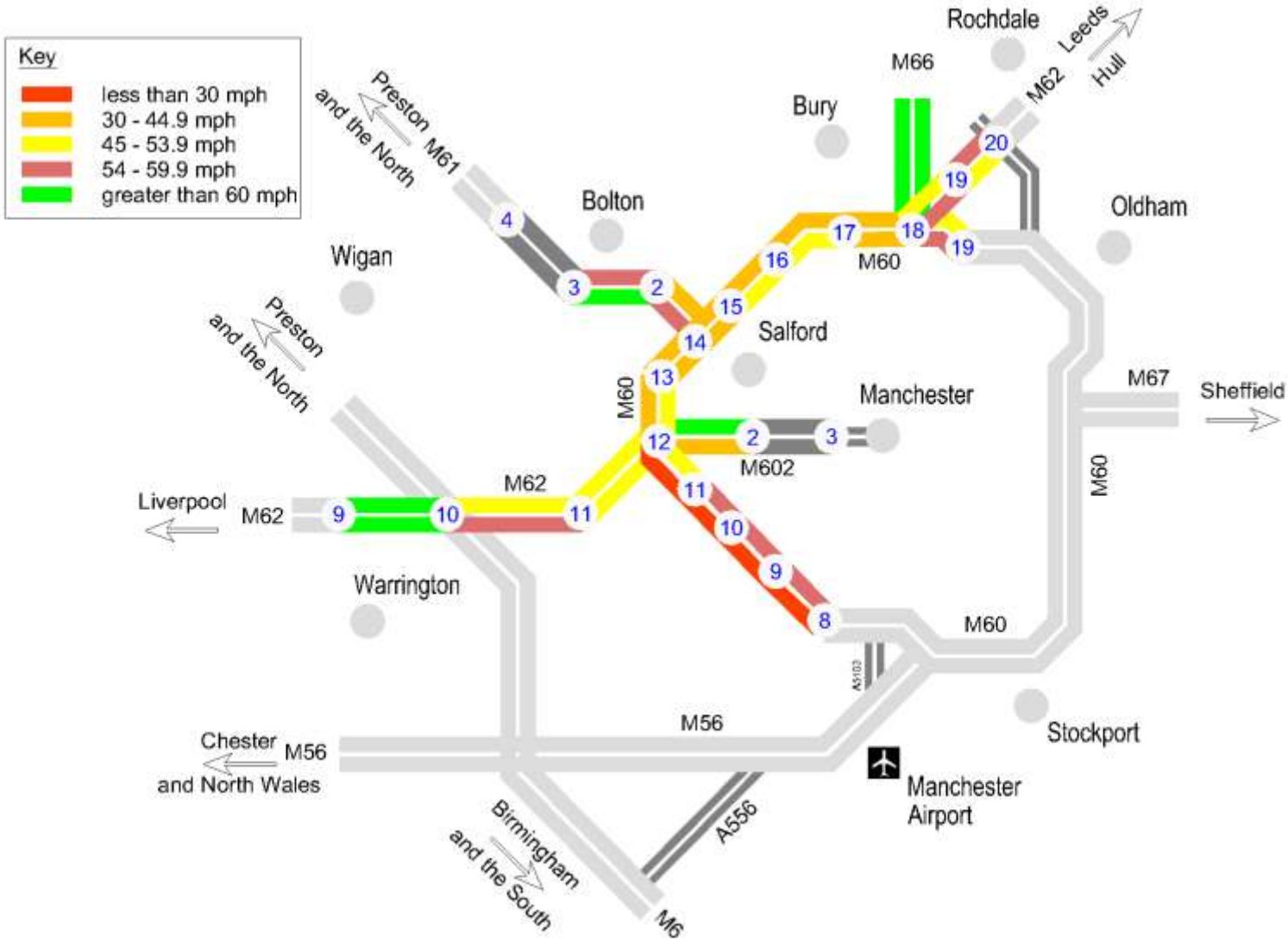


Figure 20 – Off Peak Average Speeds (19.00 – 06.00)

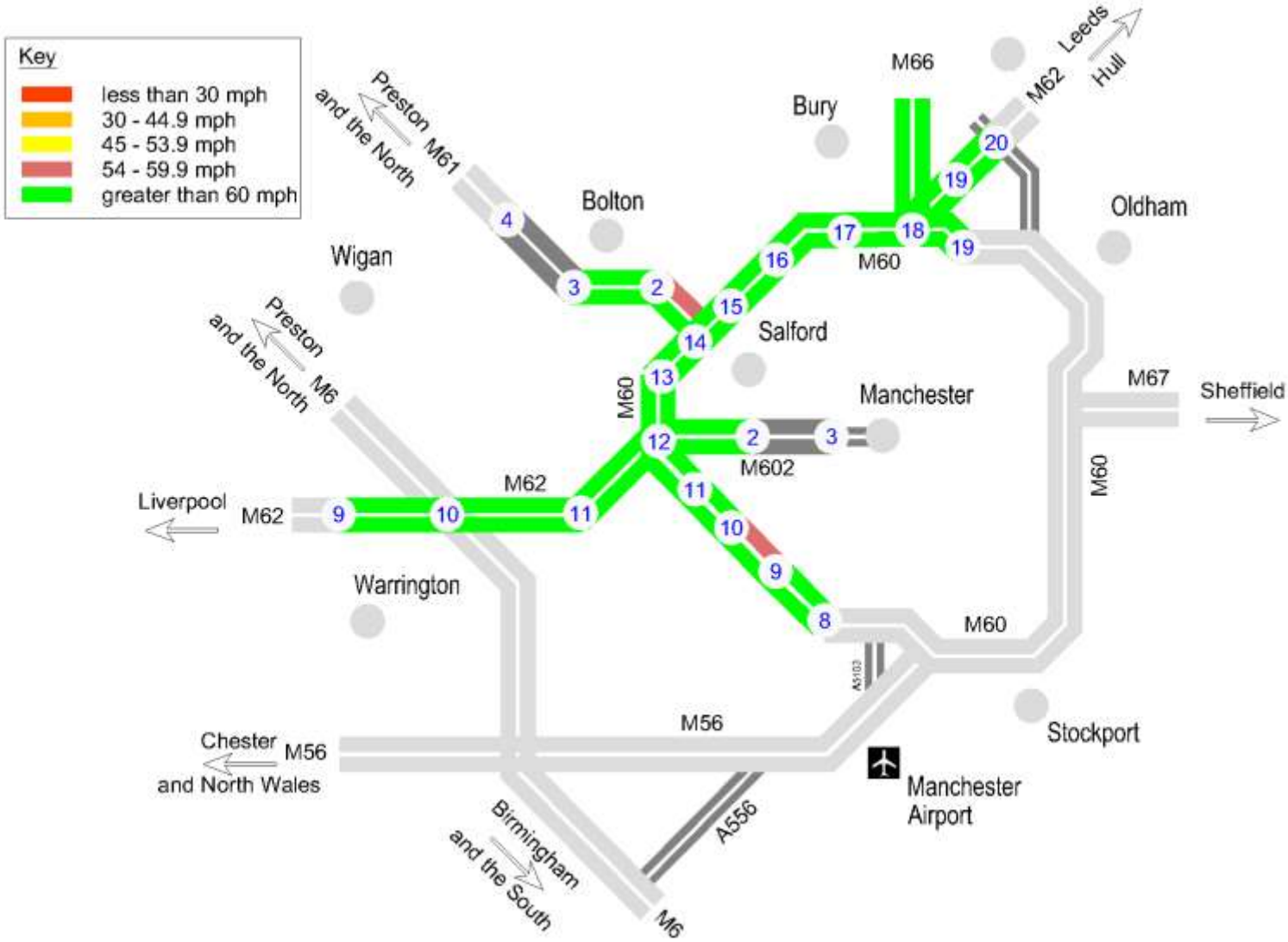
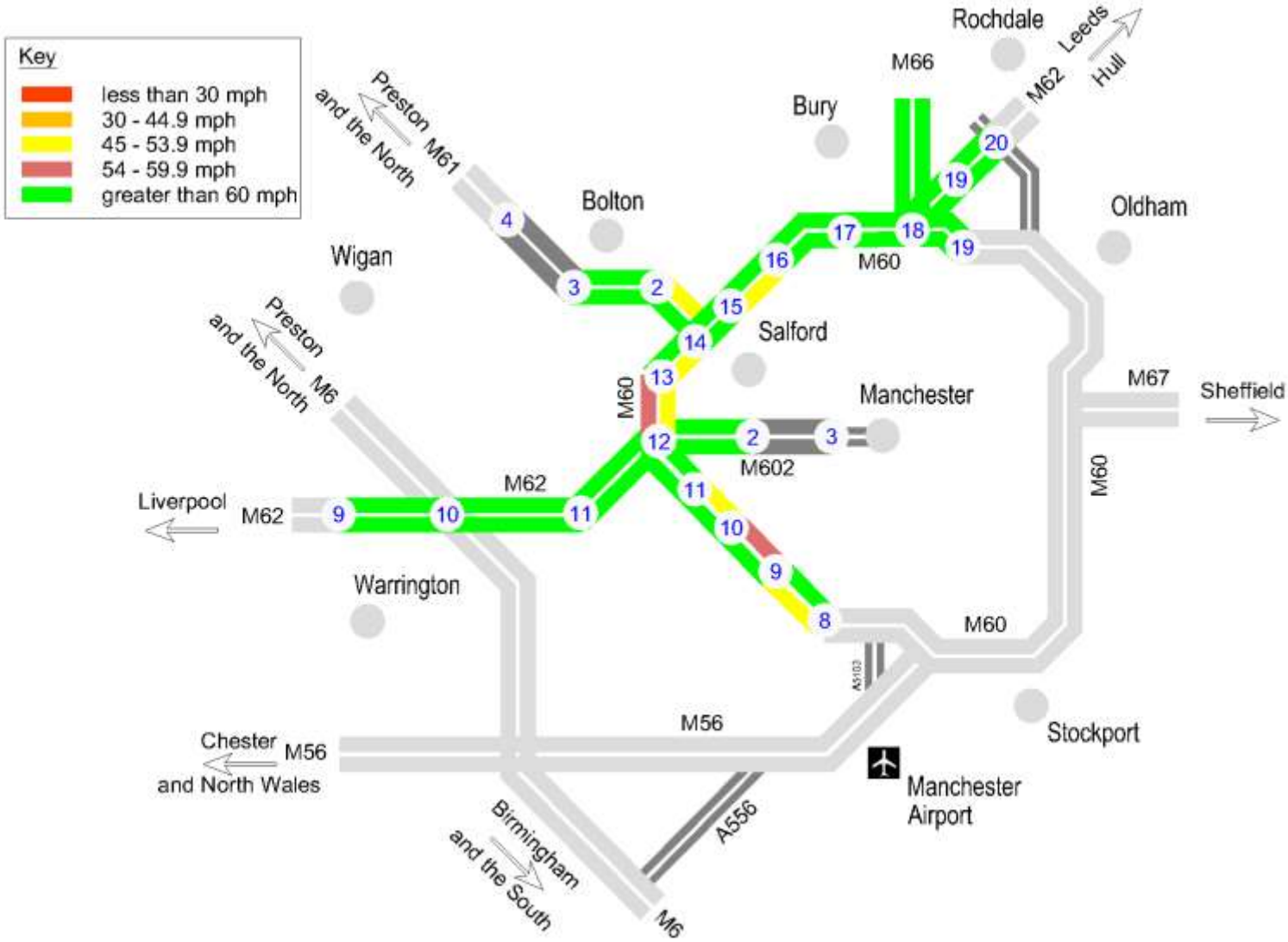


Figure 21 - Weekend Average Speeds (07.00 – 19.00)



The main findings that can be drawn from the figures are:

- The only period for which the network is consistently performing at the desirable operating speed is Off Peak (overnight);
- During the AM Peak period average speeds fall below 30 mph between:
  - M62 eastbound junctions 9 and 10;
  - M61 southbound junction 3 to M60; and
  - M60 anti-clockwise junctions 18 to 14.
- The low average speeds on the M61 and M60 anticlockwise during the AM peak are heavily affected by the merge of M61 and M60 at junction 14;
- During the inter peak period average speeds are generally with 10% of the desired Highways England's 'mile a minute' aspiration;
- During the PM Peak period average speeds fall below 30 mph on M60 anticlockwise between junctions 8 and 12 heavily affected by traffic accessing/egressing the Trafford Centre and the merge between M60/M62 and M602 at junction 12, and
- At weekends average speeds generally remain 20% below desirable on M60 anti-clockwise between junction 16 and junction 10 (Trafford Centre) and on M60 clockwise between junctions 8 and 9 again approaching the Trafford Centre.

Table 5 (below) presents the free flow (assuming 60mph) and the observed journey times for each section of the SRN within the study area for the same time periods.

The same findings are apparent from the table although it is easier in this case to identify those links where journey times vary the greatest from the desirable. For example, on both the M61 and M60 clockwise approaches to junction 14, average journey times are over 3 times what would achieved if speeds were maintained at 60 mph. Similarly, in the PM peak, average journey times are around 3 times desirable levels on M60 clockwise between junctions 9 and 10.

The South Pennines Route Strategy evidence report[43] also concluded that the majority of the SRN within the study area was in the top 10% for vehicle hours delay between April 2012 and March 2013 as can be seen in Figure 22.

[43] South Pennines Route Based Strategy Report, https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/365291/South_Pennines.pdf , Highways Agency, 2014

From statistics compiled by the DfT on Reliability of Journeys on Highways Agency roads[44] for the month of May 2014, 15 of the worst performing 100 sections of the SRN for percentage of journeys completed on time are located within the study area.

[44] Reliability of journeys on Highways Agency roads, England: Jul to Sep 2014, https://www.gov.uk/government/statistics/reliability-of-journeys-on-highways-agency-roads-england-jul-to-sep-2014 , DfT, November 2014

Figure 22 – Vehicle Hours Delay 2012/13 Delay

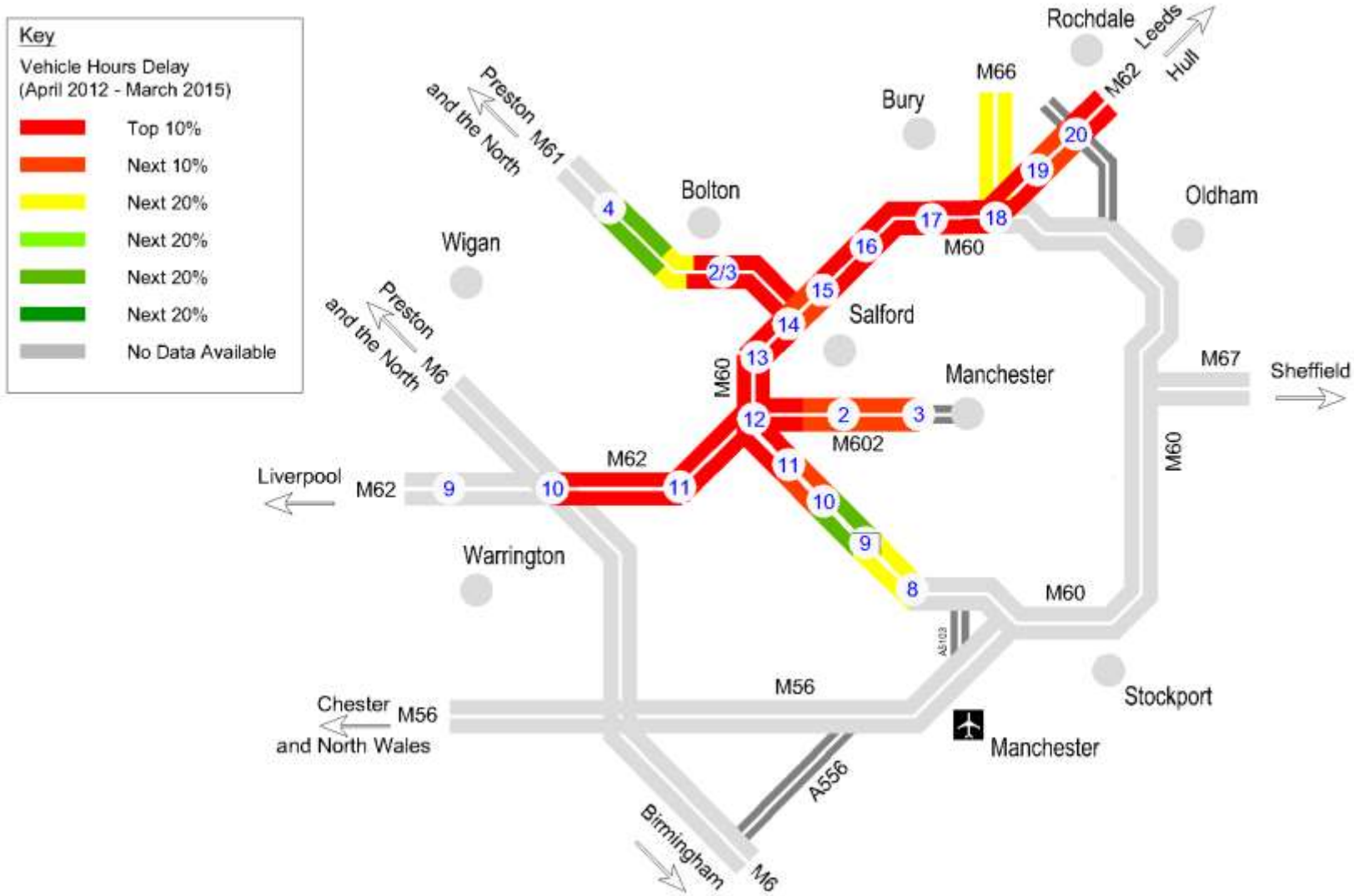


Table 5 - Actual and Theoretical Journey Times

Route	From	To	Direction	Current Journey Time															Link Length (km)
				AM Peak			Inter Peak			PM Peak			Off Peak			Weekend			
				Theoretical (sec)	Actual (sec)	%	Theoretical (sec)	Actual (sec)	%	Theoretical (sec)	Actual (sec)	%	Theoretical (sec)	Actual (sec)	%	Theoretical (sec)	Actual (sec)	%	
M62	9	10	Eastbound	108.75	276.5	254%	108.75	106.3	98%	108.75	105.5	97%	108.75	98.3	90%	108.75	93	86%	2.9
	10	11	Eastbound	146.25	288.8	197%	146.25	151.4	104%	146.25	186.3	127%	146.25	136.3	93%	146.25	126.2	86%	3.9
	11	12	Eastbound	401.25	441.8	110%	401.25	419.7	105%	401.25	521.3	130%	401.25	375	93%	401.25	360.9	90%	10.7
	18	19	Eastbound	176.25	170.1	97%	176.25	186.2	106%	176.25	215.5	122%	176.25	163.3	93%	176.25	154.9	88%	4.7
	19	20	Eastbound	131.25	127.9	97%	131.25	144.4	110%	131.25	144.5	110%	131.25	122.6	93%	131.25	116.6	89%	3.5
	20	19	Westbound	135	207.7	154%	135	128.2	95%	135	155.3	115%	135	127.7	95%	135	121	90%	3.6
	19	18	Westbound	180	305.4	170%	180	168.1	93%	180	193.3	107%	180	164.7	92%	180	158.4	88%	4.8
	12	11	Westbound	397.5	496.9	125%	397.5	387	97%	397.5	487.7	123%	397.5	369.1	93%	397.5	347.8	87%	10.6
	11	10	Westbound	146.25	155.6	106%	146.25	141.3	97%	146.25	151.4	104%	146.25	137.1	94%	146.25	129.6	89%	3.9
	10	9	Westbound	108.75	102.6	94%	108.75	99.5	91%	108.75	98.9	91%	108.75	99.1	91%	108.75	93.8	86%	2.9
M61	4	3	Southbound	No Data															
	3	2	Southbound	67.5	292.6	433%	67.5	62.8	93%	67.5	67.5	100%	67.5	60.1	89%	67.5	60.5	90%	1.8
	2	M60	Southbound	63.75	173.3	272%	63.75	74	116%	63.75	86.9	136%	63.75	64.5	101%	63.75	79.1	124%	1.7
	M60	2	Northbound	71.25	71.7	101%	71.25	72.7	102%	71.25	74.2	104%	71.25	69.7	98%	71.25	69.7	98%	1.9
	2	3	Northbound	56.25	52.2	93%	56.25	51.8	92%	56.25	51.6	92%	56.25	51.5	92%	56.25	50.4	90%	1.5
	3	4	Northbound	No Data															
M60	8	9	Clockwise	75	93.5	125%	75	74.1	99%	75	193.5	258%	75	70.4	94%	75	93.5	125%	2
	9	10	Clockwise	52.5	60.8	116%	52.5	51.6	98%	52.5	159.5	304%	52.5	48.7	93%	52.5	49.2	94%	1.4
	10	11	Clockwise	70.5	85.8	122%	70.5	71.4	101%	70.5	178.9	254%	70.5	65.4	93%	70.5	68.1	97%	1.88
	11	12	Clockwise	49.5	59.8	121%	49.5	51.3	104%	49.5	118.6	240%	49.5	46.5	94%	49.5	47.7	96%	1.32
	12	13	Clockwise	41.25	47.5	115%	41.25	45.4	110%	41.25	75	182%	41.25	39.6	96%	41.25	41.3	100%	1.1

Route	From	To	Direction	Current Journey Time															Link Length (km)
				AM Peak			Inter Peak			PM Peak			Off Peak			Weekend			
				Theoretical (sec)	Actual (sec)	%	Theoretical (sec)	Actual (sec)	%	Theoretical (sec)	Actual (sec)	%	Theoretical (sec)	Actual (sec)	%	Theoretical (sec)	Actual (sec)	%	
	13	14	Clockwise	85.125	100.1	118%	85.125	86.6	102%	85.125	121.4	143%	85.125	81.4	96%	85.125	80.7	95%	2.27
	14	15	Clockwise	72	85.6	119%	72	73.4	102%	72	104.6	145%	72	69.1	96%	72	67.7	94%	1.92
	15	16	Clockwise	56.25	64.1	114%	56.25	54.3	97%	56.25	83	148%	56.25	51.3	91%	56.25	50.1	89%	1.5
	16	17	Clockwise	116.25	135.2	116%	116.25	114.5	98%	116.25	163.3	140%	116.25	108.6	93%	116.25	104	89%	3.1
	17	18	Clockwise	86.25	128.8	149%	86.25	95.3	110%	86.25	154.7	179%	86.25	85.1	99%	86.25	85.4	99%	2.3
	18	19	Clockwise	176.25	170.1	97%	176.25	186.2	106%	176.25	215.5	122%	176.25	163.6	93%	176.25	154.9	88%	4.7
	19	18	Anti-Clock	180	305.4	170%	180	168.1	93%	180	193.3	107%	180	164.7	92%	180	158.4	88%	4.8
	18	17	Anti-Clock	86.25	193.4	224%	86.25	91.1	106%	86.25	118.7	138%	86.25	84	97%	86.25	85.9	100%	2.3
	17	16	Anti-Clock	116.25	248.7	214%	116.25	112.5	97%	116.25	138.8	119%	116.25	109.5	94%	116.25	112.6	97%	3.1
	16	15	Anti-Clock	60	141.2	235%	60	61.6	103%	60	68.2	114%	60	57.4	96%	60	69.9	117%	1.6
	15	14	Anti-Clock	71.25	209.6	294%	71.25	83	116%	71.25	99.2	139%	71.25	68.8	97%	71.25	106.2	149%	1.9
	14	13	Anti-Clock	76.875	140	182%	76.875	86.9	113%	76.875	102.5	133%	76.875	73.8	96%	76.875	99.8	130%	2.05
	13	12	Anti-Clock	48	63.1	131%	48	52.9	110%	48	58.8	123%	48	47.5	99%	48	58.6	122%	1.28
	12	11	Anti-Clock	48	52.9	110%	48	50.5	105%	48	57.2	119%	48	46.4	97%	48	66.4	138%	1.28
	11	10	Anti-Clock	69.75	74.9	107%	69.75	74.6	107%	69.75	75.8	109%	69.75	66.6	95%	69.75	90.7	130%	1.86
	10	9	Anti-Clock	53.625	56.1	105%	53.625	56.3	105%	53.625	55	103%	53.625	57.4	107%	53.625	55.6	104%	1.43
	9	8	Anti-Clock	75	72.3	96%	75	73.3	98%	75	75.2	100%	75	71.6	95%	75	71.2	95%	2
M602	1	2	Eastbound	120	121	101%	120	112.2	94%	120	109.5	91%	120	110.2	92%	120	109.1	91%	3.2
	2	1	Westbound	123.75	114.9	93%	123.75	118.7	96%	123.75	207.8	168%	123.75	113.7	92%	123.75	114.4	92%	3.3
M66	3	4	Southbound	127.5	125.6	99%	127.5	116.5	91%	127.5	117	92%	127.5	113.9	89%	127.5	110	86%	3.4
	4	3	Northbound	127.5	114.1	89%	127.5	114.8	90%	127.5	117.6	92%	127.5	112.4	88%	127.5	110.2	86%	3.4

4.3 Journey Purpose on SRN

Table 6 presents information on journey purpose by time period for M60 between junctions 12 and 13. This information can be considered typical for the SRN within the study area. The volumes quoted are average two way flows in vehicles per hour. As this information is obtained from the existing model, similar data is not available for the off-peak (overnight) and weekend periods, this information is provided Figure 23 overleaf

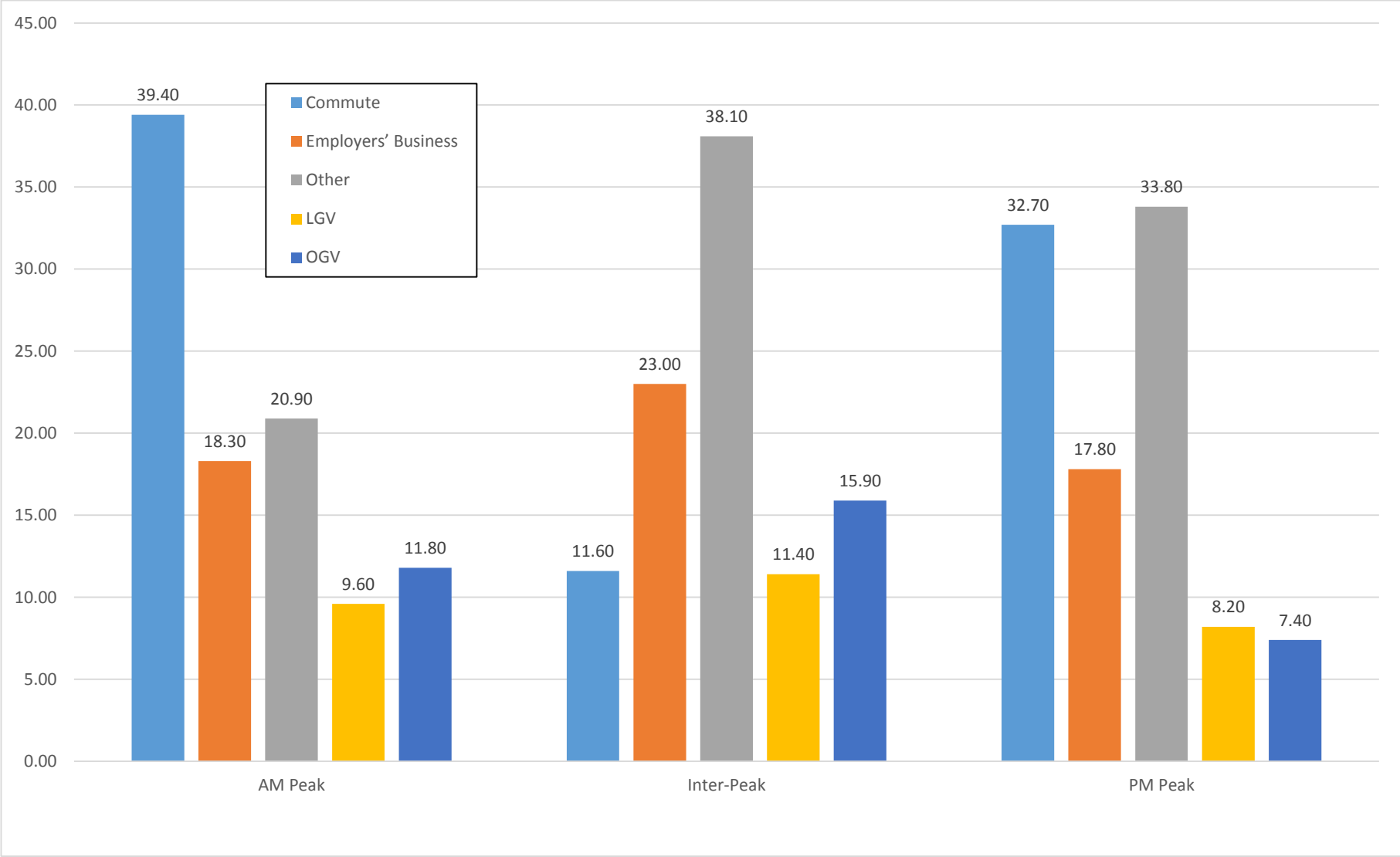
Table 6 - Journey Purposes for time periods (M60 junction 12 to 13)

	AM	%	Inter-Peak	%	PM	%	12-Hour	%
Commute	**5,298**	**39.4%**	**1,462**	**11.6%**	**4,687**	**32.7%**	**38,726**	**24.4%**
Employers' Business	**2,457**	**18.3%**	**2,902**	**23.0%**	**2,555**	**17.8%**	**32,445**	**20.4%**
Other purposes	**2,812**	**20.9%**	**4,800**	**38.1%**	**4,848**	**33.8%**	**51,780**	**32.6%**
LGV	**1,287**	**9.6%**	**1,435**	**11.4%**	**1,181**	**8.2%**	**16,009**	**10.1%**
OGV	**1,579**	**11.8%**	**2,003**	**15.9%**	**1,066**	**7.4%**	**19,950**	**12.6%**
Total	**13,432**		**12,601**		**14,336**		**158,910**	

Key observations from the table are:

- The proportion of commute trips is significantly higher in the AM peak (39.4%) than the inter-peak (11.6%) and PM peak (32.7%);
- The proportion of employers' business trips is around 18% in both the AM and PM peaks rising to 23% during the inter-peak period;
- The proportion of other trips is much lower in the AM peak (9.6%) than during the inter-peak (38.1%) and PM peak (33.8%), and
- Freight movements are made up of light (LGV) and other (OGV) goods vehicles. These account for around 20% of all vehicle movements in the AM peak, rising to over 27% during the inter-peak before falling away to under 16% in the PM peak.

Figure 23 - Journey Purposes for time periods (M60 junction 12 to 13)



4.4 Trip Distribution on SRN

As mentioned earlier, the M60 is a similar distance from the Manchester/Salford regional centre as the North Circular is from central London. Consequently, in addition to catering for strategic traffic movements it naturally acts as an orbital distributor around the regional centre and provides access to major trip generators such as Manchester International Airport, Trafford Park, Trafford Centre and Oldham, Ashton under Lyne, Stockport and Altrincham town centres.

Figure 24 to Figure 29 illustrate the origins and destinations of those trips entering the study area during the AM Peak period for key SRN approaches to the study area. The hourly directional flows on the approaches in question are as follows:

- M60 J8 to J9 Clockwise 5,188 vehs/hr
- M62 J11 to J12 Eastbound 5,490 vehs/hr
- M61 Southbound J3 to M60 3,893 vehs/hr
- M66 J3 to M60 Southbound 4,113 vehs/hr
- M62 J19 to J18 Westbound 4,527 vehs/hr
- M602 J2 to M60 Westbound 2,404 vehs/hr

The figures clearly show strong longer distance demand between M62 west/M61 and M62 east and strong demand using the M60 to access destinations throughout Greater Manchester. More specific observations by approach can be summarised as follows:

- M60 junction 8 to junction 9 Clockwise: Some traffic uses this link to access Trafford Park and Manchester City Centre but there are a significant number of trips to M62 west; M61 (and A666 to Bolton); M66 north and M62 east;
- M62 junction 11 to junction 12 Eastbound: There is a strong strategic movement continuing eastward across the Pennines via M62 with other significant movements to M60 south; Manchester City Centre via M602; M61/A666 to Bolton; and M66 north;
- M61 junction 3 to M60 Southbound: There is strong evidence of trips from M61 using the M60 to access all parts of the Greater Manchester conurbation coupled with more strategic movements to M62 east and M56/Manchester Airport;
- M66 junction 3 to M60 Southbound: Similar to the M61 approach most of the traffic using M66 southbound uses M60 to access destinations within the Greater Manchester conurbation;
- M62 junction 19 to junction 18 Westbound: This traffic is more strategic in nature with a high volumes continuing to M62 west and significant movements to M66 north; M61; and A580, and
- M602 junction 2 to M60 Westbound: Largely outbound trips from Trafford Park and the City Centre the majority of which continue onto M62 west or use M60 to access M61.

Figure 30 shows the routes used during the AM peak by trips to the City Centre. This provides clear evidence of M60 junction hopping as part of longer radial trips particularly between M61 and M602; and M66 and M60 junctions 17 and 19. This is in addition to the evidence of junction hopping between M602 and M61 illustrated in Figure 29. However, the incidence of junction hopping may be less than has been assumed in previous studies.

Figure 24 - M60 J8 - 9 clockwise select link analysis AM peak

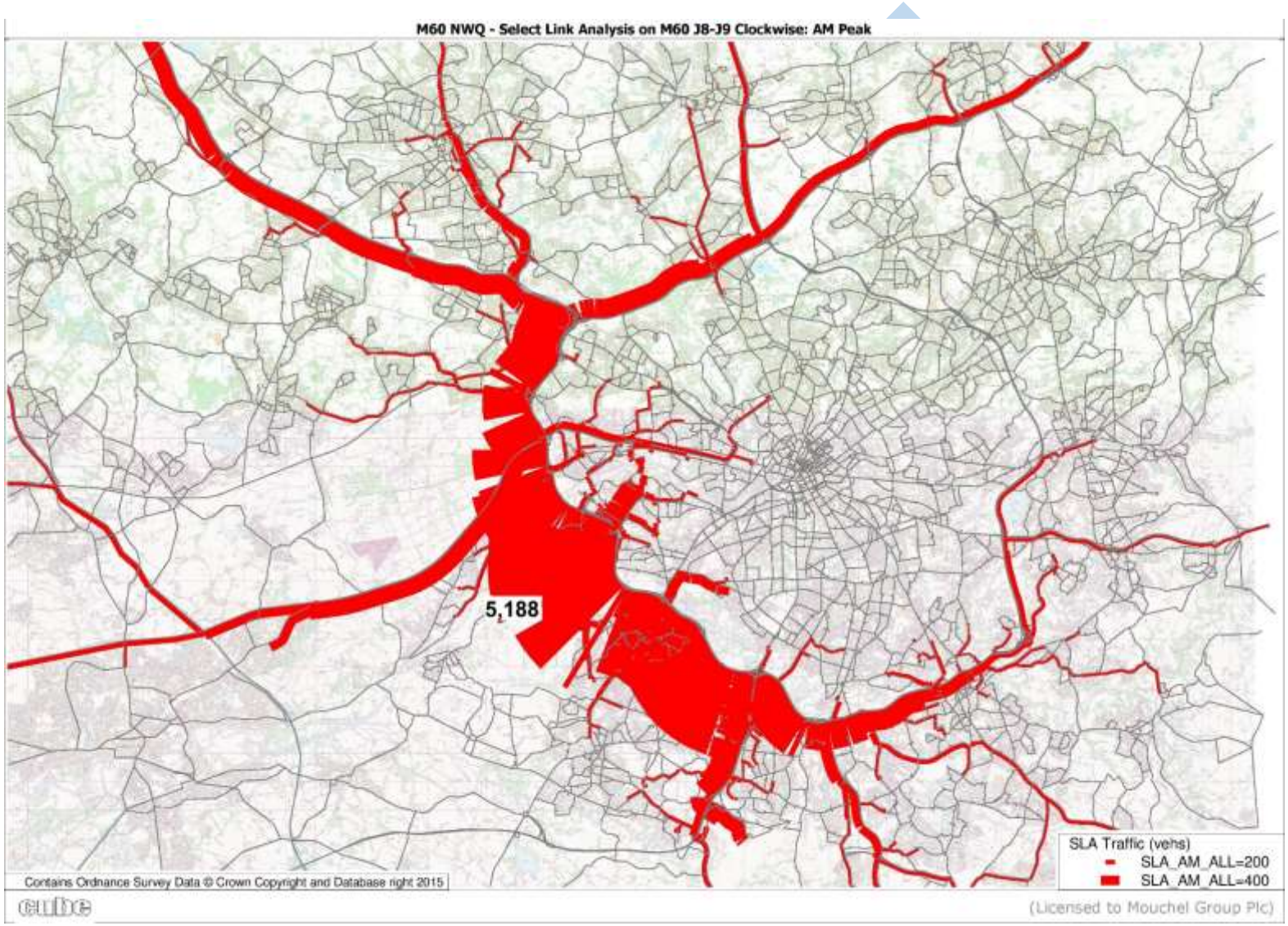


Figure 25 - M62 J11 – J12 eastbound select link analysis AM peak

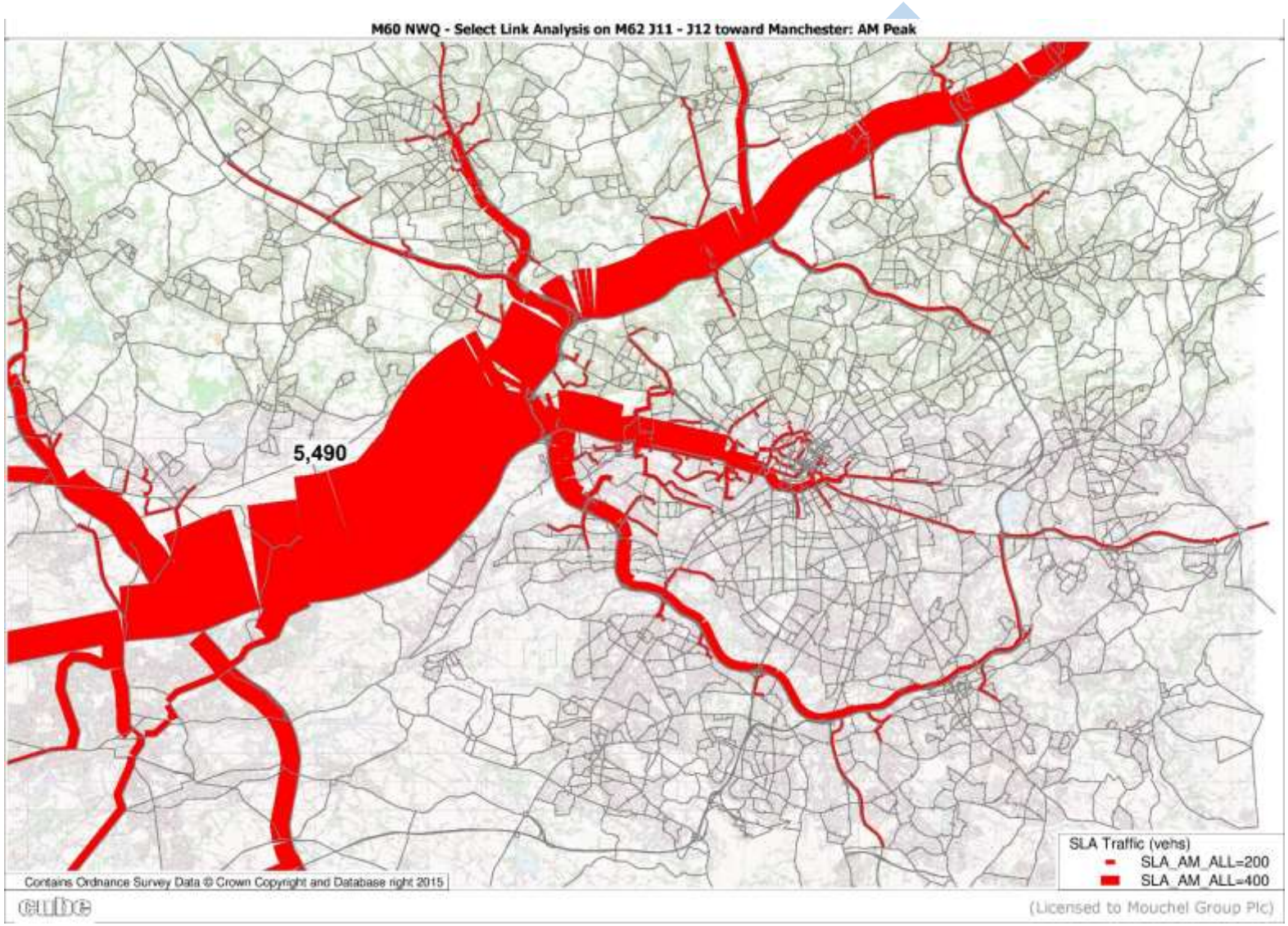


Figure 26 - M61 to M60 Southbound select link analysis AM peak

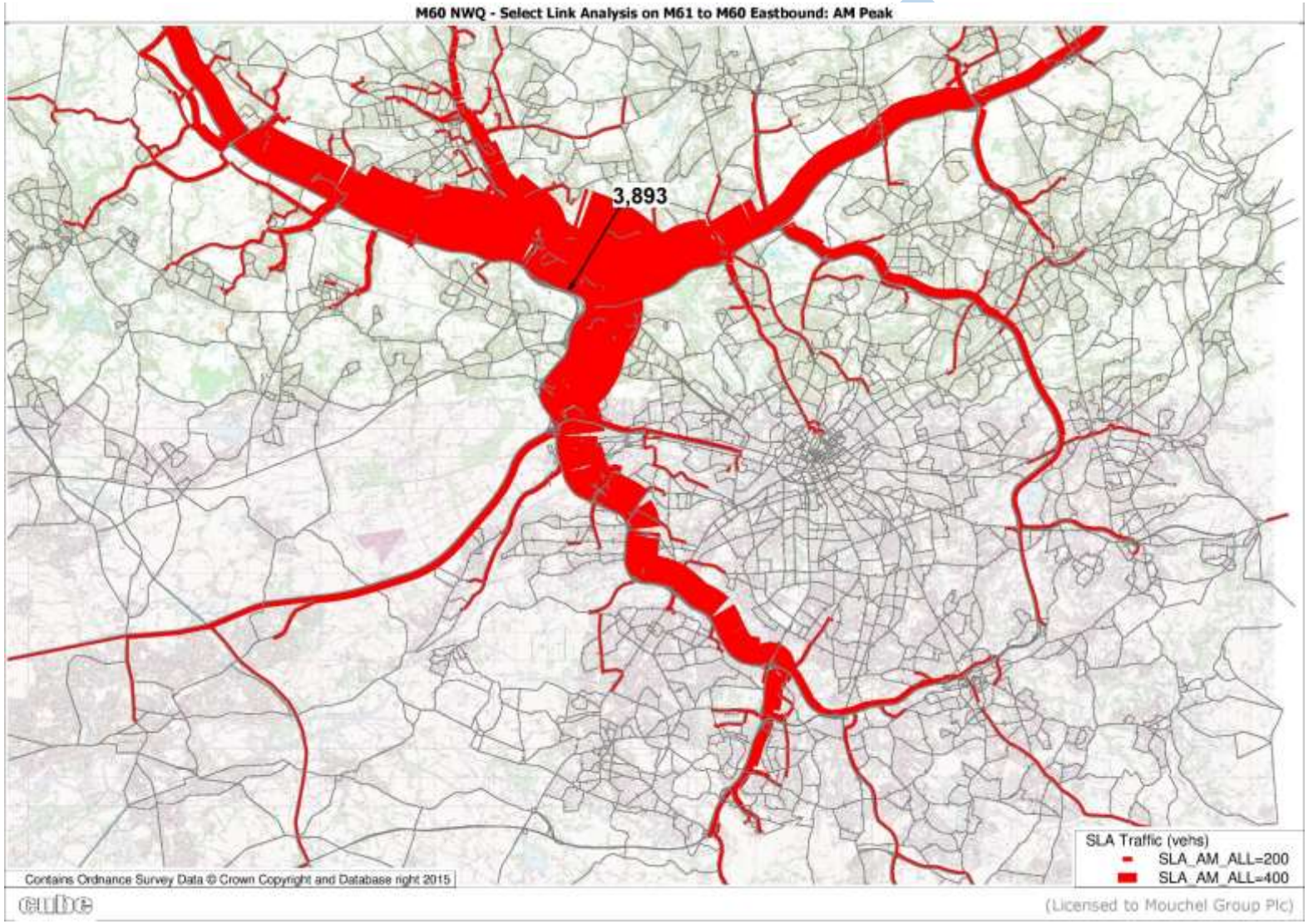


Figure 27 - M66 J3-4 Southbound select link analysis AM peak

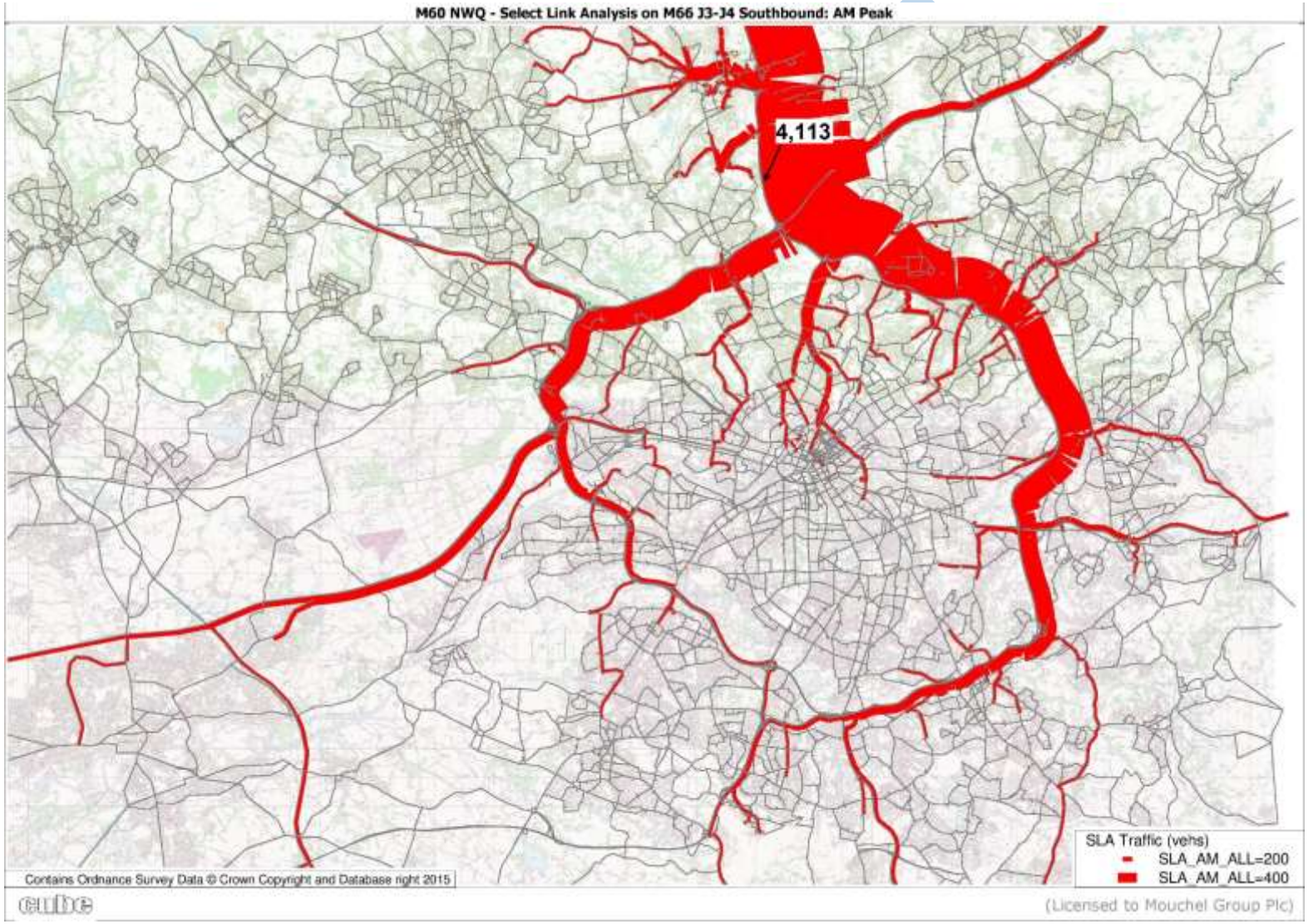


Figure 28 - M62 J19-18 Westbound select link analysis AM peak

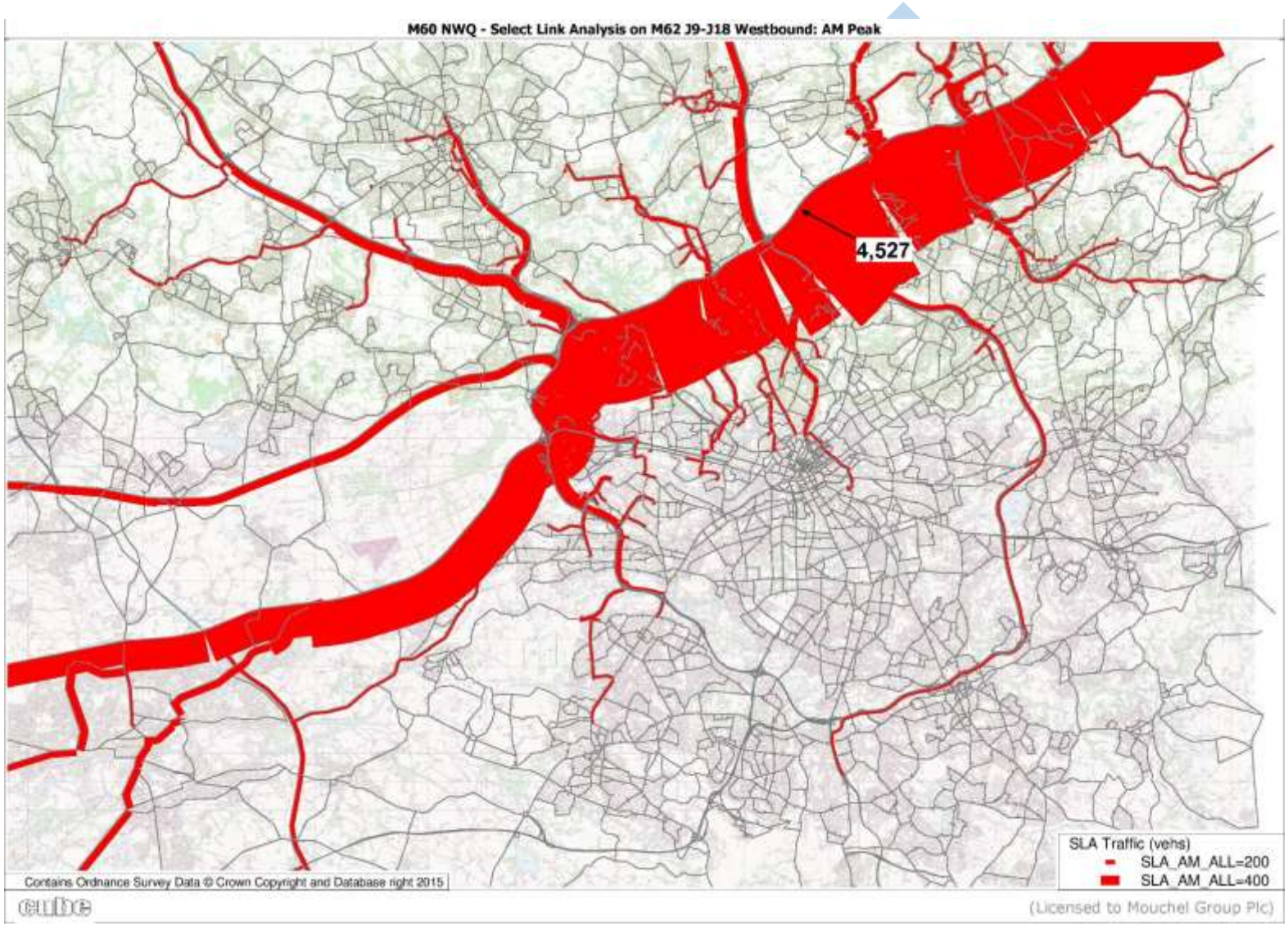


Figure 29 - M602 J2-1 Westbound select link analysis AM peak

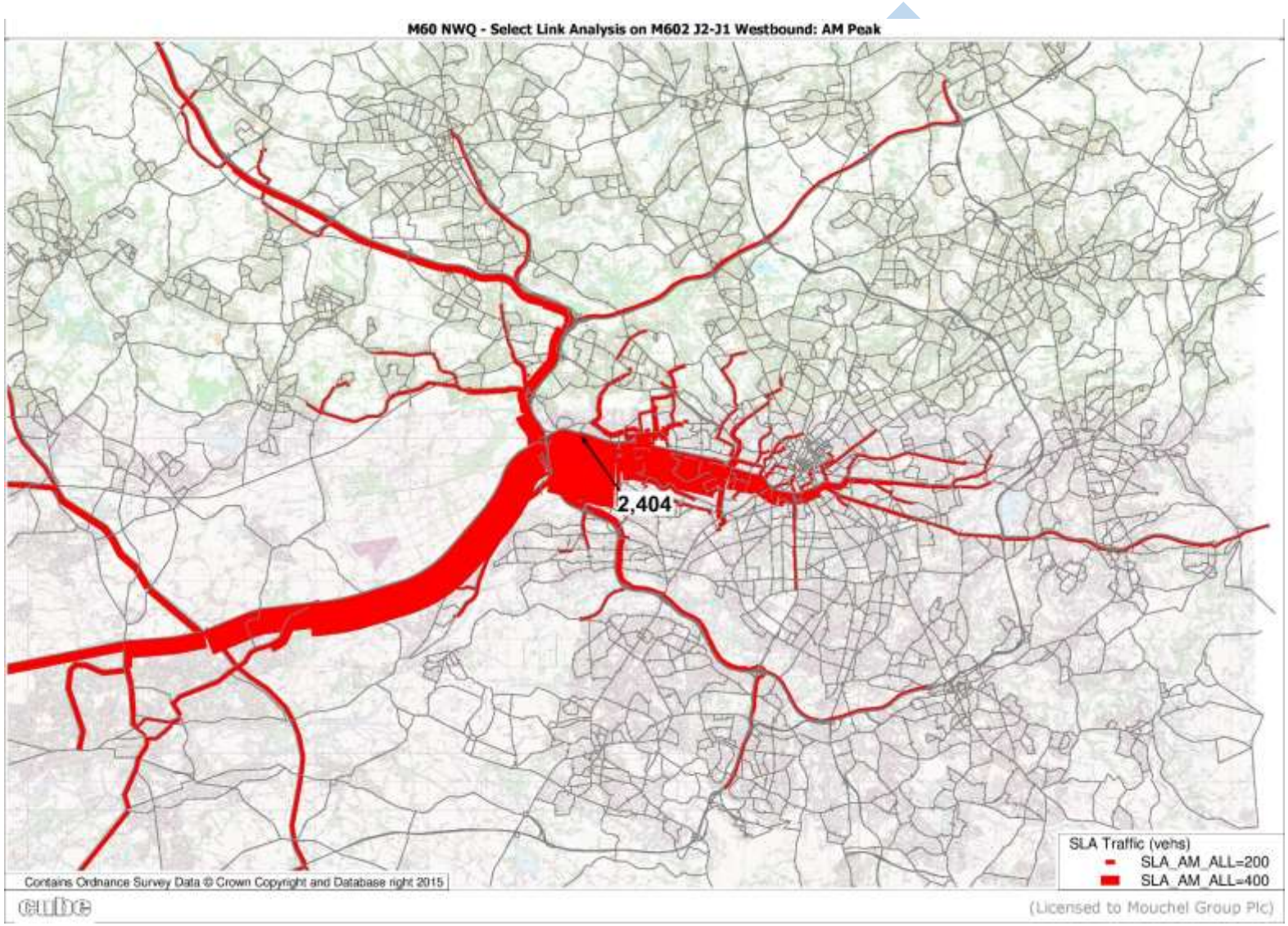
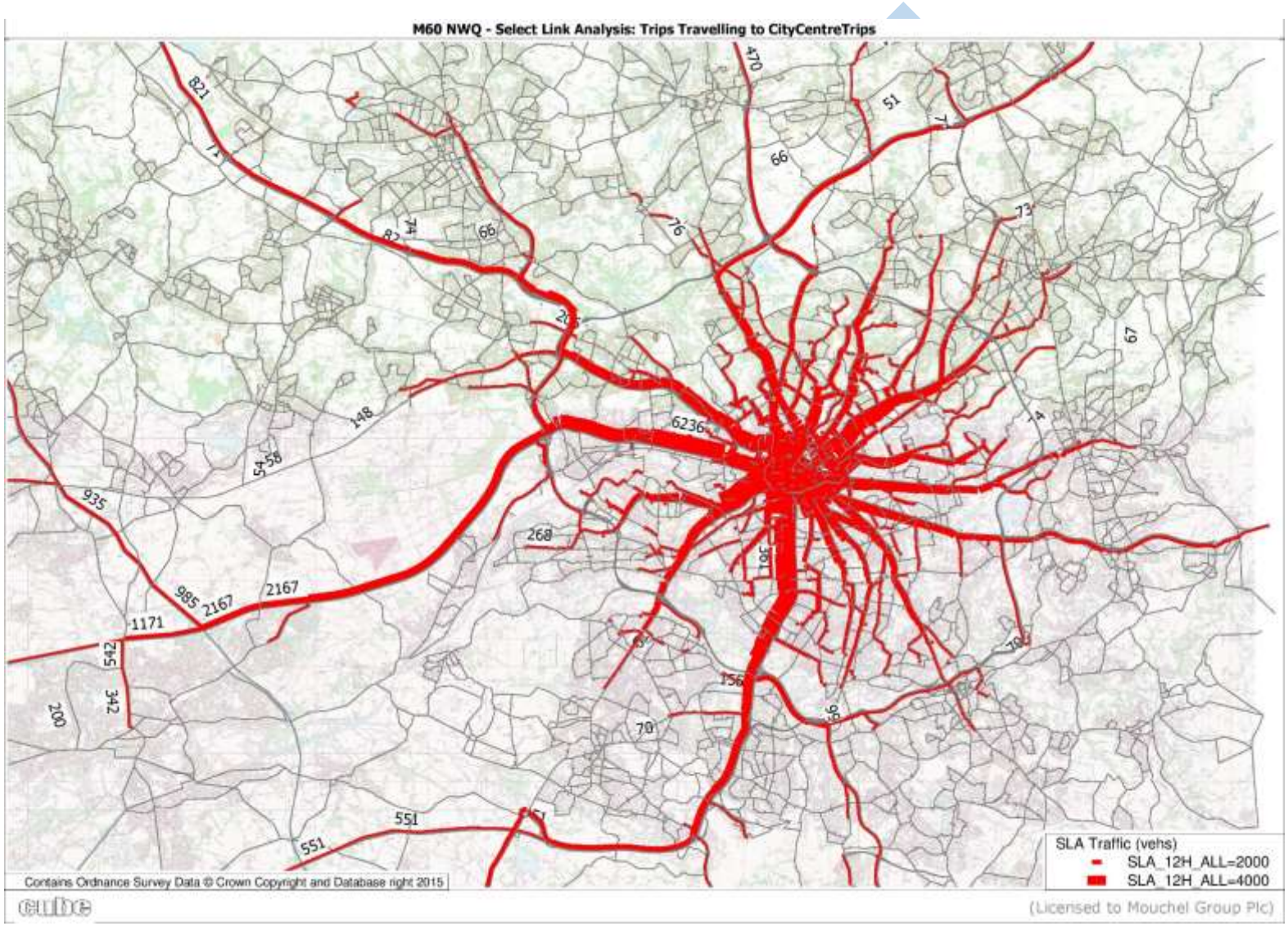


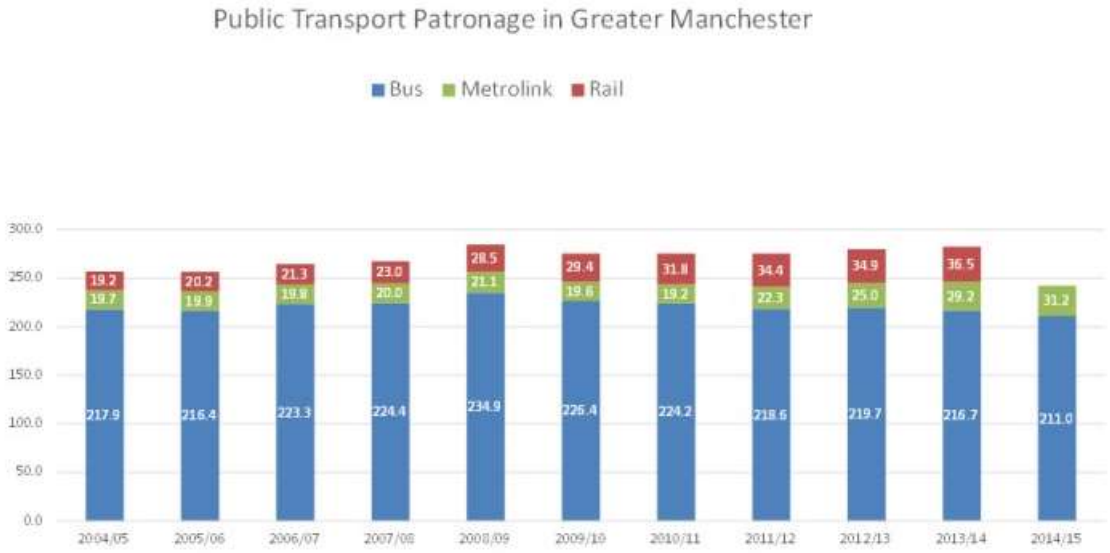
Figure 30 - Trips travelling to City centre select link analysis



4.5 Public Transport Patronage

The bus network carries over three quarters of the public transport passengers in Greater Manchester[45] with rail carrying about 13%[46] and Metrolink about 10%[47]. Over the last 10 years, public transport usage overall has grown from about 250 million passengers to around 280 million. In 2014/15 bus patronage (passenger journeys) fell by 5 million coinciding with a substantial cut to tendered services of about 25%. Rail data is not yet available but with trend growth plus the increase in Metrolink patronage, it is possible that 2014/15 will see a decline in overall public transport patronage. Further cuts have been made to tendered bus services in 2015/16.

Figure 31- Passenger flows on the Greater Manchester public transport network, in the morning peak[48].



The heaviest rail flows are on the routes:

- through Stockport from Birmingham and London;
- the combined routes from Liverpool to Manchester;
- the combined routes from Leeds to Manchester, and
- from Preston and Bolton.

[45] Bus Statistics, https://www.gov.uk/government/collections/bus-statistics#publications-released-during-2015, DfT, 2015

[46] Estimation of Station Usage, http://orr.gov.uk/statistics/published-stats/station-usage-estimates, Office of Rail & Road, 2015

[47] Light Rail & Tram Statistics, https://www.gov.uk/government/statistics/light-rail-and-tram-statistics-england-year-ending-march-2015, DfT, June 2015

[48] Bus Statistics, https://www.gov.uk/government/collections/bus-statistics#publications-released-during-2015, DfT, 2015

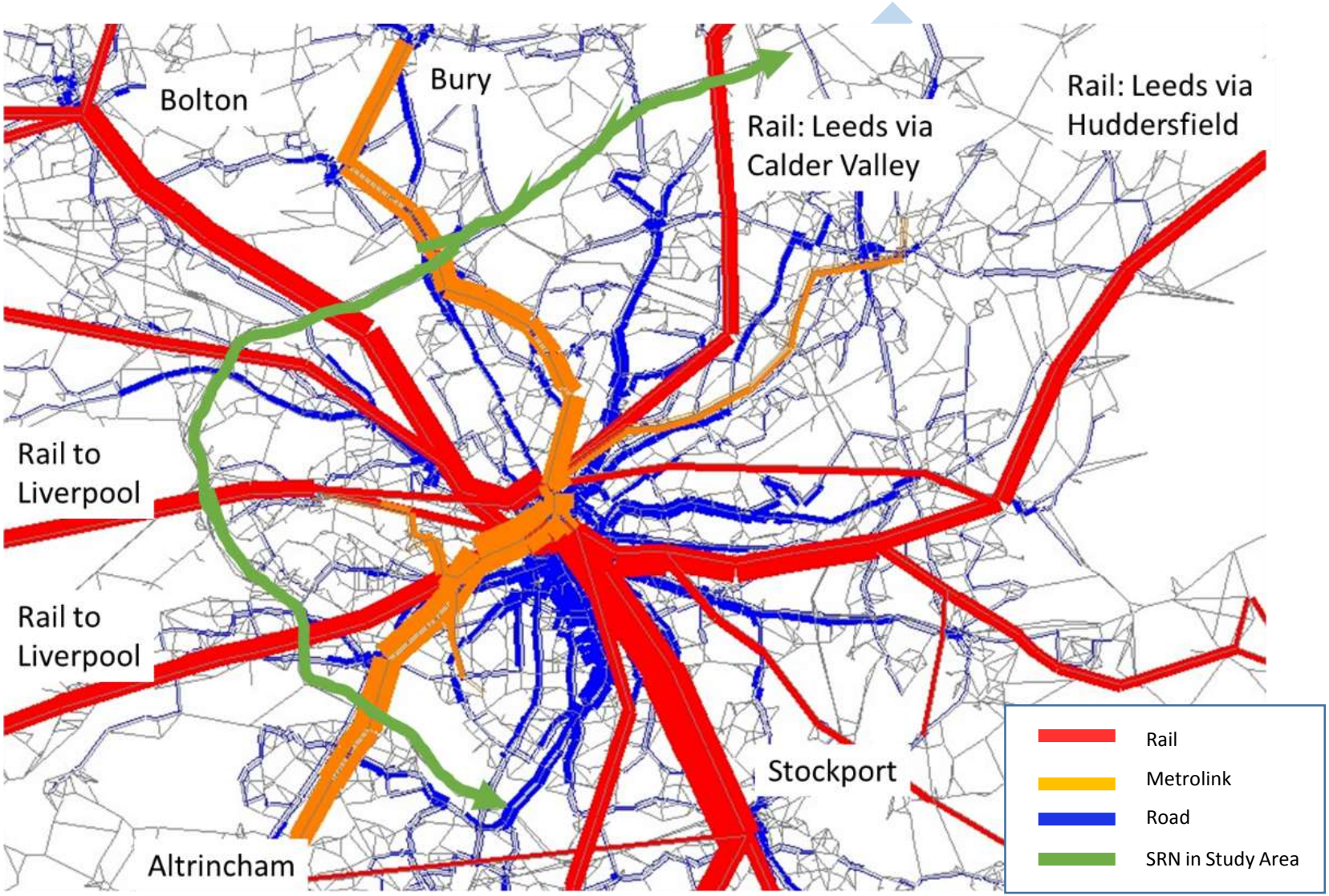
The rail routes from Bolton, Liverpool, and Leeds are some of the most crowded and they parallel the routes through our study area that suffer the worst congestion (where M61 meets M60 and where M62 meets M60).

Metrolink carries similar levels of patronage to rail, at least along the Altrincham and Bury routes. However, the figure is a little out of date because it reflects the position part way through the construction of the Metrolink Phase 3 expansion. Consequently the East Manchester line and Manchester Airport lines are not included; the South Manchester line includes about one third of its full length; and the Rochdale line only about two thirds of its full length.

Bus patronage is significantly lower than other public transport modes except in the corridors from South Manchester into the city centre.

The focus of the public transport network on travel into Manchester City centre is clear for all three modes. Also apparent from Figure 32 overleaf is the contrast between higher levels of bus usage inside the M60 and lower levels outside it.

Figure 32 – Passenger flows on the public transport network



Bus

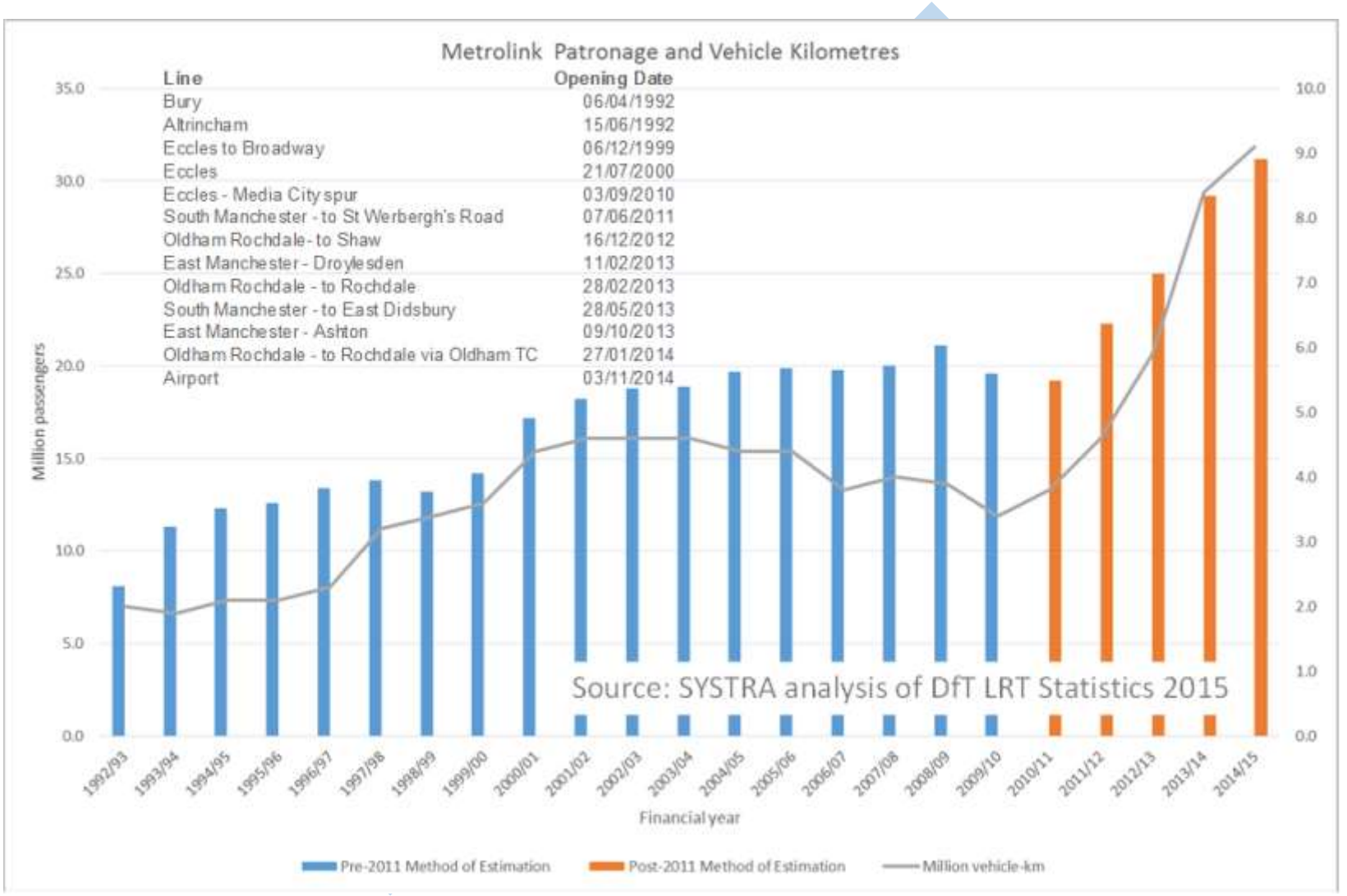
Bus patronage has been generally declining for around 50 years. Patronage began to decline much more sharply when buses were first deregulated, but that decline has levelled off somewhat. It received a large boost from the English National Concessionary Travel Scheme (ENCTS) starting in 2006. ENCTS yielded an increase in patronage of 25% amongst elderly travellers, which was enough to deliver an overall rise in patronage despite continued reductions amongst other groups of travellers. However, the trend of declining patronage has returned, and total patronage has fallen back from its peak in 2009 to about the level from 2001.

The pattern decline in bus travel has not been uniform across Greater Manchester or across the day. Bus passenger counts indicate that travel to Manchester City Centre has grown in the off-peak. The Census journey to work also indicates that between 2001 and 2011, there was an increase in the number of commuters travelling by bus to jobs inside the M60. There was also an increase in the number of workers living inside the M60, who travel to work by bus.

Metrolink

The Metrolink network has nearly quadrupled in length and patronage since opening in 1992 with numerous extensions to the original Altrincham to Bury line. It has just been through a period of rapid growth of the network and patronage has been rising at a rate of about 2.5 million passengers a year.

Figure 33 - Metrolink Patronage and Vehicle Kilometres



Rail

Rail patronage has also been growing rapidly, doubling in in twelve years, and averaging a little over a million additional journeys per year. There were noticeable leaps in patronage when the Trans-Pennine Franchise began and when the timetable was reorganised to allow for a third train to London each hour as part of the West Coast Mainline Franchise.

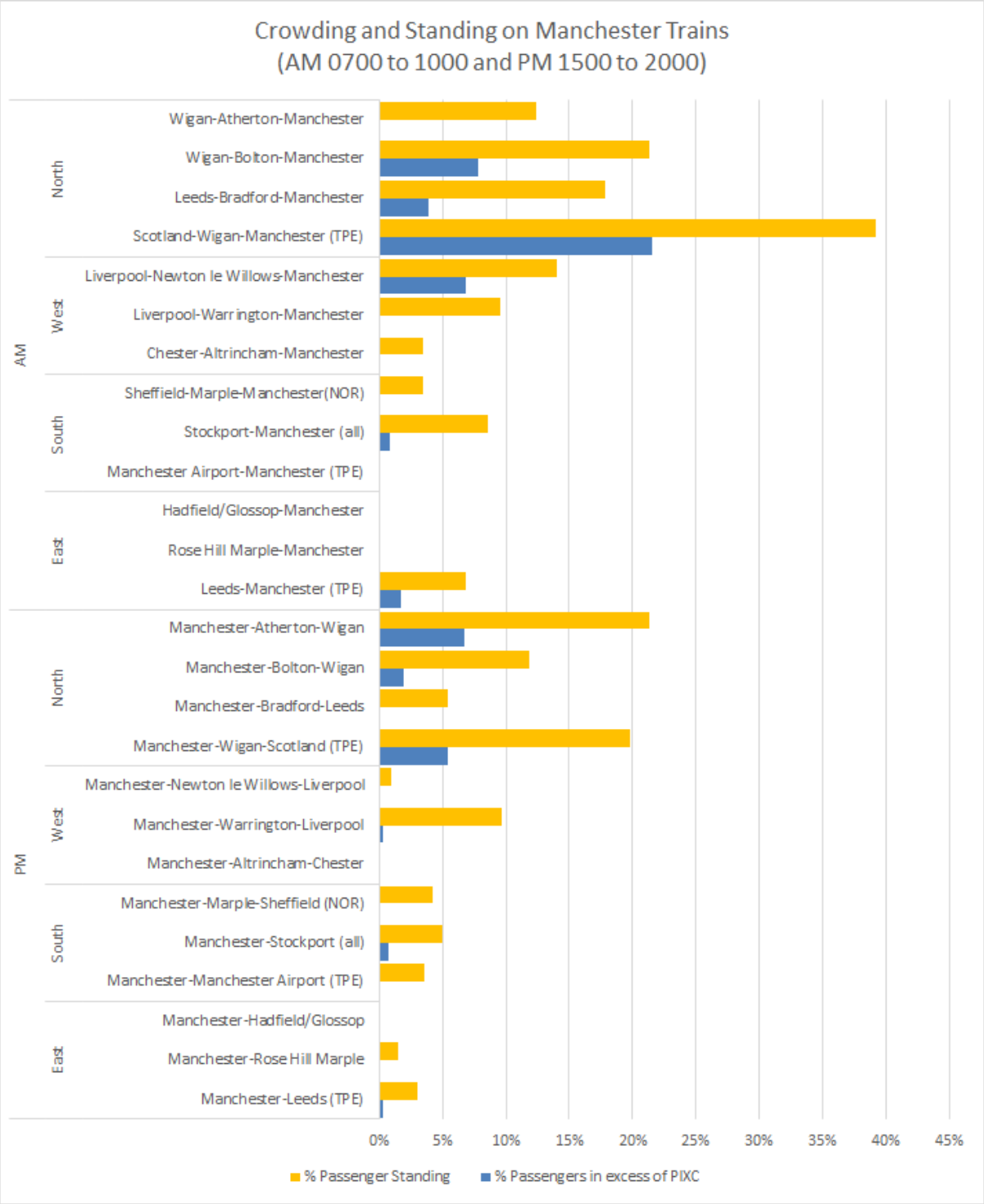
Outside London, Manchester currently has the worst crowding and the second largest rail patronage in England and Wales as shown in Table 7 below.

Table 7 - Rail Patronage and crowding

City	Passengers Arriving (0700 to 1000)	% standing	Passengers in excess of capacity
Birmingham	39,000	11.4%	1.6%
Bristol	8,000	3.7%	0.0%
Cardiff	12,000	8.9%	0.5%
Leeds	26,000	12.3%	1.8%
Leicester	5,000	1.0%	1.0%
Liverpool	20,000	3.5%	0.0%
Manchester	**31,000**	**15.7%**	**4.3%**
Newcastle	4,000	n/a	1.0%
Nottingham	4,000	3.8%	0.2%
Sheffield	7,500	7.7%	1.1%

Figure 34 shows information relating to the percentage of passengers standing and the percentage of passengers in excess of the capacity. Crowding is worst on the routes through Wigan and Bolton to Manchester. Wigan and Bolton lie on either side of the M61, whose junction with the M60 is at the centre of the congestion problems on the M60.

Figure 34 - Crowding and Standing on Manchester Trains



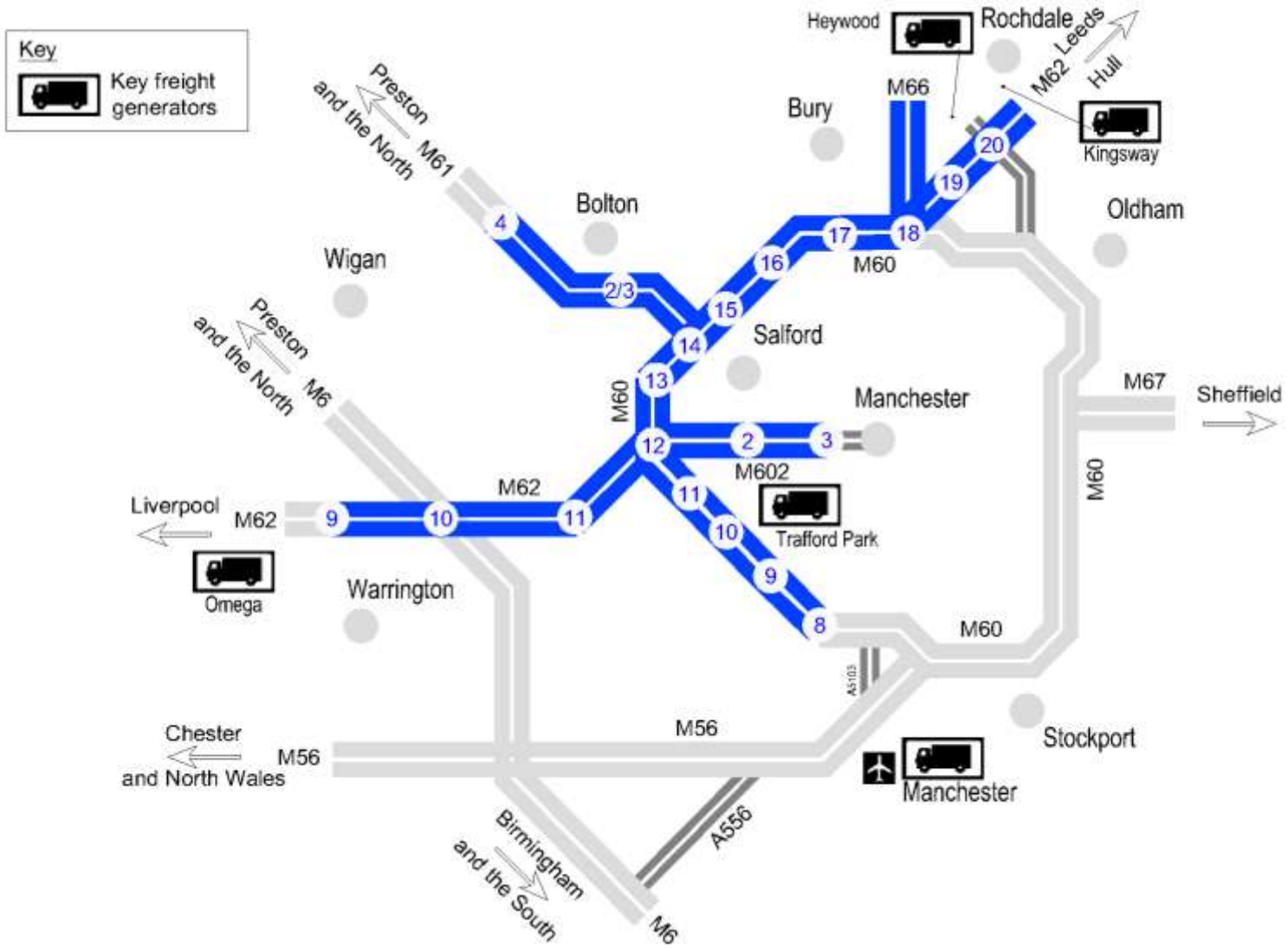
4.6 Key Freight Generators close to SRN

There are a number of key freight generators / attractors within the study area as well as the large volumes of through traffic between the coastal ports on the Trans-Pennine M62 network and to/from Manchester airport.

Distribution centres at Omega and Heywood are close to the M62 at both locations and make use of the SRN for their activities. The Kingsway Business park is being developed to the east of the study area and the Trafford Park estate continues to be a major manufacturing centre and it also contains two freightliner terminals where containerised traffic moves between road and rail.

A separate study is being undertaken by TfN the 'Transport for the North Freight and Logistics Strategy' which is considering freight movements across the North of England. This study is due to conclude in March 2016, the outcomes of this study will be included in future stages of the North-west Quadrant study.

Figure 35 - Key freight generators

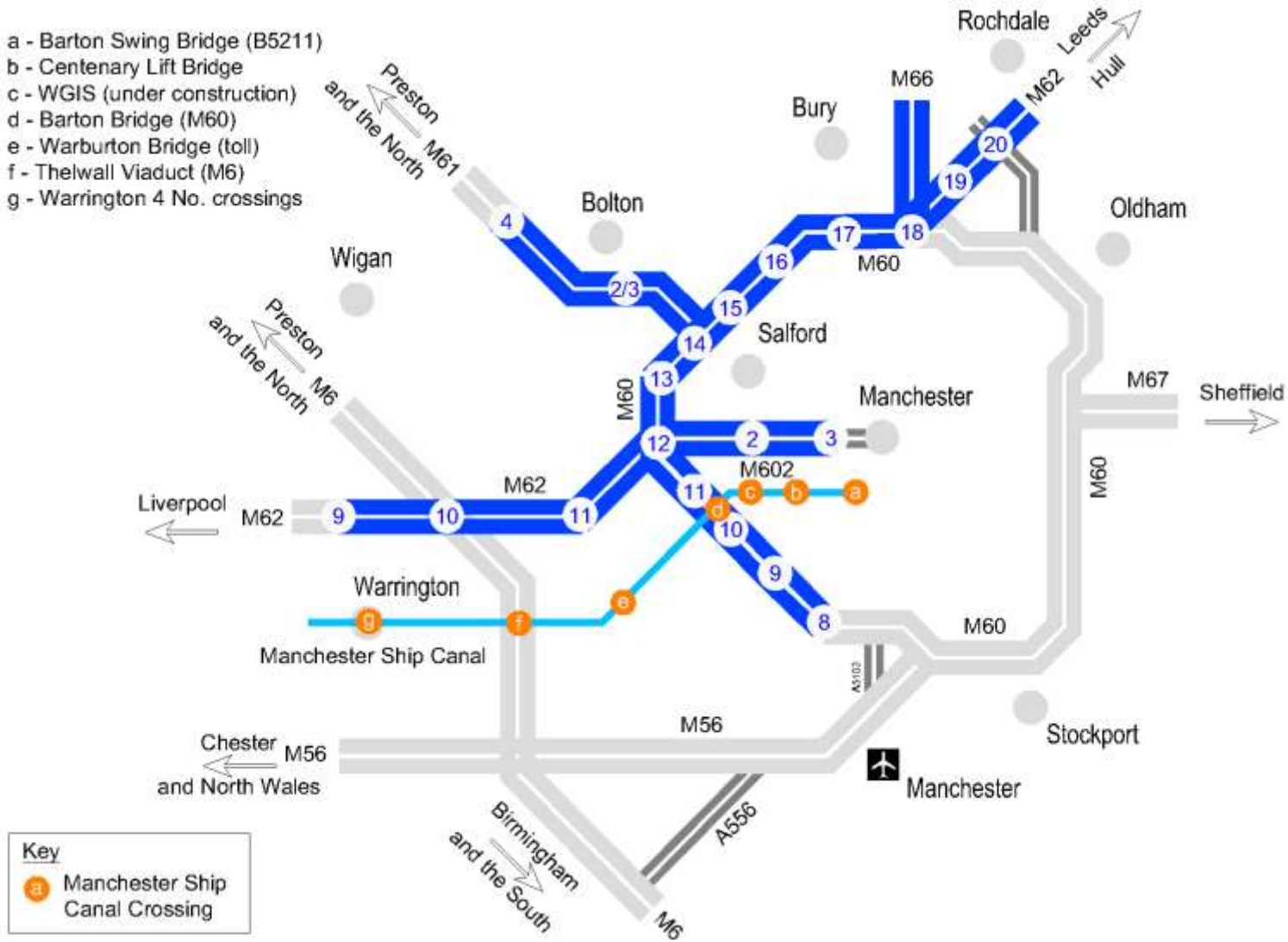


4.7 Existing SRN Alignment and Junctions

A description of the configuration of the SRN within the study area has been provided in section 2.4. Key features which contribute (both individually and collectively) to its operation and lead to adverse traffic conditions are:

- There is no direct connection to and from the regional centre for the following SRN approaches – M62 east; M66; and M61. This means that traffic with a destination in the regional centre using these approaches must use a section of M60 as an orbital distributor to access a suitable radial route within the M60;
- No all-movement intersections exist on M60 between junction 13 at Worsley and junction 17 at Prestwich;
- Substandard junction spacing particularly M60 between junctions 8, 9 and 10; M60 between junctions 11, 12 and 13; M60 junctions 17 to 18; and M60 junctions 18 to 19 leading to intensive weaving, merging and diverging manoeuvres over these sections;
- Substandard intersection configurations at Eccles Interchange (junction 12) and Simister Island (junction 18);
- Substandard lane and hard shoulder widths over Barton High Level Bridge and on M60 between junctions 12 and 14 and between junctions 17 and 18;
- Steep gradients on both approaches to Barton High Level Bridge and on M60 clockwise between junctions 12 and 14;
- Although not a configuration feature the high proportion of HGVs within the traffic composition, particularly during the AM and Inter-peak periods, causes operational issues over sections where it is combined with substandard lane widths and steep gradients, and
- Limited opportunities to cross the Manchester Ship Canal (see Figure 36).

Figure 36 - Manchester Ship Canal Road Crossings



4.8 Safety

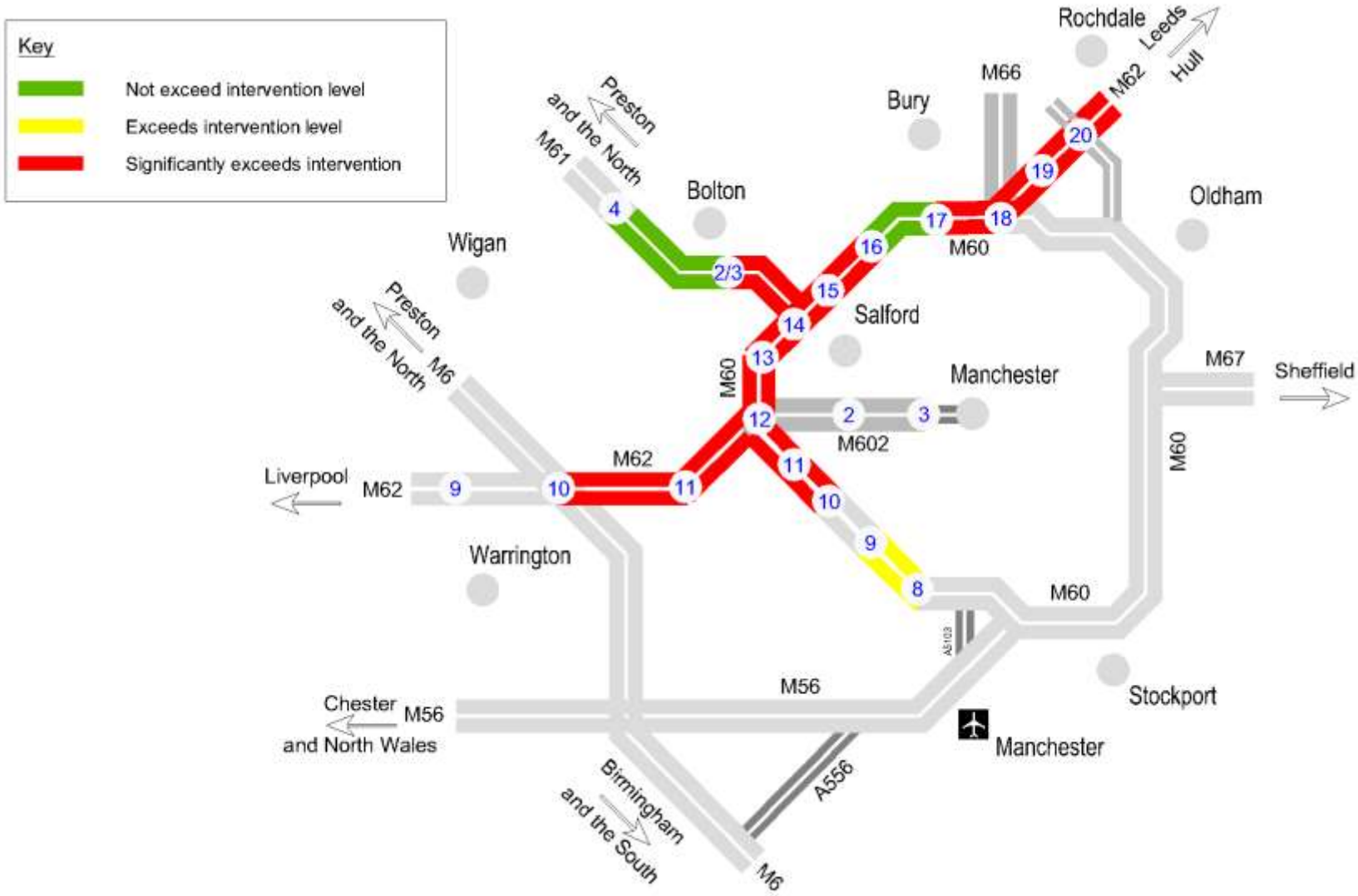
Figure 37 illustrates the collisions per 100 miles and shows how each link performs in relation to the Highways England's national intervention levels. This information was gathered from the latest route safety reports produced by Highways England[49] which were produced in January 2015 and considered the latest available 3 year collision data which covered (2011 to 2013). As can be seen from Figure 37, the majority of links within the study area exceed the significantly exceed the intervention level set by Highways England with regard to accidents.

The South Pennines Route Strategy Evidence Report[50] which covers the period 2010 to the end of 2012 concluded that 2.2% of the vehicles involved in collisions were HGV's. The evidence report states that the northwest quadrant of the M60 stands out as having a high risk of collision and concludes that this is generally due to congestion and in particular, merging traffic and resulting queuing. The route based strategy also lists the M61 approaching the M60 as an area that has a high risk of collisions.

It also states that the SRN within the study area is almost entirely within the top 20% worst performing in terms of total casualties per billion vehicle miles (2009 – 2011). There is a high incidence of locations within the top 250 collision locations nationally in vicinity of Eccles Interchange – the intersection of the M62 / M60 / M602 - the worst being ranked 98th.

[49] Route Safety Reports 2011 – 2013, Highways Agency, January 2015
[50] South Pennines Route Based Strategy Evidence Report, https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/365291/South_Pennines.pdf , Highways Agency, 2014

Figure 37 – Link Collisions / 100 miles



4.9 Planned Transport Investments

Within the study area there are a number of planned transport investments, those which have potential to affect the study area are listed below and shown in Figure 38 below.

4.9.1 Road Based Investments

There are a number of road schemes that are currently under construction within or adjacent to the study area:

- A556 Knutsford to Bowdon Improvement – a 4.5 mile improvement scheme to the A556 which links M6 junction 19 to the M56 at junction 7, planned completion winter 2016/2017;
- Manchester Smart Motorway (MSM) scheme – construction of a smart motorway between junctions 8 and 20 of the M60, planned completion autumn 2017;
- A6 to Manchester Airport Relief Road (SEMMS) – construction of a new 6 mile link connecting the M56 at Manchester airport to the A6 at Hazel grove, completion late 2017, and
- Western Gateway Infrastructure Scheme (WGIS) – construction of a new crossing of the Manchester Ship Canal (MSC) adjacent to the M60 and a new road link from the A57 north of the MSC connecting to the local road network south of the MSC adjacent to M60 J10.

There are a number of committed schemes identified in the Government's Road Investment Strategy that will impact upon the study area:

- M62 junction 10 – 12 smart motorway scheme;
- M56 junction 6 - 8 smart motorway, and
- M60 junction 4 – 24 smart motorway scheme.

M60 J18, Simister Island Interchange major junction improvement, which falls within the study area, is to be developed during the next road period.

The outcomes of this study and the development of any RIS 1 or other road based interventions will need to be aligned.

4.9.2 Rail Based Investments

The principal changes to the Rail Network relate to the Northern Hub, and the north west and trans-Pennine electrification programmes which will see the lines to Bolton and Preston and Stalybridge wired in the near future and the route to Leeds (via Huddersfield) and York in the medium term.

Current improvements to the existing network include the electrification and construction of the Ordsall Chord, part of the Northern Hub that will link Piccadilly and Victoria stations and provide

additional rail capacity and new connections. Smaller scale improvements such as station upgrades and the construction of a Manchester facing bay at Rochdale are also underway.

The Northern Hub scheme will help to address crowding issues by adding about 25% to the capacity of the fast services to Liverpool, Leeds and Bolton and increasing the number of fast services from Manchester to Leeds from 5 an hour to 6 and the number of semi-fast services from 2 to 4. It will allow 4 of the fast services to serve both of Manchester's main rail stations, and 4 to serve Manchester Airport.

In December 2015, two new rail franchising deals were announced, the Northern franchise and the Trans-Pennine Express franchise. These franchises are due to start on the 1st April 2016 and will deliver updated rolling stock, additional carriages to reduce overcrowding, smart ticketing, better station facilities and service improvements and improved connectivity including later evening journeys and additional services on Sundays. The new franchises have the potential to increase rail patronage across the study area due to the service improvements and better passenger experience

Major developments in the longer term will include HS2 with stations at Manchester Airport and Manchester Piccadilly from the south. However, to deliver the aims of the Northern Powerhouse, significant investment will be required to deliver new capacity, shorter journey times and more frequent services from Manchester to Liverpool, Leeds and Sheffield. This is currently being looked at by TfN with TfGM, Network Rail, HS2 and DfT.

4.9.3 Metrolink Based Investments

Work is currently underway to construct a Metrolink Second City Crossing through the centre of Manchester, this will increase capacity, flexibility and reliability of the Metrolink network. This new link will connect the existing network at St Peter's Square with Lower Mosely Street and provide an additional route for the Metrolink system to pass through the city centre. The first stage to Exchange Square opened recently and the complete route is due to be completed by 2017.

TfGM are currently proposing the construction of a Metrolink extension through the Trafford Park area linking with the Trafford Centre and the Port Salford development. This extension would provide improved public transport access to employment, business, leisure and retail areas adjacent to the route.

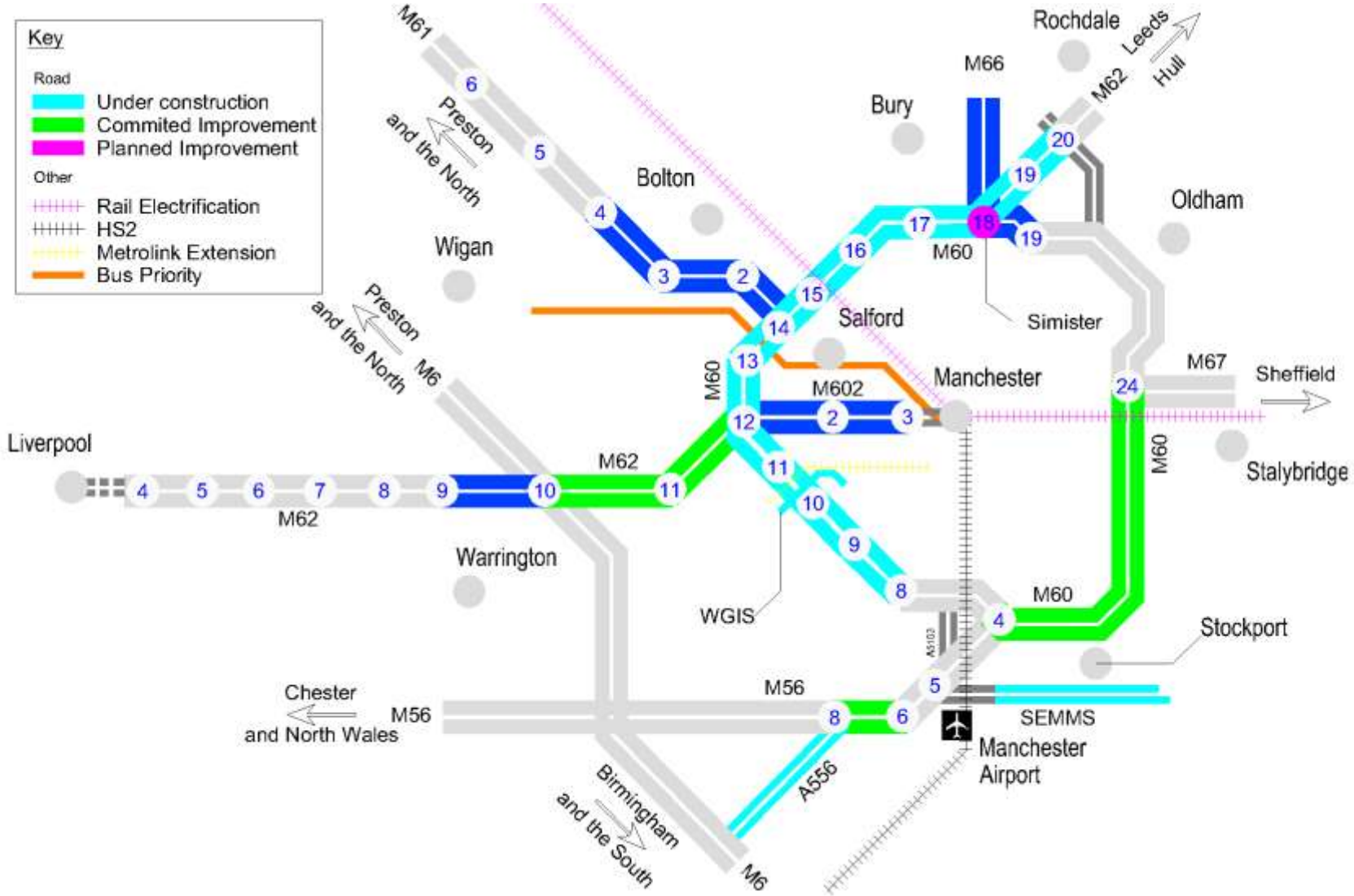
4.9.4 Bus Based Investments

Work is scheduled for completion in April 2016 on the construction of a new 4.5 mile guided busway between Leigh and Ellenbrook, as well as a package of improvements on the A580 as part of the Bus

Priority Package which includes a park and ride facility on the A580 underneath the M60 at junction 13. This package of improvements will reduce journey times and increase reliability of the service between Leigh and Atherton and the city centre.

The Cross City bus package is a £54.5m investment which will significantly improve bus travel into, and across, Manchester city centre. It will improve the speed and reliability of existing bus services from Middleton in the north, Parrs Wood in the south and Salford/Worsley in the west, as well as support the creation of new services along each of the corridors through the city centre. The scheme will also increase accessibility from areas along the A580 and A664 corridors to the city centre and the Oxford Road corridor.

Figure 38 - Planned Transport Developments



4.10 Future Travel Forecasts

Modelling work carried out around 9 months prior to this study produced future year forecasts for 2017 and 2032. These forecasts will be updated as part of the study but at this early stage they are the best forecasts available for carrying out an assessment of future transport problems in the study area. The methodology used the Department for Transport's standard approaches outlined In WebTAG[51] Unit M4, which covers forecasting and uncertainty. Growth was constrained to match the forecasts in the DfT's TEMPRO Version 6.2.

No scenarios were created to represent the success of Northern Powerhouse initiatives as at the time the model was produced, no scenarios were available to reflect the growth aspirations of Northern Powerhouse. DfT is currently developing a number of scenarios to reflect the growth aspiration of Northern Powerhouse which can be used at future stages of this study.

The future year forecasts currently included in the models, consider the impact of developments that are expected to affect the traffic flows on the motorway in the north-west quadrant. The most significant developments listed earlier are included within the model with the exception of Port Salford and Liverpool 2 deep water container terminal. At this stage of the study, no further modelling is planned, in order to ensure the impact of these omitted developments are considered within this report. The study team has consulted the team delivering the TfN Freight study to ascertain the scale of their impact. It is understood that the combined impact of these two developments could generate around 1,000 HGVs per day on the M60 north west quadrant, this is only a little over 1% of the annual average daily total traffic flows through the study area and is therefore considered to have little impact on the conclusions of this stage of the study.

The future year forecasts were produced from models that include the following transport schemes

- Road – Western Gateway Improvements (WGIS);
- Road – Manchester Airport Relief Road (SEMMMS);
- Road - A556 Knutsford to Bowdon Improvement;
- Road - Manchester Smart Motorway;
- Metrolink – all Phase 3B extensions but not the Trafford Park Line, which is awaiting Transport and Works Act Order;
- Rail – electrification of Liverpool to Manchester;
- Bus – Leigh-Salford-Manchester busway, and
- Bus – City Centre crossing.

Missing from this list are the Northern Hub rail scheme and electrification of the rail route between Manchester and Leeds. The forecasts are missing two additional trains an hour between Manchester

[51]Transport analysis guidance: WebTAG, https://www.gov.uk/guidance/transport-analysis-guidance-webtag

and both Liverpool and Manchester and any improvements in rail journey time to between Manchester and Leeds of about 5 minutes.

As part of future stages of the study and we will review the developments and currently committed transport improvements contained within the traffic models and amend these accordingly in agreement with stakeholders.

4.11 Traffic Growth

Until such time as the models have been reviewed and updated as described above, our only means of forecasting future conditions on the SRN is the use of the existing traffic models.

Based on the Core 2032 scenario, growth in traffic for car, public transport and freight (LGV and HGV) is summarised in Table 8.

Table 8 - Strength of growth by mode

	Car	Public Transport	Freight	Total
Base 2008	100%	100%	100%	100%
Core 2032	115%	102%	133%	114%

Source: Model Forecasting Report for M60 Managed Motorways study (2013)

Whilst Table 8 is only comparing growth by mode between 2008 and 2032, it is important to note the amount of growth in freight traffic relative to other modes.

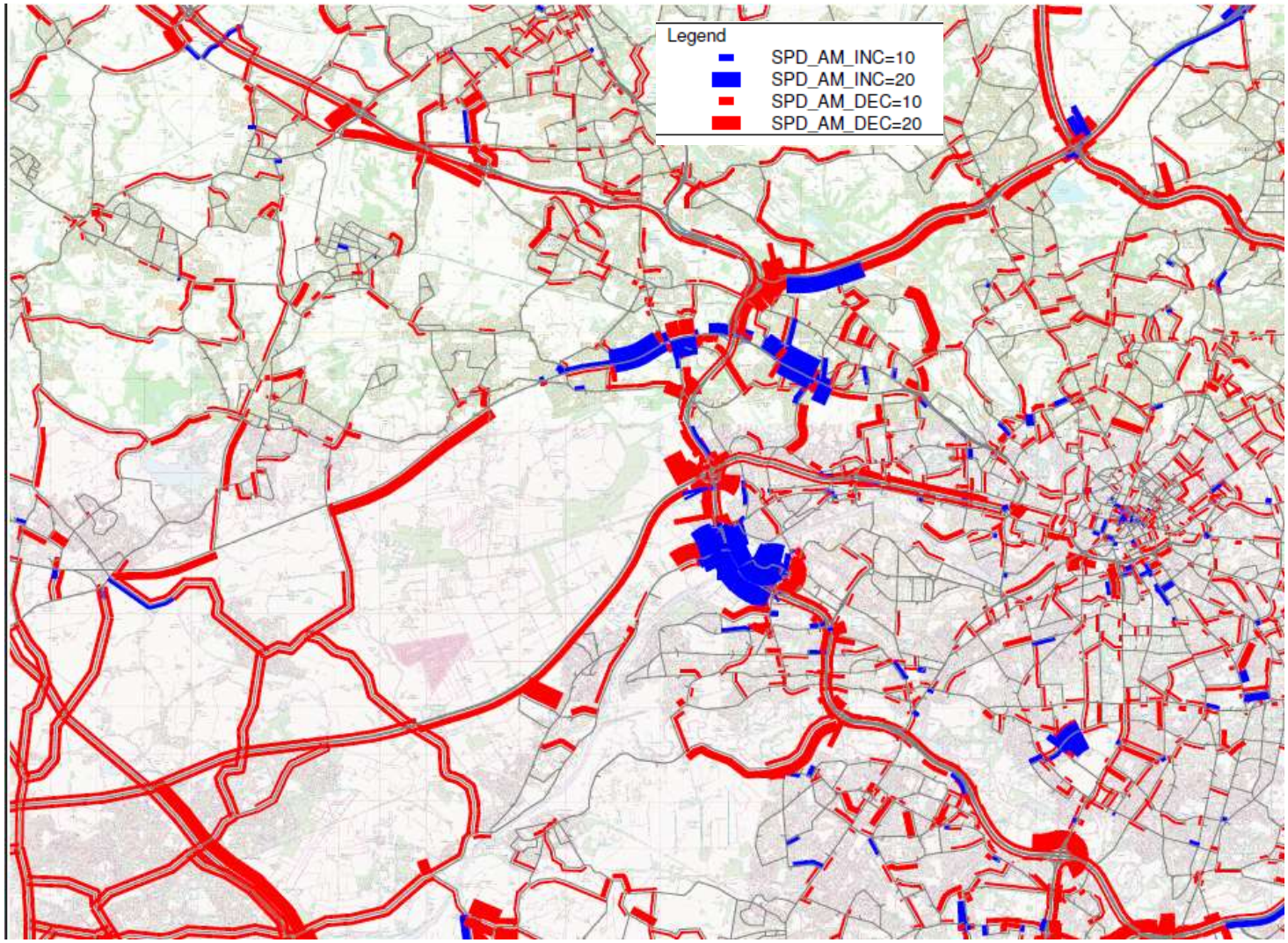
4.12 Impact of Traffic Growth on Performance of the SRN

Section 4 of this report highlighted the existing poor performance of the SRN in the study area in terms of average journey times and journey speeds concluding that the majority of the section of M60 between junctions 8 and 18 fell within the worst 10% of national motorway links in terms of journey time reliability.

Figure 39 illustrates the forecast change in average speeds on the Greater Manchester motorway network between 2013 and 2035 assuming the core development scenario and the programme of committed transport improvements included in the models (this includes planned public transport improvements). There are some localised improvements (indicated in blue) – notably Western Gateway Infrastructure Scheme (WGIS), which brings relief to Barton High Level Bridge, and the planned improvements at Simister (junction 18) However, over the majority of the study area network, the currently poor journey speeds and journey reliability will deteriorate further despite the significant levels of investment already planned.

Furthermore, these forecasts assume significantly lower levels of development and traffic growth than is anticipated as a consequence of the Northern Powerhouse.

Figure 39 - Speed difference base year (2013) - DM (2035)



KEY FINDINGS - Current Transport Problems

4a The SRN within the study area suffers from severe congestion with the majority of links falling within the worst 10% nationally in terms of journey speeds and journey time reliability. This affects not only local and regional Greater Manchester movements using the SRN in the study area but also impacts pan-northern SRN movements from origins and destinations such as Liverpool, Warrington, Preston, Leeds and Hull.

4b Between junctions 12 and 18, where the M60 and M62 are coincident, two way AADF's range from 150,000 to 195,000. AADF flows of this magnitude exceed those anywhere else on the SRN with the exception of the western section of M25 and the southern end of the M1.

4c Since 2005, the peak periods are extending into the inter-peak periods.

4d The road layout and topography of the SRN within the study area contribute to congestion and poor journey time reliability because of:

- Volume of traffic on the main carriageways of the SRN within the study area
- Significant merging and diverging flows where the M62/M60 M60/M61 M60/M62/M66 meet.
- Short distances between junctions.
- Narrow lanes and steep gradients

4e Limited opportunities for crossing the Manchester Ship Canal pushes local traffic onto the SRN within the study area.

4f Given the nature of the existing radial public transport network, there are significant challenges for public transport to contribute to the reduction of commuter traffic using the strategic road network within the study area due to the disparate origins and destinations of commuters.

4g Freight traffic on the SRN within the study area comprises pan northern, regional and local movements. The volume of freight (15%) and the road layout and topography means that freight can be slow moving impacting on overall network performance.

4h Between 2009 and 2011 the vast majority of the motorways within the study area fell within the top 20% worst performing sections of the SRN in terms of total casualties.

KEY FINDINGS - Current Transport Problems

4i	There are a significant number of road and public transport improvements already planned. Based on the forecasting work undertaken previously, it is evident that operating conditions will continue to deteriorate on the majority of the SRN despite these improvements.
4j	If the economic aspirations of the Northern Powerhouse are to be achieved a number of radical transport interventions need to be investigated, particularly on the SRN.

5 Current Environmental Challenges

The current environmental challenges within the study area are outlined in this section, environmental topics covered include air quality, noise, biodiversity, historic environment and landscape / townscape (these being consistent with WebTAG[52] topics).

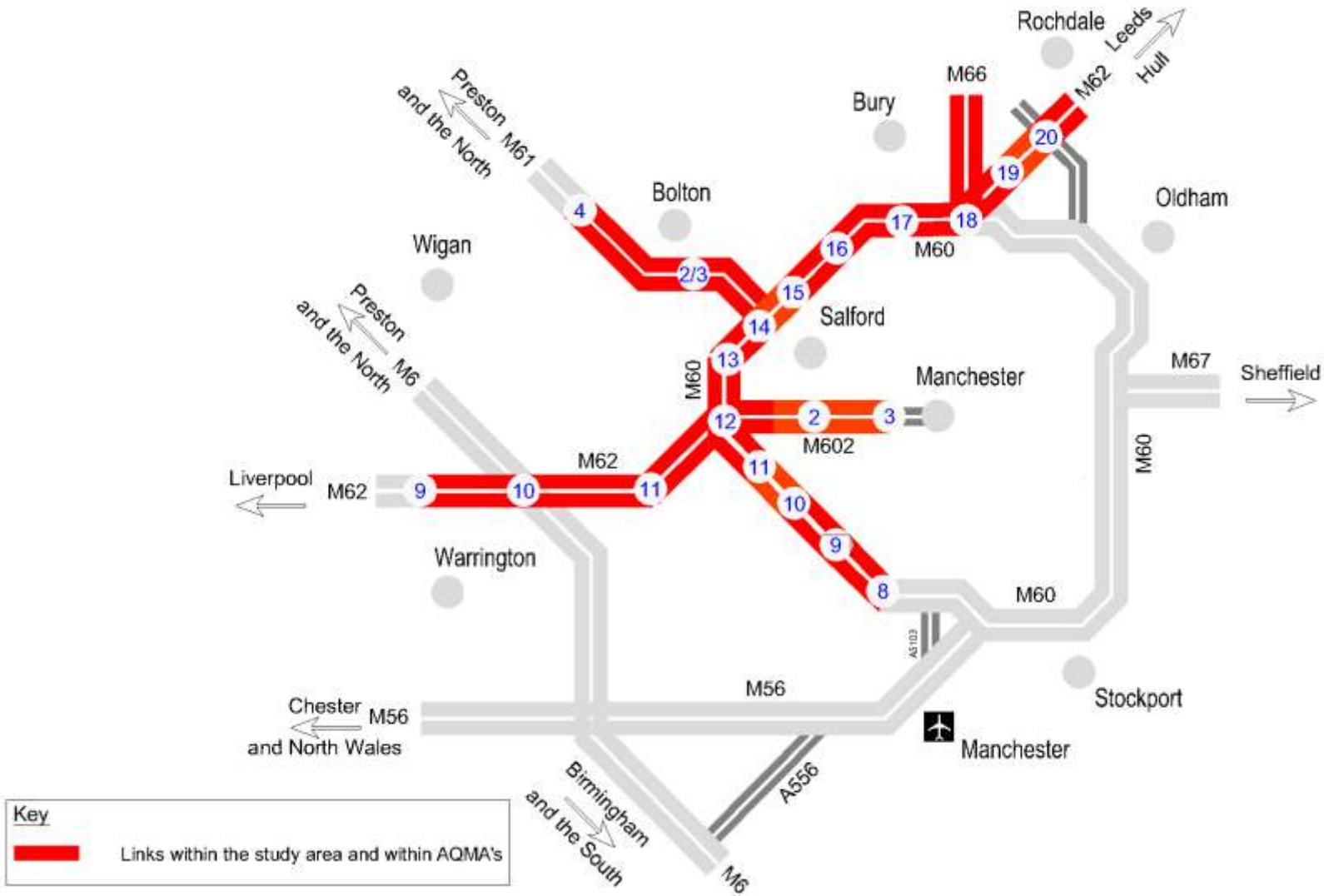
5.1 Air Quality

Air quality will be a major constraint when developing interventions. As part of previous Highways England scheme assessments around Manchester, extensive air quality monitoring has been undertaken. This has illustrated that baseline air quality is poor with measured concentrations of the key traffic related pollutant nitrogen dioxide (NO_2) being well above the Air Quality Strategy (AQS) objectives.

Air quality within close proximity to the M60 northwest quadrant is poor with measured concentration well above the AQS Objectives/EU Limit Values for the key traffic related pollutant nitrogen dioxide (NO_2). The whole of the M60 has also been designated an Air Quality Management Area (AQMA)[53] as shown overleaf in Figure 40. The AQS objectives/EU Limit Values for the key traffic related pollutants NO_2 and PM_{10} are presented in Table 9.

[52] Transport analysis guidance: WebTAG, https://www.gov.uk/guidance/transport-analysis-guidance-webtag
[53] Air Quality Management Areas, http://uk-air.defra.gov.uk/aqma/, Department for Environment Food and Rural Affairs

Figure 40 - AQMA's within the study area



For geographic location of AQMA's refer to Appendix A

Table 9 - Air Quality Objectives and European Directives for the protection of human health

Air Quality Objectives				**EU Limit Values**	
Pollutant	**Concentration**	**Averaging Period**	**Compliance Date**	**Concentration**	**Compliance Date**
NO_2	200 $\mu g.m^{-3}$	1-hour mean (not to be exceeded more than 18 times per year)	31 December 2005	200 $\mu g.m^{-3}$ (18 exceedences)	1 January 2010
	40 $\mu g.m^{-3}$	annual mean	31 December 2005	40 $\mu g.m^{-3}$	1 January 2010
PM_{10}	50 $\mu g.m^{-3}$	24-hour mean (not to be exceeded more than 35 times per year)	31 December 2010	50 $\mu g.m^{-3}$ (35 exceedences)	1 January 2005
	40 $\mu g.m^{-3}$	annual mean	31 December 2004	40 $\mu g.m^{-3}$	1 January 2005

The AQS objectives only apply where members of the public are likely to be regularly present for the averaging time of the objective (i.e. where people will be exposed to pollutants). The annual mean objectives apply to all locations where members of the public might be regularly exposed; these include building façades of residential properties, schools, hospitals, care homes, etc.

Monitoring of air quality (for NO_2 and PM_{10}) has been undertaken extensively across the study area for a number of years by local authorities and Highways England.

Monitoring results for NO_2 using automatic analysers and diffusion tubes show that there is widespread exceedance of the annual mean NO_2 objective (40 $\mu g/m^3$) at roadside sites across at locations close to the M60. In addition to the exceedances of the annual mean objective a number of monitoring locations have recorded concentrations above 60 $\mu g/m^3$, which also suggests that the hourly NO_2 objective is also likely to be exceeded (Laxen & Marner, 2003).

Historic PM_{10} particulate concentrations recorded at automatic monitoring sites showed that the PM_{10} concentrations are below both the annual mean objective (40 $\mu g/m^3$) and the 24 hour objective (50$\mu g/m^3$ 24 hour mean not to be exceeded more than 35 times per year)[54] .

[54] GreatAirManchester, http://www.greatairmanchester.org.uk/TellMeMore/history.aspx

Some of the highest concentrations of NO_2 monitored by Highways England occur in the study area. One area that records concentrations above the AQS Objectives is Worsley (close to Junction 13) where receptors (residential properties) are located particularly close to the M60 (within 6m of the hard shoulder). Highways England continued to undertake monitoring around Manchester until April 2015. This monitoring indicated that there is currently widespread exceedance of the AQS Objectives within the vicinity of the M60.

In the past an ALR scheme was developed between junction 8 and junction 15 of the M60 to reduce congestion along this section, however, following the air quality assessment for this scheme, it was identified that it would have a significant impact on air quality and as a result an environmental statement would be required and it would need to be considered as a Nationally Significant Infrastructure Project. This was as a result of the increase in traffic flows in areas where air quality was predicted to exceed AQS Objectives in the scheme opening year.

To make a judgement on significance Highways England's Interim Advice Note IAN 174/13 is utilised, which considers all receptors which are predicted to exceed AQS Objectives in the opening year of the scheme. The change at these receptors whether improvements or deteriorations are considered against the guideline bands in the IAN. Given the number of receptors that are located in close proximity to the M60, any intervention that leads to a deterioration in air quality whist concentrations remain above the AQS Objectives is therefore likely to trigger a significant impact.

It is still uncertain what the future trend in monitored concentrations and roadside concentrations will be. Previous emission standards have failed to deliver the anticipated reduction in emissions and hence the reduction in concentrations has also been smaller than anticipated. The evidence to date on the performance of the Euro VI/6 standard suggests that the emissions will significantly reduce when compared to the current standards. This is particularly the case for HGV emissions.

Monitored concentrations in parts of the M60 are well above the AQS Objectives and as a result it is likely to take time before concentrations fall to below the AQS Objectives assuming that Euro 6/VI perform as anticipated. It is acknowledged therefore that air quality is a material factor in the development of options and progressing a scheme around the MNWQ.

It is anticipated that with the introduction Euro VI/6 vehicles into the fleet, concentrations of NO_2 are expected to decline more rapidly than has been seen in the last decade. Air quality assessments of scheme impacts are undertaken in accordance with the Design Manual for Roads and Bridges (DMRB)[55], in addition a number of Interim Advice Notes (IANs) have been issued which also need to

[55] Design Manual for Roads & Bridges, http://www.standardsforhighways.co.uk/dmrb/, Department for Transport

be followed. Highways England (IAN 170/12v3[56]) provides Highways England's advice in relation to its view on future trends of NO_2 as a result of improvements associated with Euro VI/6 vehicles.

The assessment of impacts on air quality of a road scheme need to be considered in accordance with national policy (the National Planning Policy Framework[57] and the National Networks National Policy Statement[58] (NN NPS). The NPPF and the NN NPS require consideration of whether the scheme is likely to impact on the UKs ability to comply with the EU Directive on Air Quality or impacts on achievement of national objectives (e.g. where there are AQMAs). For any scheme that has a significant impact on air quality, substantial weight will be given to the air quality implications during the approval process for the scheme.

Once the interventions for the MNWQ have been identified, it will be important to assess the potential impacts on air quality in order to ensure that any significant impacts can be adequately identified and mitigated where necessary. Given the proximity of receptors to the M60 and the current state of air quality around the main routes in Manchester, any intervention in the MNWQ will need to ensure that air quality is not made significantly worse. It is likely that any intervention in the MNWQ will have impacts over a wider area and therefore consideration of air quality would not be limited to the North West Quadrant of the M60.

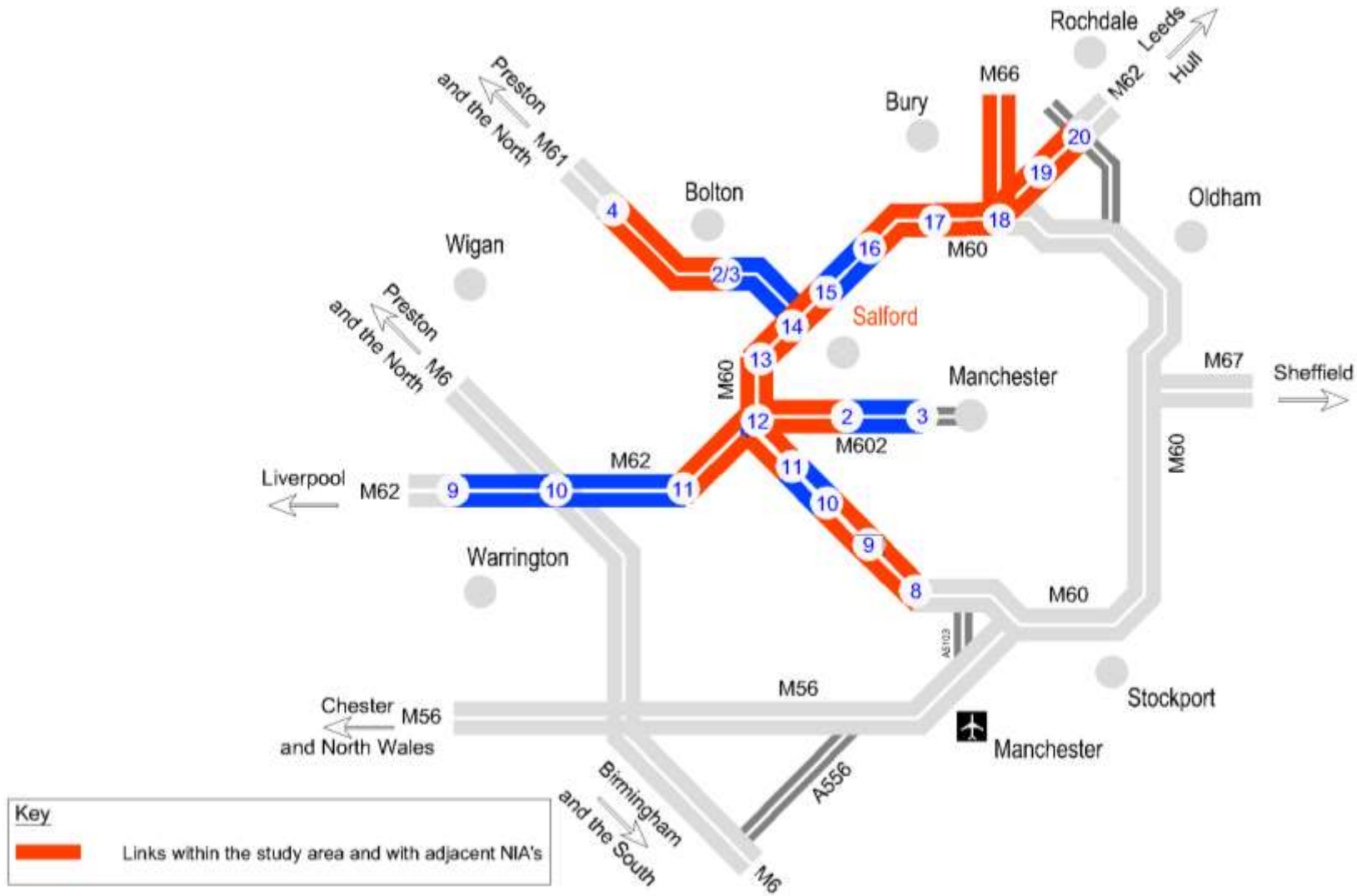
5.2 Noise

The existing noise climate within the MNWQ study area is dominated by the busy M60 and surrounding roads. However, there are a number of secluded and tranquil areas outside of the main traffic corridors, particularly in the north east of the study area and away from the M60 to the west within the Mersey River Valley.

There are approximately 40 Noise Important Areas within the study area, these are shown Figure 41 overleaf. Many of these are located at junctions around the North West Quadrant of the M60 Motorway, whilst another significant proportion are located along the M56 between Wythenshawe and Manchester Airport. There are also isolated NIAs located throughout the study areas including at the A556 junction with the M56, on the M62 at Irlam, and around the M61 / A575 between Little Hulton and Farnworth.

[56] Updated Air Quality Advice, http://www.standardsforhighways.co.uk/ians/pdfs/ian170v3.pdf, Highways Agency, November 13
[57] National Planning Policy Framework, https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/6077/2116950.pdf, Department for Communities and Local Government, 2012
[58] DfT. *National policy statement for national networks*, December 2014

Figure 41 - NIA's within the study area



For geographic location of NIA's refer to Appendix A

In accordance with the June 2013 Major Projects Instruction 'Policy positions on noise and application to major improvement schemes'[59], which states that consideration should be given to improving the noise environment in important areas (IA's) and First Priority Locations (FPL's), Highways England have agreed that low noise resurfacing should be provided between M60 Junctions 8 to 18 and M62 Junctions 18 to 20. Given this resurfacing work which is currently programmed to be completed by 2017, it is anticipated that the noise environment will be significantly improved in those affected areas.

However, such resurfacing is only likely to provide an improvement should the vehicle numbers and speeds stay the same. Given the anticipated growth in traffic into the future there is a possibility that the benefits of that resurfacing could be undermined by future increases in traffic volumes. Traffic volumes can be expected to increase as a result of population growth and a demand for economic growth.

Section A1.11 of the Design Manual for Roads and Bridges (DMRB) provides a rule of thumb estimate for changes in traffic volume and noise. Assuming the mix of traffic remains constant (i.e. percentage HGVs, cars etc) an increase in traffic by 25% would be equivalent to a 1dB increase in traffic noise, and a 100% increase in traffic would be equivalent to a 3 dB increase. Consequently, changes in traffic volume on existing roads or new routes may cause the threshold values for noise to be exceeded. Changes in traffic speed or proportion of heavy vehicles on the existing roads or new routes may also cause a change in noise level.

It will be essential during the later stages of the project to have a good understanding of the changes in traffic to ensure that appropriate noise mitigation can be incorporated into the scheme if necessary.

[59] MPI-09-052013, Policy positions on noise and application to major improvement schemes, Highways Agency, May 2013

5.3 Biodiversity

Within the MNQM study area there are two European designated sites, these are:

- The Manchester Mosses Special Area of Conservation (SAC), and
- Rochdale Canal SAC.

Manchester Mosses SAC covers an area of 172.81 ha within both Warrington and Wigan and is designated for its degraded raised bogs still capable of natural regeneration. Rochdale Canal SAC covers an area of 25.55 ha and is designated for its floating water-plantain *Luronium natans* of which it supports a significant population.

In addition to the above there are also a number of nationally designated sites within the study area including several Sites of Special Scientific Interest. Sites include Risley Moss SSSI; Holcroft Moss SSSI; Rochdale Canal SSSI; Nob End SSSI and Ashclough SSSI. There are no National Nature Reserves within the study area. There are also in excess of ten Local Nature Reserves along with many locally designated sites within the study area such as Sites of Biological Importance.

Given the scale of the study area, the area has the potential to support a range of protected species, which would require further consideration throughout the options development. In addition, as would be expected for such a large study area, there are a number of sensitive habitats which would need to be considered throughout the options development. These include: broadleaved semi-natural woodland, broadleaved plantation woodland, scrub – dense/continuous, scrub – scattered, scattered trees – broadleaved, mixed plantation woodland, neutral grassland etc.

5.4 Historic Environment

Within the study area there are approximately seven Scheduled Monuments, which include: Canal tunnel entrances and wharf, Ringley Old Bridge March Barn Bridge (Rochdale Canal), Bowl barrow west of Highfield Lane, Radcliffe Tower and site of hall, Wardley Hall moated site and promontory fort 300m west of Great Woolden Hall Farm.

In addition, the study area also contains a significant number of Listed Buildings that are largely focussed within settlements. There are also several Conservation Areas within the study area again these are focussed within urban areas, notably within Eccles, Kearsley and Whitefield.

Within the study area there are numerous Registered Parks and Gardens, including Farnworth Park, Heaton Park, Buile Hill Park, Weaste Cemetery, Manchester Southern Cemetery, Wythenshaw Park and Sale and Brooklands Cemetery. There are no World Heritage Sites within the study area.

5.5 Landscape / Townscape

There are no National Parks or Areas of Outstanding Natural Beauty (AONB) within the study area. The closest National Park to the study area is the Peak District located approximately 11km to the east. The closest AONB to the study area is the Forest of Bowland, located in excess of 20km to the north. The study area incorporates Natural England's National Character Areas (NCA) 'Manchester Pennine Fringe' (NCS 54), 'Manchester Conurbation' (NCA 55), 'Lancashire Coal Measures' (NCA 56) and 'Mersey Valley' (NCA 60).

The study area is largely urban and dominated by the motorway network. However there are areas of green space between settlements. Settlements within the study area are of varying sizes all with their own unique townscape. Key settlements include: northern Warrington, Irlam, Urmston, Stretford, Eccles, Worsely, Farnworth, Walkden, Swinton, Kearsley, Whitefield, parts of Heywood and Rochdale.

As would be expected within a study area of this size there are many visual receptors. Occupants of residential properties and users of Public Rights of Way / other recreational routes / recreational access land would require further consideration as the potential options are identified.

KEY FINDINGS -

Current Environmental Challenges

5a	Given that air quality within close proximity to the M60 northwest quadrant is poor (with measured concentration well above the AQS Objectives/EU Limit Values) this will constrain traditional highway solutions.
5b	The development of any interventions will have to carefully consider the noise environment and consideration given to improving the noise environment in important in NIA's and FPL's.
5c	The environmental considerations – particularly air quality and noise – are significant and have historically presented a barrier to road improvements in the study area. The subsequent stages of the study will consider carefully how to ensure that opportunities for a net improvement in air quality and traffic related noise are maximised
5d	There are two ecological European sites within the study area; The Manchester Mosses SAC; and Rochdale Canal SAC these will need to be considered carefully as their locations may influence the location of any proposed interventions.
5e	There are a number of heritage assets within the study area of varying importance including Scheduled Monument, listed buildings, conservation areas and Registered Historic Parks and Gardens. The development of interventions should be mindful of their locations as works that significantly affect these assets particularly Scheduled Monuments are unlikely to be permitted.

6 Conclusions

Since completion of the M60 in 2000 significant works have taken place on the SRN within the study area however despite these improvements the network suffers from severe congestion and the majority of links within the study area fall within the worst 10% nationally in terms of journey speed and journey time reliability. These issues are intensified where local traffic is also making use of the SRN. This congestion affects all traffic using the network, passenger and freight and all journey purposes leading to long delays and lack of journey time reliability throughout the working day and certain periods during weekends.

Over a period of many years the time periods in which the SRN within the study area is at its operational capacity has continued to increase with both the morning and evening peak periods now extending for typically 3-4 hours each, furthermore average inter-peak flows are typically 85% to 90% of average peak flows leading to congested conditions throughout the working day. On the M60, average hourly volumes on Saturday afternoon closely resemble average weekday inter-peak volumes.

The extended weekday peak periods suggest that there is considerable suppressed demand, which could rapidly erode the benefits intended to be delivered by modest improvements to the transport network particularly the SRN.

A number of characteristic of the SRN contribute to congestion and lack of journey time reliability, including:-

- High flows on the main carriageways of the SRN including high proportions of HGVs;
- High merging and diverging flows where motorways meet;
- Proximity of junctions;
- Narrow lanes, steep gradients and, again, high HGV flows;
- Limited opportunities for crossing the Manchester Ship Canal;
- Lack of attractive public transport alternatives, and
- Congestion on the local road network adding to the attraction of the M60 for local journeys.

The public transport system serving the study area suffers a number of problems including overcrowding, particularly on the heavy rail line from Preston and Bolton, and a general lack of park and ride facilities at stations, particularly those accessible from the SRN. Public transport is generally best suited to journey with at least one trip end in the city centre; elsewhere interchange makes its use less attractive than car. Consequently, based on existing travel and development patterns, there is limited further potential for public transport to contribute to the reduction of commuter traffic using the motorway network.

Congestion and journey time reliability are already inhibiting the development and economic output of Greater Manchester and will become a serious impediment to achieving the Government's Northern Powerhouse aspirations. Estimation of the scale and geographical location of changes in economic output brought about by investment in transport infrastructure will require relatively innovative approaches to modelling and appraisal based upon empirical evidence on the strength of the relationship between economic productivity and transport connectivity. To assess the impacts of investment on the performance of the transport network and the impact of other initiatives on the success of the Northern Powerhouse, careful development of a range of potential future scenarios will be needed to illustrate the scale and distribution of potential outcomes.

There are a number of planned developments that have been taken account of in the assessments using the existing traffic models to date, however it is also emerging that there are substantive additional development proposals and aspirations at other locations in the Greater Manchester area. Clearly development proposals by their nature continue to evolve and these latest additions will be incorporated into subsequent analysis.

There are a significant number of road and public transport improvements already planned. However, based on forecasting work undertaken previously, it is evident that operating conditions will continue to deteriorate on the majority of the SRN despite these improvements.

If the economic aspirations of the Northern Powerhouse are to be achieved a number of radical transport interventions need to be investigated, particularly on the SRN to supplement a possible suite of localised improvements. Complementary improvements to both TfGM's KRN and the public transport network need to be investigated to ascertain the extent that they can relive pressure on the SRN. Future development patterns envisaged as part of Northern Powerhouse could have a major influence on the contribution that could be made by public transport.

The environmental considerations – particularly air quality and noise – are significant and have historically presented a barrier to road improvements in the study area. The subsequent stages of the study will consider carefully how to ensure that opportunities for a net improvement in air quality and traffic related noise are maximised.

The next stages of the study will define the transport objectives that will solve the problems identified and identify a long-list of options which will be appraised to inform a short-list of better performing options. For these better performing options a strategic outline business cases will be developed for further consideration. The study is anticipated to conclude in October 2016.

Appendix A – Environmental Constraints Plans

Appendix B – Existing Studies

Previous studies developed within the study area:

- Greater Manchester Northern Western Relief Road (GMNWRR)
- Carrington Spur Extension
- Altrincham-Sale-Stretford Bypass
- M60 JETTS Multi-Modal Study
- M60 J8-15 Capacity Enhancement Scheme
- M62 Jct 11 to M62 Jct 20 "Golf Course Route"
- M56 to M62 : “Green Route”