Technical Note

Project:	A6 to Manchester Airport Relief Road	**To:**	SMBC
Subject:	Justification of a D2AP Road Solution	**From:**	Atkins
Date:	10 October 2012	**cc:**	

1. Introduction

1.1 Background

In order to understand the rationale and justification for the currently proposed road scheme it is important to be aware of the background that has led to the current proposal.

In July 1998 the Government published *A New Deal for Trunk Roads in England*, following a strategic review of the roads programme undertaken in association with the development of its new Transport Policy. The report established a Targeted Programme of Improvements to the trunk road network to be taken forward by the Highways Agency. The report also proposed a series of 'multi-modal' studies to address problems on the strategic trunk road network not covered by the short term Targeted Programme of Improvements.

The South East Manchester Multi-Modal Study (SEMMMS) was one of such studies. Recognising that transport problems and their solutions are not just limited to the trunk road network, the studies considered all modes of transport.

The SEMMMS study was commissioned because the following three road schemes were removed from the trunk roads programme along with the de-trunking of the A6 and the A523:

- The A6(M) Stockport North South Bypass;
- The A555 Manchester Airport Link Road West (MAELR West); and
- The A555/A523 Poynton Bypass

The Brief for the SEMMMS study was to develop a 20-year transport strategy that addressed the problems of the study area and provide a plan of specific interventions to address those problems that were most urgent.

1.2 Purpose of this Paper

This Paper examines whether the case for the current proposed road scheme, at a dual carriageway standard is still justified or whether other solutions should be considered. In considering this justification, the paper looks at:

- the original SEMMMS study objectives;
- the problems the study was tasked with addressing – and in particular those that relate to the current road scheme;
- the options for intervention that were considered in arriving at the SEMMMS study recommendations;
- whether the traffic problems have materially changed since the publication of the SEMMMS study recommendations;
- whether it is feasible to consider any non-road alternatives to address the transport problems in the study area; and
- the appropriate carriageway standard and whether it is appropriate to consider a Low Cost Alternative.

2. The SEMMMS Study

2.1 Objectives

Within the over-arching national objectives for major transport scheme investment the following Core Objectives were defined for the SEMMMS Study:

- The promotion of environmentally sustainable economic growth;
- The promotion of urban regeneration;
- The improvement on amenity, safety and health;
- The enhancement of the Regional Centre, town centres, local and village centres and the Airport;
- The encouragement of the community and cultural life of neighbourhoods, and encouragement of social inclusion.

In using the Core Objectives as a starting point for the study, there was an explicit recognition that this pointed towards a strategy that promoted:

- Public transport use; and
- The concentration of development at existing established centres, brownfield sites and a number of particularly priority locations as opposed to expansion on green-filed sites located on the urban fringe and around major road junctions.

2.2 Traffic and Transport Problems in the Study Area

The study recognised that there were a number of locations in the area that experienced significant traffic congestion and associated environmental impacts. The key locations identified by the study are listed below and shown in Figure 1:

- Finney Lane in Heald Green;
- A523/A5149 cross roads in Poynton;
- Hazel Grove at the A6/A523 intersection (Rising Sun) and the A6/A627 (Torkington Road);
- The A34 at Gatley;
- The M67/A57 interchange in Denton
- The A6 through Stockport; and
- Alderley Edge village

The Alderley Edge bypass has recently been built resolving the traffic problems in Alderley Edge village. The A67/A57 Denton Interchange is located on the M60 and not directly affected by the current SEMMMS road scheme proposal. All other identified locations would be affected by the proposed relief road.

The SEMMMS study recognised that there was a dispersed pattern of activity in relation to job location and employees which resulted in an orbital trip making pattern in the study area, which by its nature is challenging to cater for by public transport. The residential development patterns and social changes had reinforced the prevailing position of an affluent and highly mobile population around the southern fringe of the conurbation where the communities were characterised by high car ownership, long commuting distances and inherently low public transport use. The changing pattern of jobs and services had made access to and from them more difficult by those in the pockets of deprivation where car ownership was low.

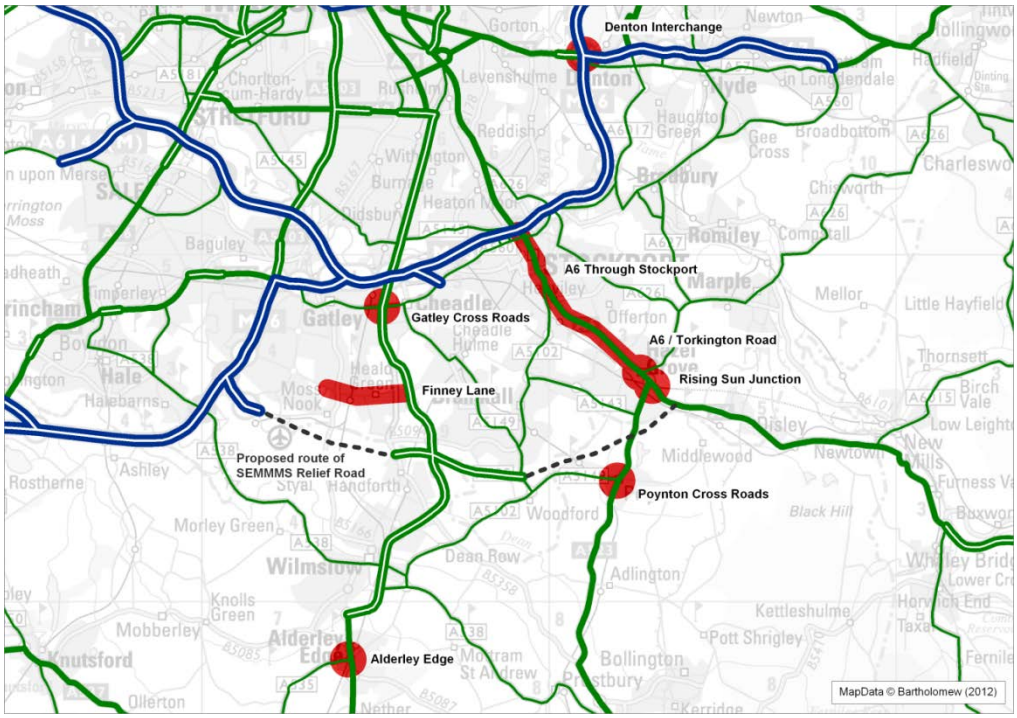


Figure 1 – Areas of Significant Congestion

2.3 Road Options Considered

The following five broad options were considered for each of the three road schemes remitted to the study.

- Do not construct the scheme (do minimum);
- Construct the scheme as proposed at the time it was put on hold;
- Construct the road but at a lower standard;
- Construct the scheme but with provision for both private cars as well as dedicated facilities for goods vehicles and/ or public transport;
- Construct a scheme for goods and / or public transport only.

Considering the road schemes in isolation, the assessment indicated that:

- Constructing all schemes should be considered;
- Constructing only one or two, but not all to the design previously proposed would simply amplify the existing traffic problems;
- Building lower capacity schemes is a viable option;

It would be compatible to build a lower standard MALRW and Poynton bypass along with traffic management measures in Hazel Grove.

Not building the schemes is an option. A freight or PT only facility along the A6(M) or the MALRW corridors is an option but there is insufficient demand for such a facility in the Poynton scheme corridor.

2.4 Integrated Strategy Options Tested

The study developed and tested six separate strategy options in order to arrive at a preferred strategy of interventions. They key elements of these strategy options are listed in Table 1 and shown in the figures included at Appendix A. All options assumed the construction of Alderley Edge Bypass.

Option	Road	Metrolink	Rail	Quality Bus
Red	Reduced: A6(M), A555/A523, and MALRW	Airport - Wilmslow, Airport - Poynton, Hough End - Stockport	Urban Metro, Western Rail Link	New QBC Corridors
Orange	Reduced: A555/A523, and MALRW	Hough End - Stockport, Stockport - Rose Hill	Urban Metro, Eastern Rail Link, Western Rail Link	New QBC Corridors
Yellow	Reduced A6(M)	Hough End - Stockport, Stockport - Hazel Grove	Expand orbital services: Stalybridge, Stockport,	Do Minimum corridors enhanced
Green	Full standard road schemes, A523 dualing, A6 Disley/High Lnae Bypass	Hough End - Stockport	Western Rail Link	New QBC Corridors
Blue	None	Airport - Poynton, Stockport - Hazel Grove, Hough End - Stockport	Urban Metro, Western Rail Link	New QBC Corridors
Violet	Reduced: A6(M), A555/A523, and MALRW, A6 Disley/High Lnae Bypass	Hough End - Stockport, Stockport - Rose Hill, Stockport - Airport	Urban Metro, Western Rail Link	New QBC Corridors

Table 1 – SEMMMS Strategy Options

It is clear from the options listed in Table 1 that all six strategy options included significant public transport improvements in the broad SEMMMS Relief Road corridor.

Assessment of the six strategy options led to the development of a Core Strategy for further assessment. Key elements of the core strategy are listed in Table 2 and shown at Appendix B.

Road	Reduced A555/A523, Reduced MALRW
Metrolink	Hough End - Stockport, Stockport - Rose Hill, Stockport - Airport
Rail	Urban Metro, Western Rail Link
Quality Bus	New QBC Corridors

Table 2 – SEMMMS Core Strategy

The strategy assessment against the five national objectives concluded that whilst there were some slight to moderate adverse environmental impacts from the strategy it generally delivered moderate beneficial impacts across the other four objectives of Safety, Economy, Accessibility and Integration.

2.5 Study Recommendations

Based on the assessment of the study area traffic and transport problems, the appraisal of a wide range of strategy options and the detailed assessment of a core strategy, the SEMMMS study led to a recommended strategy that is shown in Appendix C and the key infrastructure elements of which are listed in Table 3 below.

Road	Reduced A6(M), Reduced A555/A523, Reduced MALRW
Metrolink	Hough End - Stockport, Stockport - Rose Hill, Stockport - Airport
Rail	Urban Metro, Airport Western Rail Link, Expanded Orbital Services including Airport Eastern Link
Quality Bus	New QBC Corridors

Table 3 – SEMMMS Recommended Strategy - Infrastructure

The study recommended a substantial public transport investment in new infrastructure and services and also recommended the construction of all three remitted road schemes but to a lower standard of provision. In addition to the infrastructure interventions proposed, the strategy included recommendations for road space reallocation, transport change measures and urban regeneration proposals.

The appraisal of the recommended strategy showed that in 2021, there would be a small increase in car traffic in the AM peak compared to the Do Minimum but a small decrease in the off-peak period. The mode share for public transport would increase by about 20% in the AM peak and over 50% in the off-peak although this represented only 12% and 7% respectively of overall trips in the study area.

Whilst a 20 year Strategy was developed, the work was split into Short, Medium, and Long Term programmes.

The SEMMMS study concluded that some of the serious congestion problems could only be addressed through the implementation of the remitted road schemes, albeit to a reduced standard. However, it was noted that the highway proposals were one element of the overall package of recommendations that the study concluded should be implemented in their entirety if the 20-year transport vision were to deliver its full outcomes.

In 2002 the recommendations of the Strategy were welcomed by the then Transport Minister, John Spellar, who invited the local authorities to take forward the schemes necessary for delivery.

3. Progress on Implementation of the SEMMMS Study Recommendations

3.1 Schemes Implemented

Over the last ten years since the completion of the SEMMMS study, approximately £63 million has been spent on SEMMMS projects. Within the five priority themes of SEMMMS, the schemes that have been delivered include:

Public Transport

SEMMMS Major Scheme Quality Bus Corridors / Integrated Transport Corridors (QBCs/ITCs). This included eleven main corridors plus a network of routes to serve the Manchester Airport. The

improvements were designed to reduce journey time, improve reliability and to increase comfort and convenience to all users.

Other Public Transport improvements have included:

- accessibility improvements to bus stops on other bus routes;
- improvements to accessibility for number of transport interchanges and railway stations in the SEMMMS area;
- the provision of a computerised booking and scheduling system for flexible transport providers such as Ring and Ride and Local Links;
- the provision of yellow buses to improve school journeys by reducing anti-social behaviour and so increasing use of public transport for school journeys. Yellow School Bus services in operation in Stockport are Brinnington – Harrytown, Heavily – Harrytown, Offerton – Brinnington, Reddish – St. Annes, Brinnington – Werneth.

Work has also continued on the proposals for a Metrolink extension to Stockport. So far however, the delivery of such a route is unlikely before 2016. Consideration is also being given to tram-train options for extending the tram system beyond Stockport to Marple. The delay and possible non-delivery of these schemes have been identified as a possible weakness to the SEMMMS programme as it will compromise its overall integrated approach.

A rail station improvement programme has commenced across Tameside, Stockport, Manchester, Derbyshire and Cheshire East.

Use of Road Space

Road space reallocation has involved the creation of on street cycle facilities, improvements to the pedestrian network, reducing traffic speed and removal of targeted vehicles from inappropriate routes, in order to make vulnerable road users feel more secure.

Transport Change

A strength of the SEMMMS strategy is the increased ability to encourage behavioural change due to increased school travel plan delivery and the ability to improve the accessibility of routes. A large part of the work to encourage a change in modal split away from private motor vehicles, reducing congestion and the health and environmental effects of this type of transport, is related to the production of travel plans for schools and business but other actions that encourage modal shift have also been pursued such as:

- Safer Routes to Schools including the provision of improved traffic signals, signing and lining with relevant TRO's, maintenance of sight lines, dropped kerbs and tactile paving;
- Improvement of cycle facilities on school sites for example the implementation of cycle parking at Offerton High School, Stockport;
- Walking promotion schemes such as walking buses, Walk Once a Week (WOW) and park and stride e.g. St Peters Catholic Primary School, Hazel Grove, Stockport who have park and stride and take part in walk to school week and Abingdon Primary School, Reddish Stockport who have a walking bus and a WOW scheme in operation;
- Other education establishments such as Adult Education and Six Form Colleges have also been approached to develop travel plans and in Stockport, they are all involved in the Stockport Travel Easy Partnership (STEP) to support the implementation of these plans through collective working and joint travel initiatives;
- In Stockport, area wide travel plans have been produced to help reduce specific congestion issues such as the Stanley Green Industrial Estate, in Heald Green and at another industrial estate in Bredbury.

Urban Regeneration

The ability to regenerate district centres and integrate schemes with necessary maintenance works has been identified as a strength of SEMMMS. As such there has been a significant amount of work done by the Greater Manchester authorities via SEMMMS funding to improve accessibility, aid public transport, improve public safety, improve the environment and the streetscape in local, district, and town centres.

3.2 Impact of the Implemented SEMMMS Schemes on Congestion

Of the areas of significant congestion identified by the SEMMMS Study listed in 2.2 above, only the following has been addressed to some degree by the elements of the SEMMMS recommended strategy that have been implemented to date:

- The A6 through Stockport. This has benefitted from the quality bus corridor and the various transport change interventions

The SEMMMS study had assumed that the A34 Alderley Edge bypass would be built and this would resolve the traffic problems in Alderley Edge village. The bypass was opened to traffic in 2010.

None of the other identified locations have benefited from any reduction in traffic congestion due to the elements of the SEMMMS strategy that have been implemented to date. These being:

- Finney Lane in Heald Green;
- A523/A5149 cross roads in Poynton;
- Hazel Grove at the A6/A523 intersection (Rising Sun) and the A6/A627 (Torkington Road);
- The A34 at Gatley; and
- M67/A57 Denton Interchange

With the exception of the Denton Interchange, all the above congestion spots would require the construction of the currently proposed SEMMMS Relief Road to address traffic congestion problems. In the following section we examine how traffic conditions have changed in the key areas of interest.

3.3 Conclusions

The SEMMMS study recognised that many of the serious traffic congestion problems would only be addressed through the construction of the three road schemes. It has also been shown that the implementation of the SEMMMS recommendations to date has not addressed the congestion issues at most of the key locations identified as problems within the SEMMMS study.

4. Traffic Conditions

The previous sections have described that the SEMMMS road scheme proposal has been developed to address the significant traffic congestion problems in south Manchester. In this section we examine the traffic conditions around the time of the original SEMMMS study in 2000 and see how these have changed over the last 12 years.

4.1 Current Traffic Conditions

Traffic count data collated by Transport for Greater Manchester confirms that the volume of traffic in the south Manchester corridor (Stockport and Trafford districts) has started to increase again since 2009 (following a slight decrease during the recession in 2008/09). These are the only two districts of Greater Manchester showing an increase. The statistics confirm the following:

- 12-hour weekday flows on A and B roads in Stockport and Trafford districts *increased by 0.4% and 3.0% respectively* between 2009 and 2010, compared to an overall *decrease* of 1.9% across Greater Manchester:

- The above increases were driven by an increase in cars and heavy goods vehicles on the Stockport and Trafford highway networks, which was partially offset by a reduction in light goods vehicles in both districts:
  - A 0.8% increase in the number of cars and a 5.0% increase in heavy goods vehicles was partially offset by a 4.2% reduction in light goods vehicles in Stockport District,
  - A 3.6% increase in the number of cars and a 20.0% increase in heavy goods vehicles was partially offset by a 6.0% reduction in light goods vehicles in Trafford District;
- Average journey time rates (minutes per mile) during the morning and evening peak hours are higher in Stockport than across Greater Manchester as a whole and have increased since 2008.

The mix of local and strategic traffic is one of the major causes of congestion on the highway network. Freight traffic from Derbyshire, Staffordshire and Cheshire, using the A34, A523 and A6 to access Manchester Airport, Manchester City Centre and distribution centres and other destinations across the North West, mixes with commuter and business traffic travelling between Cheshire and parts of Greater Manchester, and with local commuter and leisure trips in the centres along the south Manchester corridor. These travel patterns have a direct impact on the ability of the transport network to provide efficient connectivity and access to markets and jobs in the future. It also means that local communities are faced with large volumes of traffic and heavy goods vehicles passing through their centres, creating problems in terms of air quality, noise and safety.

Analysis undertaken as part of the development of the base year traffic models for the scheme show a large amount of journey time variability on the roads within and traversing the study area, both within and across time periods. The main findings from an assessment of 32 routes within and across the study area were:

- The morning (0800-0900) and evening (1700-1800) peak hours display substantial journey time variability:
  - across all routes journey times are, on average, 64% longer in the AM peak and 71% longer in the PM peak than the potential journey time within in each time period (the equivalent figure for the inter-peak is 25%),
  - comparing across time periods, AM peak and PM peak journey times are, on average, 26% and 24% longer than the equivalent mean inter-peak journey time;
- The greatest levels of journey time variation (unreliability) are observed on the motorway network:
  - the maximum observed variation in journey time in the AM peak was 166%, on the M56 between Manchester Airport and West Didsbury i.e. the difference between the minimum observed journey time of under seven minutes, and the maximum observed journey time of over 17 minutes,
  - the maximum observed variation in journey time in the AM peak was 205%, on the M60 between Junction 6 and Junction 24 i.e. the difference between the minimum observed journey time of ten minutes, and the maximum observed journey time of over 31 minutes;
- …but journey time reliability and delay is a problem across the whole study area:
  - More than half of all routes surveyed in the AM and PM peak hours displayed a variation in journey time that was more than 50% greater than the potential minimum journey time for each route in that time period, which included the A6, A34, A555 and other routes through local and district centres such as Hazel Grove, Bramhall and Heald Green,
  - Looking across time periods, more than two-thirds of all routes showed journey time variability in the peak hours that was more than 50% longer than the potential journey time in the inter-peak,

- Almost half of all routes in the AM and PM peak hours had mean journey times that were 25% greater than the equivalent mean inter-peak journey time.

The findings from the journey time analysis confirm that journey times in general are much longer in the peak hours than the potential journey time were there free-flowing traffic conditions. It confirms also that within each time period – but particularly in the morning and evening peak hours – most routes in the study area suffer from regular and substantial journey time variability. Journey times across the study area are therefore highly susceptible to delay and very unreliable.

The impact of traffic congestion and journey time unreliability has far-reaching impacts, as the polycentric nature of the Manchester City Region means that whilst Manchester City Centre is the hub of economic, social and cultural activity, a number of distinct town centres exist as economic and social bases in their own right. In the south-east Manchester area, the largest of these centres is Stockport, and this is complemented by Hazel Grove, Heald Green, Poynton, Bramhall, Wilmslow, Handforth and Cheadle Hulme. The emergence and future potential of Manchester Airport as a hub of international commerce means the area traversed by the proposed SEMMMS A6 to Manchester Airport Relief Road Scheme contains substantial pockets of economic activity.

Change since the SEMMMS Study

In looking at the current traffic conditions in the study area, and particularly at the locations of traffic congestion highlighted in the original SEMMMS study, it is necessary to compare the current situation to that in 2000, at the time of the SEMMMS Study. Figure 2 below shows the current (2009) AM peak hour modelled traffic flows compared to historic counts undertaken around the time of the original SEMMMS study. It also shows the percentage change in traffic volumes between the two sets of data.

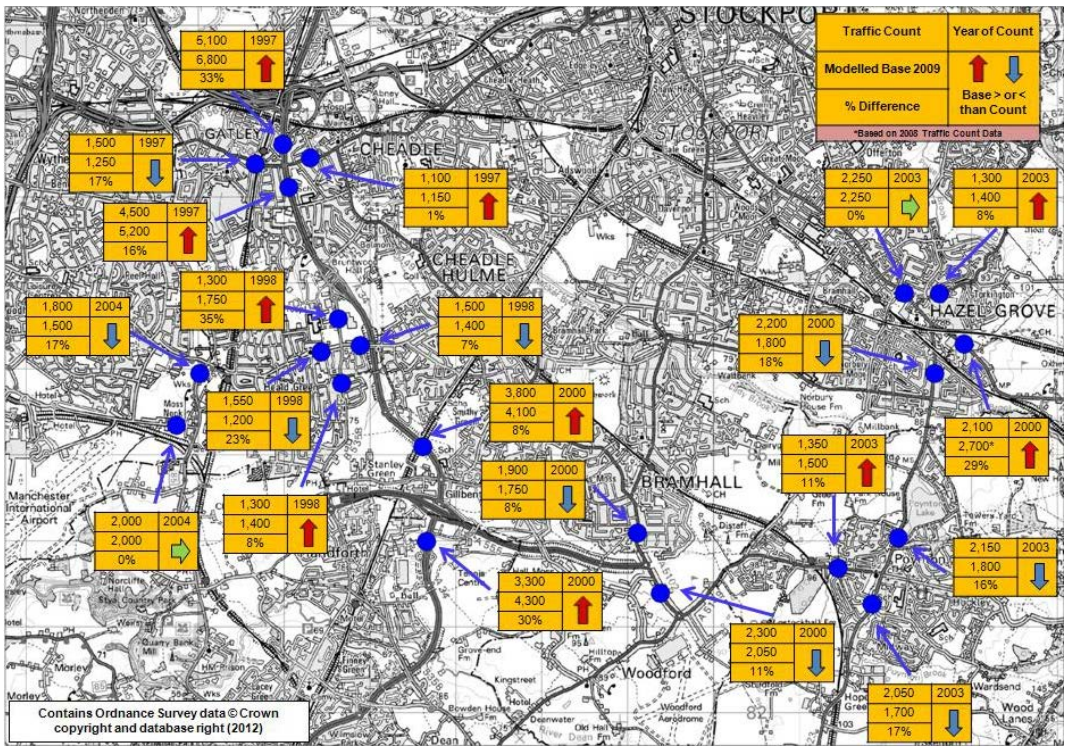


Figure 2 – Comparison of Historic AM Peak Hour Counts to Current Flows

It is evident from Figure 2 that there has generally been a significant increase in traffic volumes on the north south routes whilst traffic volumes have reduced on some of the east west links. This confirms that because of the congested conditions on the road network in the study area, significant volumes of traffic is now using north-south roads along with the M60 as part of a route to make an east-west journey.

Congestion

In order to better understand current traffic conditions on the road network in the study area, Figures 3 and 4 present respectively the conditions on the local road and motorway network in terms of highway speed across the study area in 2009. Figure 3 shows that traffic speeds across the study area road network during the morning peak hour are typically below 20 mph and in many instances below 10mph.

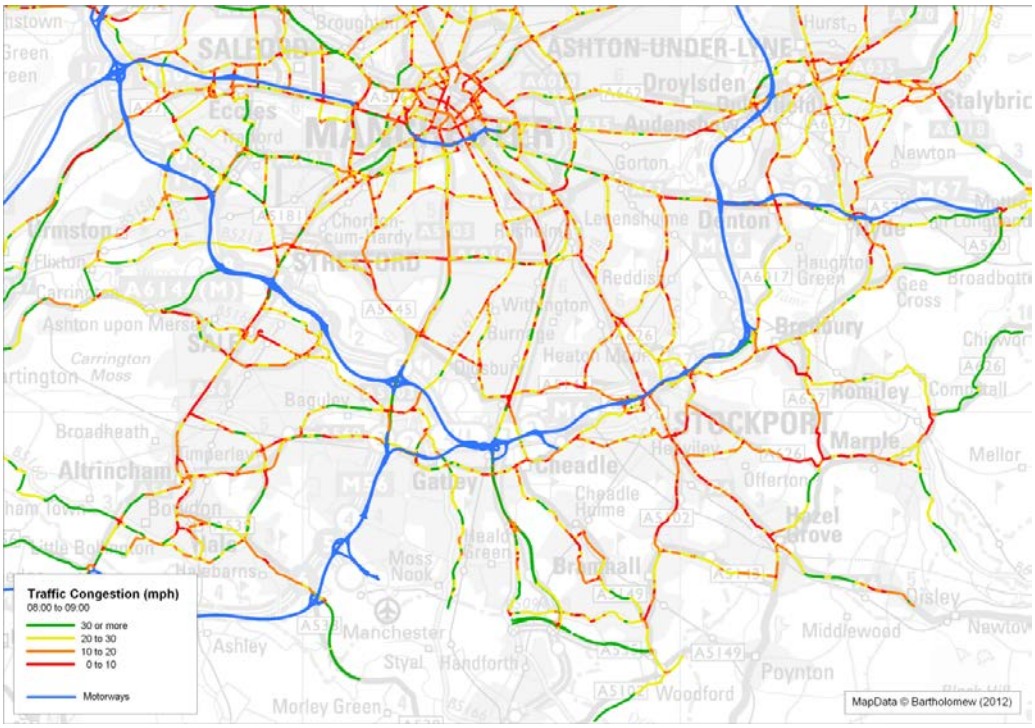


Figure 3 – AM Peak Hour Speeds

Figure 4 below, shows that the AM peak hour speeds on the south east section of the M60 motorway. It can be seen that speeds are generally below 45 mph in the peak direction and below 30mph on some sections of the motorway.

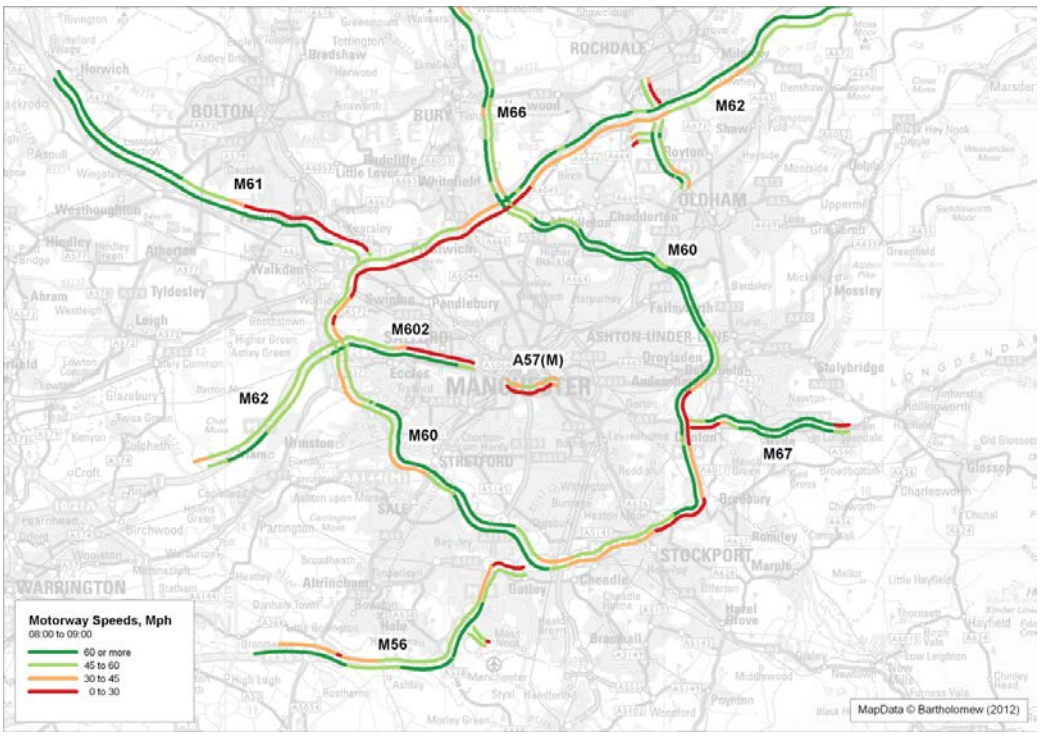
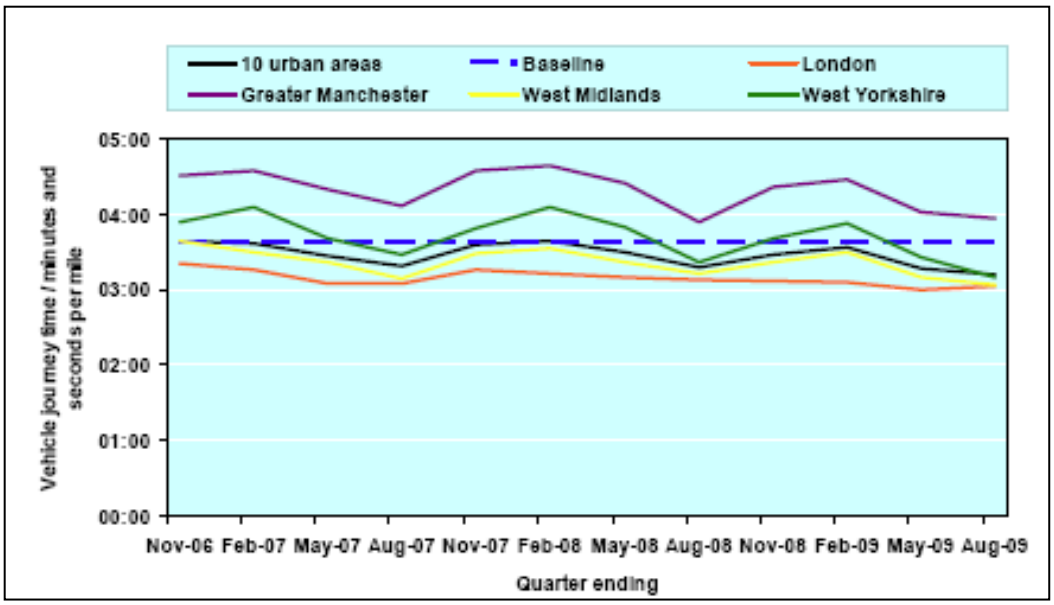


Figure 4 – AM Peak Hour Motorway Speeds

The road network in the study area is amongst the most congested in Greater Manchester. To put this into a national context, Figure 5 presents a comparison of journey times in England's ten largest urban areas. This shows that Greater Manchester is suffering from the greatest levels of congestion, being markedly more congested than all the other areas.



Source: DfT Transport Trends 2009

Figure 5 – Congestion in urban areas: journey times per mile in key areas

Connectivity and Accessibility

Manchester Airport is a key generator of economic value in the study area, sustaining some 35,000 jobs. Figures 6 and 7 respectively, show accessibility to the Airport by all public transport modes and by Bus. It can be seen from Figure 6 that public transport journey times from many areas of South Stockport to the Airport are between 45 to 60 minutes with many being over a 60 minute journey time.

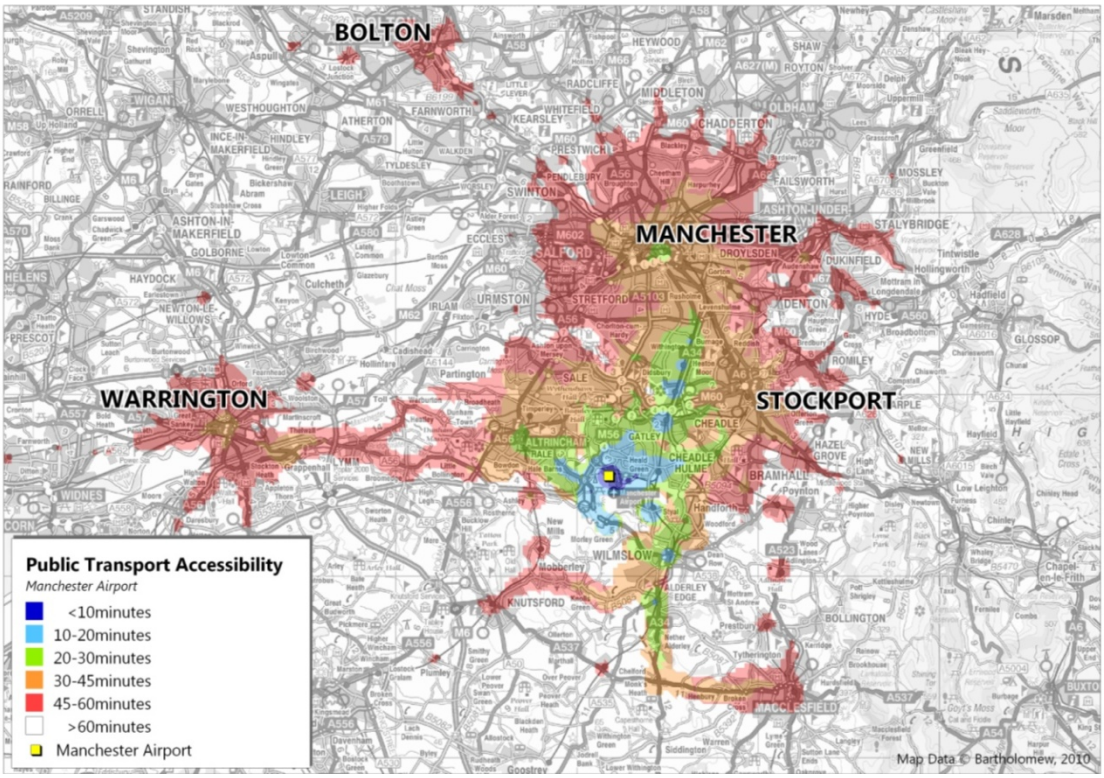


Figure 6 – Public Transport Accessibility to Manchester Airport

Figure 7 shows the very limited accessibility by bus to the Airport. This is due largely to the poor traffic conditions on the surrounding highway network, resulting in unreliable journeys and long journey times. Large areas are not served by any realistic bus option because of the very congested highway conditions.

Given the current road network and the congested conditions, there cannot be an improvement in bus accessibility to the Airport from the east without the provision of new infrastructure in the SEMMMS road scheme corridor. The SEMMMS Relief Road will provide an improved direct route between the Airport and areas to the east resulting in a substantially reduced journey time and improved accessibility by bus.

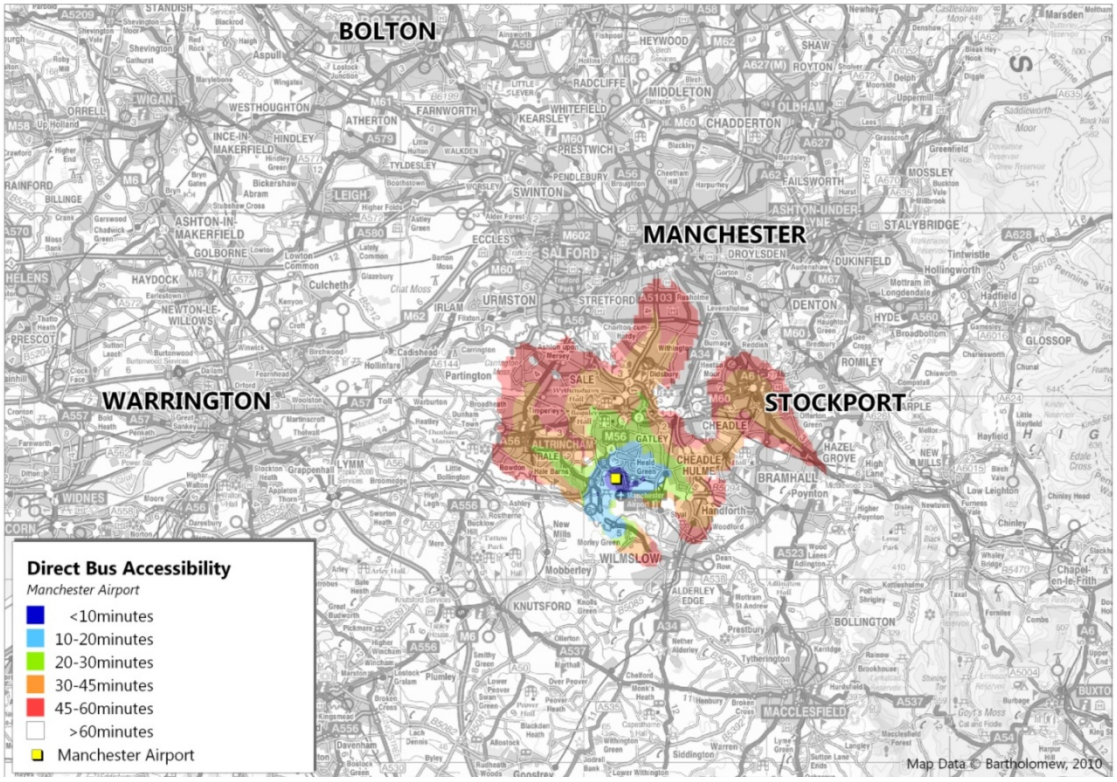


Figure 7 – Bus Accessibility to Manchester Airport

4.2 Traffic Movements in the SEMMMS Road Scheme Corridor

The above sections have described the current traffic conditions in the study area and how these have changed since the original SEMMMS study. In this section we examine the nature of the traffic movements in this corridor. In order to do this, we have produced select link matrices for the three north-south routes shown in Figure 8 below.

Figure 8 – Location of Select Link Matrices

Analysis of these select link matrices has been undertaken to understand the proportion of trips on these links that are travelling north-south in order to make an orbital journey.

M56 South of the Airport Spur

Figure 9 shows the proportion of traffic travelling **northbound on the M56** which is making an orbital movement from west to east; heading northbound before travelling along the M60 and then along radial routes in the study area such as the A34 or the A6. In total, around 11,700 (approximately 17%) of all trips on this section of the M56 can be considered to be making a north-south movement in order to travel in an easterly direction.

The SEMMMS scheme would be of particular benefit for trips heading to areas such as Bramhall, Wilmslow and Handforth, Hazel Grove and Poynton where the scheme would offer a much shorter, direct route to these areas. These trips could not realistically be attracted to an alternative public transport mode.

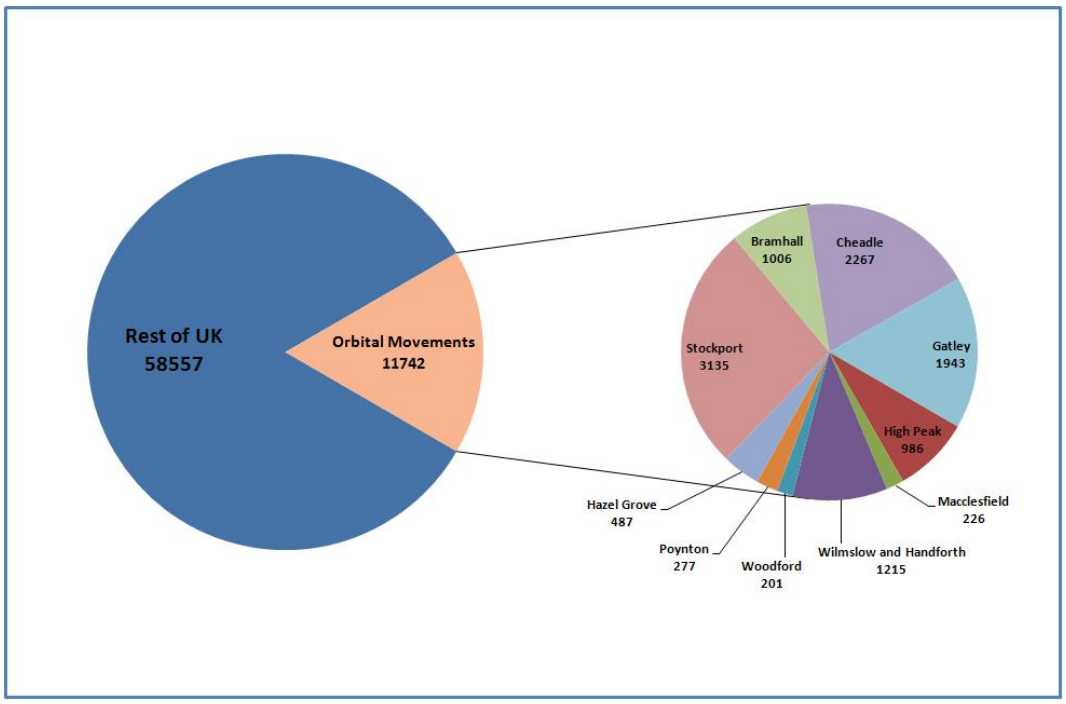


Figure 9 – M56 Northbound Destination Sector Movements

The trend is reciprocated in the southbound direction as can be seen by looking at the origin of traffic movements on the M56 southbound in Figure 10. Approximately 18% (around 13,000 PCUs) of traffic travelling in this direction can be considered to be making an orbital movement. Once again, the majority of the movements originate from areas such as Stockport (around 4,100 PCUs), Cheadle (around 2,500) and Gatley (around 1,600). However, there are still as significant number of trips from areas further South such as Bramhall, Hazel Grove and Poynton which are mostly likely to benefit from the proposed link road but could not be attracted to a public transport mode.

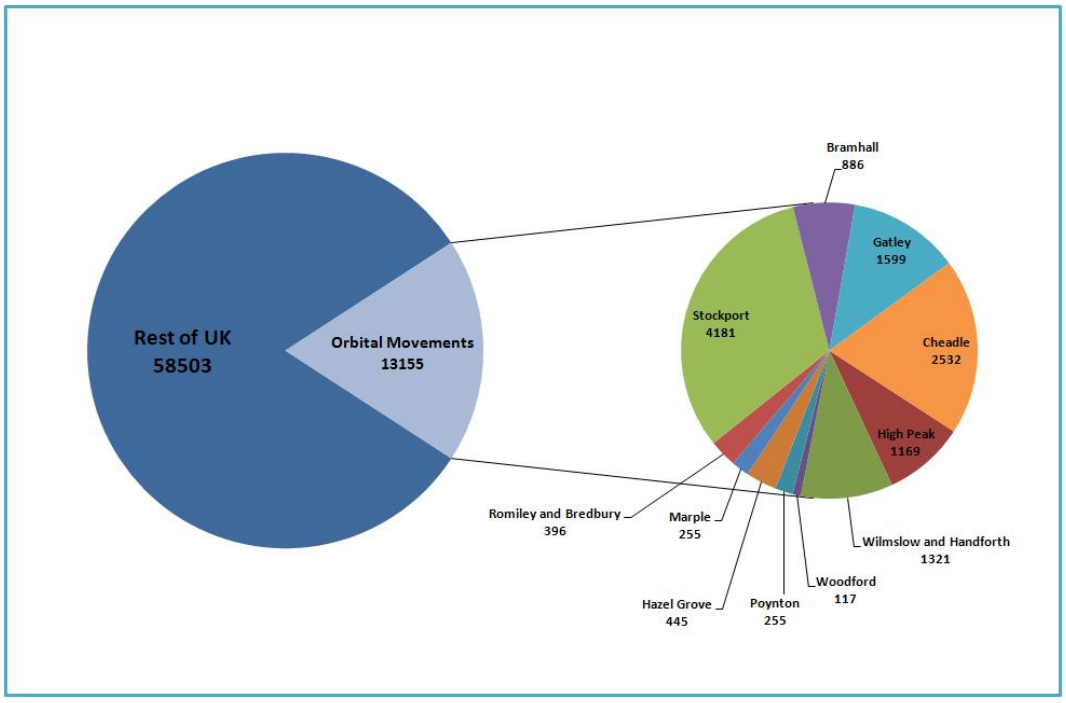


Figure 10 – M56 Southbound Destination Sector Movements

A34 North of the A555

Figure 11 illustrates the proportion of orbital movements using the A34 to the north of the existing section of the A555. Approximately 6,600 PCUs (23%) of all traffic on this section of the A34 appear to be making an easterly or westerly movement by first heading northbound on the A34. Most of the orbital movements appear to be heading in a westerly direction towards nearby areas such as Trafford (around 3,600 PCUs) and Wythenshawe (around 800 PCUs). The SEMMMS Relief Road would represent a significantly quicker route for these trips, allowing traffic to access the areas via more appropriate routes. There are also a number of trips heading in an easterly direction towards Stockport and Romiley (around 600 PCUs in total). Similarly, the SEMMMS Relief Road could potentially allow trips to these areas to avoid having to use the M60 by using shorter, alternative routes such as the A6.

In addition, there are a number of longer distance trips which may also benefit from the implementation of the new link. Around 1,700 trips currently route via the A34 before joining the M60 in order to head towards towns such as Wigan, Bolton and the rest of Lancashire to the north as well as Warrington to the west. The SEMMMS link would allow these trips access to the M56; allowing direct access to Warrington and presenting motorists wishing to travel north with the option of using the M6.

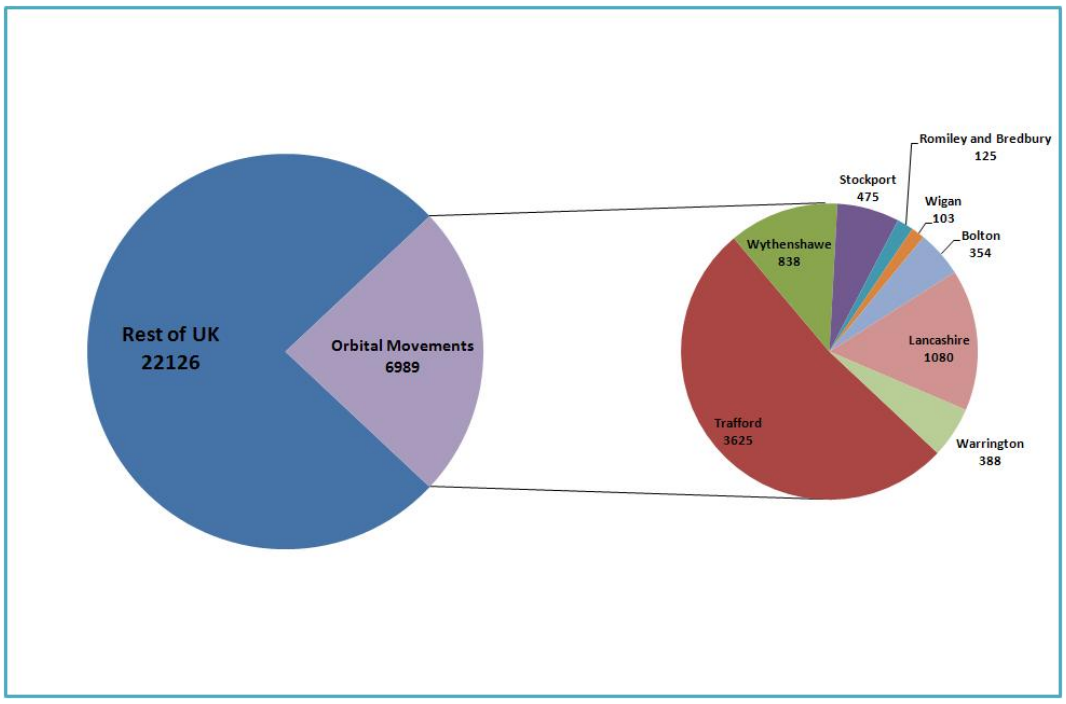


Figure 11 – A34 Northbound Destination Sector Movements

A6 Southwest of Hazel Grove

Studying O-D movements along the A6 to the east of the study area also reveals a number of orbital movements involving vehicles which appear to be using the M60 or other north-south routes in order to travel in either a westerly or easterly direction. Figure 12 represents the destination proportions for traffic travelling northbound along the A6. Approximately 4,000 PCUs (33%) of all northbound traffic appears to be making an orbital movement in order to travel in a westerly direction. A number of these movements appear to be relatively short-distance trips to local areas such as Bramhall, Wilmslow and Handforth. Currently, these trips are most likely to use a number of roads such as the A5143, the A5102 and the A523 in order to access these sectors. The SEMMMS Relief Road would offer a much more direct alternative for such trips.

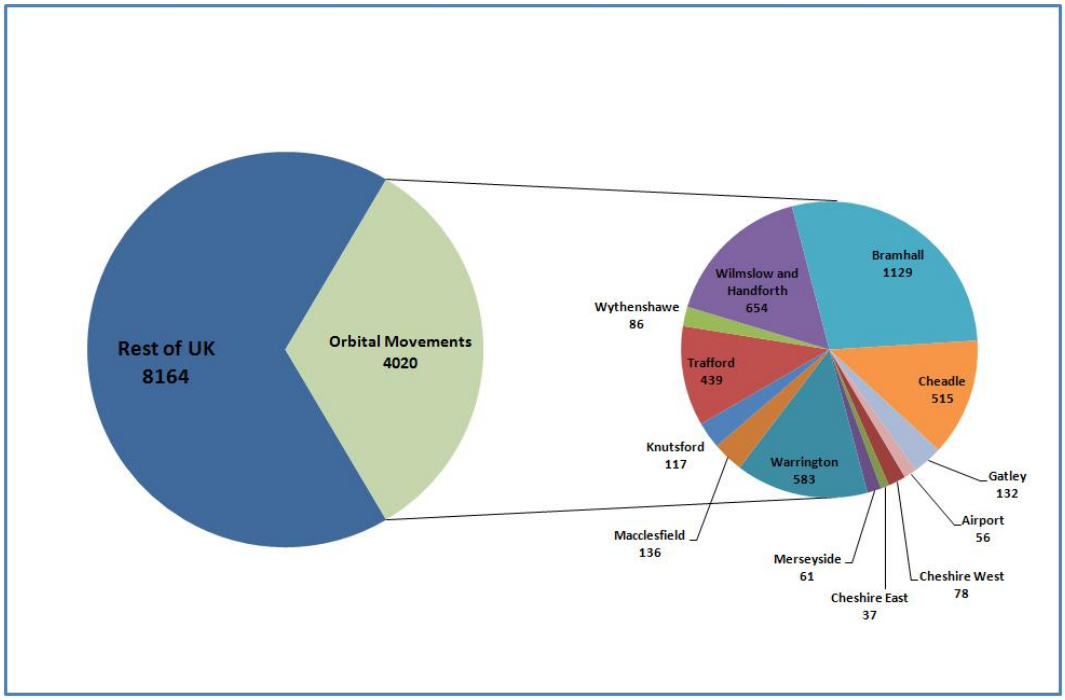


Figure 12 – A6 Northbound Destination Sector Movements

In addition, a number of trips also seem to be using the M60 in order to access sectors such as Cheadle, Wythenshawe, Trafford and Manchester Airport or to long distance destinations such as Warrington and Merseyside. The proposed scheme would be significantly beneficial to these movements as it would allow motorists direct access to the A34 trunk road or to the M56, diverting traffic away from the centre of Stockport to the north.

Figure 13 shows a similar trend in terms of origin sectors for southbound movements along the A6. Around 4,200 vehicles (32% of all traffic travelling through the link) are travelling in an easterly direction using existing north-south routes. Again, these movements are a combination of local trips from nearby areas such as Bramhall and Wilmslow and Handforth as well trips using the M60 before travelling along the A6 either from areas such as the airport, Cheadle and Gatley or over a longer distance from Warrington and Merseyside.

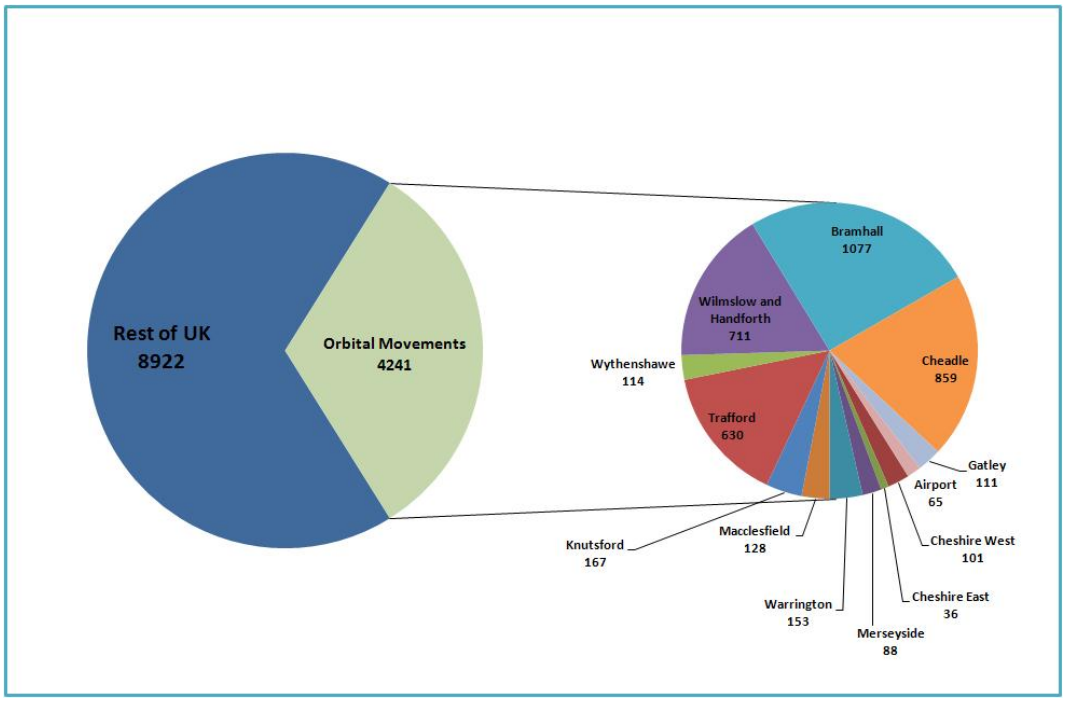


Figure 13 – A6 Southbound Destination Sector Movements

4.3 Conclusions

The comparison of current traffic volumes against historic counts shows that there has been a significant increase in traffic volumes on north-south routes. This is a reflection of the significant traffic congestion on the local east-west routes, forcing many drivers to choose a longer journey along north-south roads and the M60 in order to complete an east-west journey.

The analysis of traffic speeds confirms the very congested conditions on the study area road network and demonstrates that these are amongst the worst conditions nationally.

The accessibility analyses show that public transport journey times are poor along the east-west corridor, in particular between south Stockport and Manchester Airport. Bus Accessibility is very poor, again due to the congested road conditions.

The select Link analyses have shown that there is a significant proportion of traffic on these north-south routes that is making an east-west journey across the SEMMMS corridor. The analyses also show the much dispersed nature of origins and destinations, confirming that these trips could not be catered for by the provision of any realistic public transport alternative.

The overall conclusion from the analyses presented in this section is that a public transport alternative could not:

- realistically cater for the very dispersed orbital movements in the SEMMMS Scheme corridor
- materially improve the level of congestion on the local road network due to the very limited reduction in traffic that could be achieved by any public transport scheme
- improve public transport accessibility to all areas of the corridor due to the very congested road network.

5. The Importance of Manchester Airport and the Enterprise Zone

Manchester Airport is the largest airport outside the South East and the only international gateway to the north that has the capacity for substantial growth in business-based and tourist air traffic anticipated in existing growth strategies. In March 2011, the airport was designated by the Chancellor of the Exchequer as one of 21 UK 'Enterprise Zones', which will benefit from reduced tax rates for businesses to locate and invest in the area with a view to generating employment and economic growth.

Manchester Airport sustains 35,000 jobs, generating £800 million of direct productivity benefits. It is the largest airport in the UK outside the south-east and the only international gateway to the North West offering the capacity for growth in business and tourist travel. The airport serves over 200 destinations across the world and is a major hub for international freight traffic, its World Freight Terminal accommodating 170,000 tonnes of cargo throughput per year, making it the UK's fourth-largest airport in terms of flown cargo volume.

The airport has one of the largest catchments in the UK, attracting people from across the country. Approximately 89% of these trips use the road network. This has clear implications for the surrounding road network, where airport traffic mixes with strategic north-south and east-west movements, in addition to local traffic.

The Greater Manchester Strategy recognises the need to improve surface access to Manchester Airport and emphasises the key role that the A6, A523 and A34 in Stockport and Cheshire East play both locally and strategically. These links provide access routes into the North West and links to the M60 and Manchester Airport for traffic from the West Midlands and Wales.

5.1 Airport City

Manchester Airport City was designated as Greater Manchester's Enterprise Zone in March 2011. In January 2012, the Chancellor of the Exchequer unveiled the detailed Masterplan for a £659-

million mixed use economic development – the first of its kind in the UK. Over the next 15 years, the Enterprise Zone is expected to create around 20,000 new jobs.

The SEMMMS A6 to Manchester Airport scheme will complement the growth of 'Airport City', providing much improved access from the east, complementing the extension of the Manchester Metrolink system to serve the Airport, which is due for completion in 2016. This development and employment opportunity will occupy a range of sites close to Manchester Airport, forming part of the agreed Wythenshawe Regeneration Framework.

6. The Current SEMMMS A6 to Manchester Airport Relief Road Proposal

On the basis of the SEMMMS Strategy recommendations, the road schemes that were originally listed on the Roads Programme did not form part of the Strategy. Instead it was recommended that the local authorities within the study area develop smaller and more appropriate scale road proposals along the protected alignments. It recommended that these be designed to provide relief for the study area communities affected by inappropriate through traffic, but not to provide a new strategic route of regional and potentially national significance.

The recommendations stated that:

- a road is constructed between the M60 at Bredbury and the A6 at Hazel Grove following the protected alignment for the A6(M). The construction of the Stepping Hill Link between the A6 north of Hazel Grove centre and the new road forms part of the recommendation. It is recommended that the north-south bypass be constructed to dual carriageway standard with a 40/50 mph design speed;
- Junctions should be at-grade and most likely signal controlled;
- a bypass of Poynton is constructed. The bypass should comprise an east-west section linking the A555/A5102 junction north of Woodford to the A6 at Hazel Grove. Traffic modelling undertaken for the study indicates that a dual carriageway is more than likely required, but junctions can be accommodated at grade. For the north-south bypass of the A523 a single carriageway bypass is recommended from the existing A523 at Adlington, joining the east-west section of the bypass north of Woodford;
- a reduced scale scheme is constructed in the MALRW corridor. Traffic modeling indicates that an at-grade dual carriageway linking the Airport roundabout at the end of the M56 spur to the Western end of the A555 at Handforth is sufficient. An at-grade junction at Styal Road should be provided. Combined with other recommendations, there is the opportunity to introduce dedicated HGV/public transport lanes along the MALRW corridor.

It was recommended that the protected alignments in the development plans for the MALRW, Poynton Bypass and A6 (M) proposals be maintained. It is also recognised, however, that the reduced scale schemes recommended may be able to use modified alignments that have lower adverse environmental impacts or bring additional traffic or other benefits. Therefore, alignments may deviate from the protected routes. The implementing authorities should not feel constrained by the protected alignments.

On the A523, between the northern end of the Silk Road and Adlington, it was envisaged that capacity improvements would be required if the full benefits of the strategy to the villages and lanes between the A34 and A523 north of Macclesfield were to be achieved. It was judged that such improvements could be achieved through on-line (or close to line) improvements, although more investigation was recommended. If an off-line scheme is required, traffic forecasts indicate that a single carriageway scheme would be sufficient.

The three local authorities involved, Cheshire East Council, Manchester City Council and Stockport Metropolitan Borough Council accepted the SEMMMS Strategy's recommendations and

the Minister's request to begin development and appraisal of these schemes and ensure *"that the designs of these schemes maximises the benefits that they can bring to the study area."*

In July 2007 the Department stated that while the scheme provided value for money, limited funding capabilities meant it was not possible to fund the Relief Road as a single scheme, such that consideration should be given to its phased delivery. Three potential phases of the scheme were identified by the local authorities, and were submitted the DfT for consideration in 2007 / 08 as follows:

- M60 to the A6, including the Stepping Hill Link;
- A6 to Manchester Airport with Poynton Bypass; and
- A6 to Manchester Airport without Poynton Bypass (SEMMMS A6 to Manchester Airport Relief Road).

Given the funding constraints the DfT and Local Authority Officer's jointly examined the key policy drivers in the area and agreed that the A6 to Manchester Airport section was the priority scheme due to the potential economic impact on Manchester Airport (and therefore the City Region) of delaying access improvements, which in turn could constrain future economic growth.

6.1 Problems Addressed by the SEMMMS Scheme

Traffic congestion and the lack of connectivity along the south Manchester corridor remain the most important transport issues to be resolved in the area, due to the substantial implications this has for the economy, society and environment. This culminates in a poorer current and future standard of living for people residing in parts of the south Manchester corridor, severely constraining the ability of the North West to 'punch its weight' in the national and international economy. The core problems that the scheme is designed to address are:

- Traffic congestion and poor connectivity in the study area, which constrains the **economy** through:
  - Lengthening journey times for highway and public transport users, thereby reducing labour market catchments and business-to-business activity,
  - The creation of congestion outside the peak periods (peak spreading), affecting both highway and public transport, reducing the attractiveness of the local town centres and thereby affecting the competitiveness of local businesses,
  - Creating delays on designated freight routes (e.g. the A6), generating productivity losses for businesses at a pan-regional level,
  - Increased use of the strategic motorway network (e.g. the M60) by local traffic, restricting its ability to cater for strategic commuter and business travel by highway and bus-based public transport at a local, sub-national and national level,
  - Constraining Manchester Airport's potential as a major regional, national and international hub of transport and economic activity, and
  - By placing constraints on the ability of Manchester Airport, major development sites in the area and on Cheshire East and Greater Manchester, the area is missing out on potentially substantial levels of wider economic benefits;
- Traffic congestion and poor connectivity in the study area impact on **society** by:
  - Contributing to poor transport accessibility, particularly as a result of lengthening and increasingly variable public transport journey times, which has a greater impact on the more deprived communities of South East Manchester, thereby widening the inequality gap,
  - Creating poor environmental conditions, through poor local air quality and the higher noise levels associated with the traffic congestion,

- Increasing the perceived safety risk of pedestrian and cyclists, increasing the level of community severance, and
- Increasing the actual safety risks in terms of the number of accidents on the highway network;

- Traffic congestion and poor connectivity in the study area impact on the **environment** through:
  - A poor and declining level of air quality, resulting in worsening health for the local population,
  - The inefficient fuel consumption caused by stationary and slow-moving traffic during peak periods, which generates more emissions than in free-flow conditions,
  - The journey time delays it imposes on public transport, making car the only viable alternative for many local residents and leading to increased carbon and other emissions.

Analysis from the original SEMMMS study demonstrated that the majority of transport problems identified by the study required the remitted road schemes to be constructed as part of the solution. It is clear from the evidence above that the traffic conditions have not changed for the better since the SEMMMS study that would require a re-appraisal of the road schemes as a viable solution.

7. A Reduced Standard 'Low Cost' Alternative

As discussed above, the original SEMMMS study recommended the construction of all three remitted Highways Agency schemes but to a lower standard than that proposed by the HA. The standard of the HA's preferred schemes were:

- **A6(M) Stockport North-South Bypass**: a combination of dual two, three and four lane motorways;
- **Poynton Bypass**: a dual 2-lane carriageway with grade separated junctions with the A555 and along the northern section with at-grade junctions along the southern section;
- **MAELR West**: a dual 2-lane carriageway with grade-separated junctions

In contrast, the SEMMMS recommendation was for:

- a dual carriageway road between the M60 at Bredbury and the A6 at Hazel Grove following the protected alignment for the A6(M) and including the Stepping Hill Link;
- Junctions should be at-grade and most likely signal controlled;
- a bypass of Poynton at dual carriageway standard north of Woodford to the A6 and a single carriageway from the existing A523 at to the east-west section of the bypass north of Woodford; and
- an at-grade dual carriageway linking the Airport roundabout to the Western end of the existing A555 at Handforth

Because of funding constraints only the A6 to Manchester Airport sections of the 'full' scheme is being progressed as it is the most urgent to provide the much needed improvement in transport conditions in the corridor to facilitate continued economic growth.

Assessment undertaken during the original SEMMMS study confirmed that the 'low cost' option for this scheme was a dual carriageway road with at-grade junctions. This is the scheme currently being progressed. The traffic data in section 4 above, confirm that despite the significant investment in the non-road elements of the SEMMMS strategy, travel conditions have continued to deteriorate over the last 12 years. Given that an at-grade dual carriageway road was the most appropriate standard when the SEMMMS study reported, and traffic conditions have deteriorated since then, it is logical that a dual carriageway road would still be required.

In the following sections we examine the appropriate carriageway standards that should be considered as a starting point for scheme assessment. Before doing so, however, we highlight recent developments which have some impact on carriageway standards for the scheme.

7.1 Recent Developments

Two specific issues need to be highlighted which both have implications for carriageways standards along the scheme.

Metrolink

The first relates to the western most section of the scheme that is adjacent to the current construction works for the new Metrolink line to Manchester Airport. Figure 14 below shows the route of the Metrolink line. The route crosses Shadomoss Road and then passes between Ringway Road West and Aviator Way. The line then crosses Ringway Road West to enter the Airport terminus.

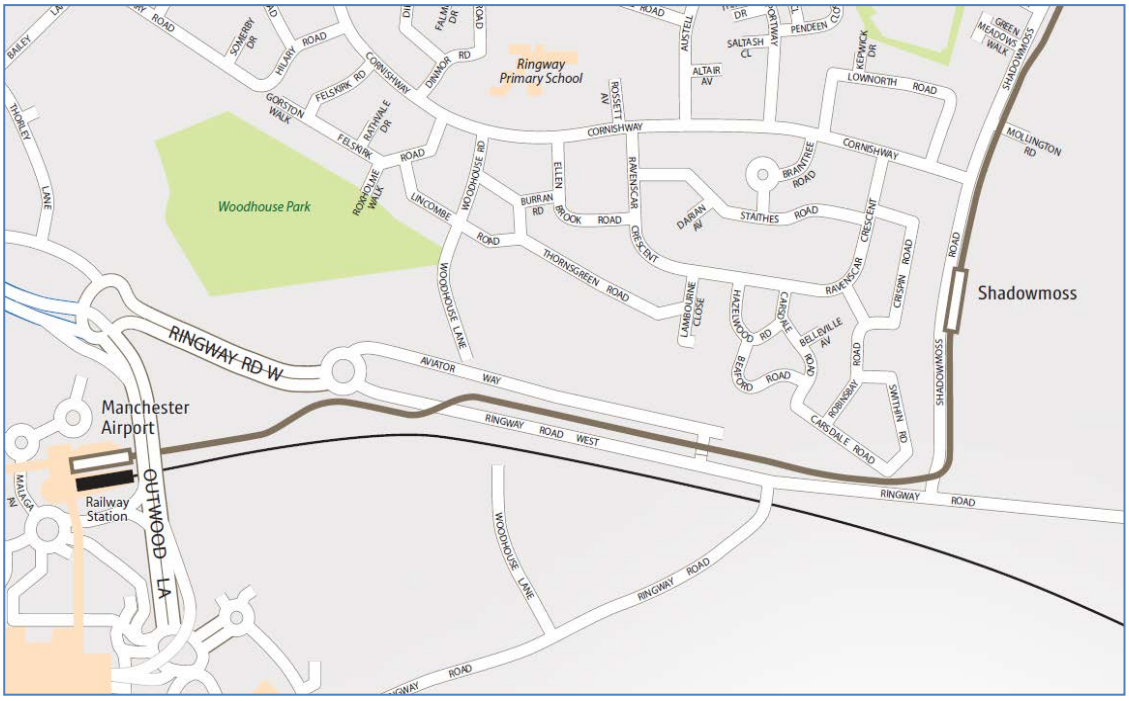


Figure 14 – Airport Metrolink Line

There are a number of issues related to the construction of this section of the Metrolink line that had significant implications for the construction of the relief road. Firstly, the metrolink works required significant utilities diversions to be undertaken and similar but different service diversions would also be necessary for construction of the relief road. Secondly, Metrolink crosses Ringway Road West through an underpass and this would require further works at the time of construction of the relief road. Thirdly, having two separate sets of road works and two different contractors working along the same length of route would entain significant additional cost and disruption to the travellers on Ringway Road West. An assessment was undertaken of the benefit of combining the two sets of works at this location which demonstrated substantial cost savings (c £25m) as well as savings in terms of disruption to travellers. As a result of this, the contract for the construction of the dual carriageway between Shadomoss Road and the Airport terminating roundabout has been awarded to the existing Metrolink contractor. It therefore represents a committed early phase of the A6 to Manchester Airport Relief Road.

The main relief road will thus require only a small modification to the western section of road at the tie-in point at Shadowmoss Road.

Poynton Relief Road

The original SEMMMS scheme proposal included a Poynton Bypass that would be formed by building a new road from the A523 junction with Adlington Road to connect with the proposed Oil Terminal link at Chester Road as shown in Figure 15.

Whilst the Poynton Relief Road (PRR) currently does not have any identified funding and thus no programmed timescale for delivery, Cheshire East Council is actively seeking opportunities to secure the early delivery of the PRR. The construction of the PRR will result in the north-south through traffic currently passing through Poynton to transfer to the PRR and onto the eastern section of the A6 to Manchester Airport Relief Road. This will have significant impact on the traffic flows on this section of route

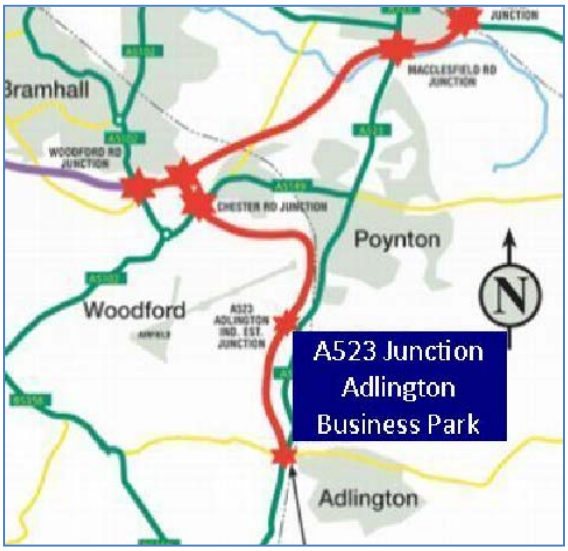


Figure 15 – Proposed Poynton Relief Road

7.2 Carriageway Standards

The Design Manual for Roads and Bridges (DMRB) provides guidance on the appropriate carriageway standards to be considered for new road schemes based on the expected traffic flow levels. The guidance is given in Technical Advice Notes (TAs) and depends on whether the scheme is a rural or urban road.

TA 46/97[1] of the DMRB provides a guide to the desirable standard of carriageway options for use as starting points in the assessment of **new rural trunk roads**. The TA defines a 'rural road' as one that is *"generally not subject to a local speed limit"* – i.e. a de-restricted road. Whilst the SEMMMS road is not a trunk road scheme, the existing sections of the A555 are de-restricted and hence fall into the category of a rural road. It must be recognised that the TA guidance was published in 1997 and that today, many rural roads are subject to a speed limit.

The new sections of road are designed for a 50mph speed limit. This speed limit was a recommendation of the original SEMMMS strategy for the 'full' SEMMMS road scheme, so as to ensure that the route not be seen as a bypass to the M60 motorway. The road layout and character will be that of a rural dual carriageway. There will be no frontage activity/access, no side road other than at controlled junctions, no parking or loading facility and no street lighting other than at the junctions. As such it is appropriate that for the purposes of the TA46/97 definition and the assessment of carriageway standards, the new Relief Road should be treated as a rural road.

- The TA provides guidance by which to understand the carriageway standard that will likely be most economically viable for a given set of traffic flows. The opening year AADT economic flow ranges recommended in TA 46/97 are:Single carriageway up to 13,000 vehicles
- Wide Single carriageway 6,000 to 21,000 vehicles
- Dual 2-lane carriageway 11,000 to 39,000 vehicles
- Dual 3-lane carriageway 23,000 to 54,000 vehicles

The forecast opening year (2017) flows for the SEMMMS scheme are shown in Figure 14 below. The section between Handforth and the A5102 is the existing A555. It can be seen that based on the DMRB guidance, the starting point for the assessment of carriageway standards for a rural road would be as follows:

[1] DMRB Volume 5, Section 1, Chapter 2, February 1997

- Airport to Styal Road - Dual 3-lane Carriageway
- Styal Road to Handforth - Dual 2-lane Carriageway
- Handforth to A34 to A5102 - Existing Dual Carriageway
- A5102 to the A5149 Link - Dual 3-lane Carriageway
- A5149 Link to the A523 - Dual 2-lane Carriageway
- A523 to the A6 - Dual 2-lane Carriageway

The assessment indicates that it is likely that the most economically viable standard on two sections of the new route would be a dual 3-lane carriageway. However, given that the existing section of A555 is a dual 2-lane carriageway, it would not be appropriate to consider building a higher standard carriageway along sections of the new route. Thus, on the basis of this assessment, it is clear that a dual 2-lane carriageway is the most appropriate standard to be considered for the complete length of the new road.

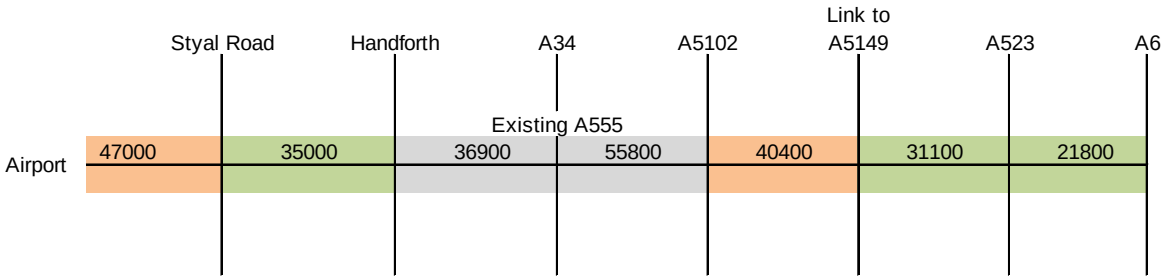


Figure 16 – Forecast Opening Year AADT Flow

The above analysis demonstrates that the forecast traffic flows meet, and in some cases exceed, the minimum threshold given in TA46/97 for consideration of a dual 2-lane carriageway standard road, To check the sensitivity of the carriageway standards to road type classification, we provide below an assessment of likely standards using the guidance for an urban road. TA 79/99[2] sets out the expected carriageway standards provision for a **new urban road** based on the expected hourly traffic volumes. The design standard traffic threshold for an urban road is higher than that for a rural road and is based on peak hour flows in the design year rather than the opening year AADT flows.

The TA defines four Road Types for Urban All-Purpose roads – UAP1 through to UAP4, The closest Road Type to the proposed SEMMMS scheme is UAP1. This relates to a high standard single or dual carriageway road carrying predominantly through traffic with limited access. The capacity thresholds for Road Type UAP1 in terms of one-way hourly traffic flow are:

- 1,590 vehicles per hour for a two-lane single carriageway
- 3,600 vehicles per hour for a dual two-lane carriageway

It is appropriate to compare the design year forecast traffic flows against the guide capacities above. Figure 15 below shows the forecast highest peak hour directional flow on the sections of the proposed Relief Road in the design year (2032). The section between Handforth and the A5102 is the existing A555.

On the basis of the guide capacities, the starting point for the assessment of carriageway standards of the new road would be as follows:

- Shadowmoss Road to Styal Road - Dual Carriageway
- Styal Road to Handforth - Dual Carriageway
- Handforth to A34 to A5102 - Existing Dual Carriageway

[2] DMRB Volume 5, Section 1, Chapter 3, May 1999

- A5102 to the A5149 Link - Dual Carriageway
- A5149 Link to the A523 - Dual/Single Carriageway
- A523 to the A6 - Single Carriageway

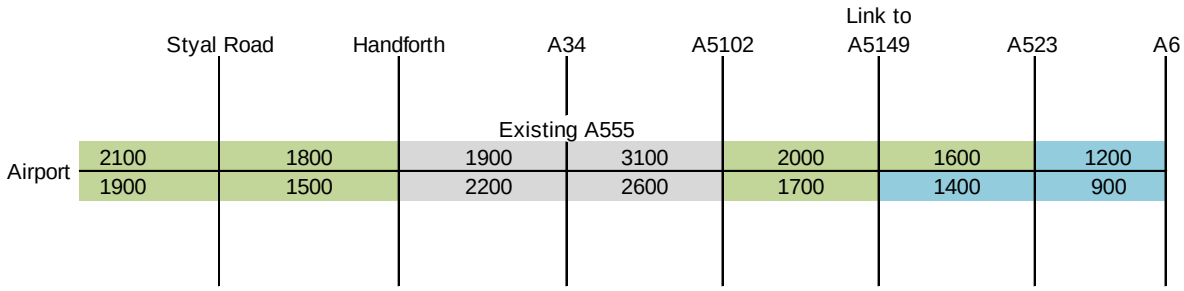


Figure 17 – Forecast Design Year Highest Hourly Directional Flow

It can be seen from the above that based on the DMRB guidance for a new urban road, the forecast traffic volumes along the bulk of the road fall within the dual carriageway standard. Looking at the traffic flows in isolation, the eastern most section of the scheme would warrant consideration of a single carriageway standard with the section between the A5149 Link and the A423 being borderline between a single and a dual carriageway standard. Based on the forecast traffic flows, the sections of road east of the A5149 Link should be tested at a single carriageway standard. In addition, the realignment of the A6 should also be considered for omission as part of the Low Cost Alternative.

Whilst recognising that solely on traffic grounds it is appropriate to test the eastern sections of the scheme at a lower carriageway standard, it must be recognised that these sections of road are not individual, stand-alone roads, but sections of a longer scheme. As such, there are other issues that need to be considered in determining the appropriate standard for the eastern section of the scheme. These considerations are set out below.

7.3 Wider Considerations for the Carriageway Standards

The Design Manual for Roads and Bridges[3] states that "Changes from dual to single carriageways are a potential hazard situation and the aim in new construction should be to provide continuity of road type, either single or dual carriageway layout, on any major section of a route which carries consistently similar traffic, subject to satisfactory economic and environmental assessments." Whilst the traffic volume east and west of the A5149 Link falls into two different carriageway standard ranges, the actual level of traffic is such as would be considered similar either side of the junction. As such, it would not be appropriate to consider a change in carriageway standards at this location.

There is a need to acknowledge that the proposal for a new road between the A6 at Hazel Grove and the M60 still exists and that the line remains protected from development. If this scheme were to be constructed then this would significantly increase the traffic volumes on the eastern sections of the SEMMMS Relief Road and this would require a dual carriageway standard road. Whilst there is no funding for such a scheme at the present time, this remains a policy aspiration for the local authority. As such it would not be appropriate to prejudice a future scheme by constructing the current scheme to a lower standard. If these sections were built to a single carriageway standard then in order not to preclude such a scheme in the future, it would be necessary to include prudent provision within the current SEMMMS scheme in terms of the structures and necessary land take required for possible future dualling of these sections.

Similarly, Cheshire East Council continues to protect the alignment of a Poynton Bypass to the south of the A5149 Link and has a strong aspiration to deliver this scheme in the short to medium

[3] DMRB, Volume 6 Section 1 Chapter 7, Part 1 TD 9/93 Single 2 Lane Carriageway Roads, Changes in Carriageway Width – Paragraph 7.36.

term. If this road is constructed then it again would require a dual carriageway standard road between the A5149 Link and the A523.

Finally, it must be acknowledged that a single carriageway road along the eastern sections of the route will be unacceptable to the local elected members and as such, the lead promoting authority, Stockport MBC, will not be prepared to take forward a single carriageway road.

7.4 Conclusions

The scheme standard as currently proposed is the right scheme for the reasons set out above. However, for the purpose of the Business Case, an appropriate Low Cost Alternative scheme will be assessed consisting of a single carriageway between the A5149 Link and a new junction on the existing A6. The A6 diversion currently proposed as part of the preferred scheme will be omitted. However, for scheme cost purposes, it will be assumed that any structures are constructed to enable a future dualling of the road.

8. Conclusions

This paper has provided the background to the current scheme and described the extensive planning and implementation work that has been carried out over the ten years since the original SEMMMS study. It has demonstrated that many of the traffic and congestion problems in the study area are only envisaged to be addressed through a road based solution.

Current traffic conditions have been compared to the situation at the time of the original SEMMMS study and it has been shown that despite the substantial non-highway investment, conditions are currently no better than they were at the time of the SEMMMS study. In fact there has been a significant increase in traffic along north-south routes coupled with a decrease in traffic on east-west routes as a result of the deterioration in overall travel conditions, with drivers using radial north-south routes and the M60 to make an orbital east-west journey.

The original SEMMMS study included a range of public transport interventions but maintained that a highway scheme was the only feasible option for delivering congestion relief to the A6 and local town and district centres in the south Manchester corridor, along with the much-needed improvement in surface access to Manchester Airport. This remains the case today and is based on the following:

- Heavy and light rail, and guided bus options are all ruled out on cost grounds given the new infrastructure required to operate along the corridor. Also, these alternatives would only cater for a small proportion of the traffic that would be attracted to a new road given that they could only serve a limited number of the end-to-end journeys;
- Bus-based options on the existing highway network are unrealistic, since they will not be able to offer the journey time savings to generate a sufficient level of mode shift to produce a viable business case (bus services have been withdrawn from operation in the past due to the large level of subsidy required to maintain them). This means that:
  - The problem of congestion in town and district centres will not be resolved,
  - Journey times may improve slightly if there is reasonable mode shift, but they will be insufficient to provide the step-change required to generate economic growth and employment
  - Other problems, such as poor air quality and noise, could potentially be exacerbated
- A new piece of highway infrastructure, providing direct access to Manchester Airport from the congested A6 will provide substantial journey time savings that allow businesses and employers to reach markets and jobs in the Enterprise Zone.

The conclusions of the SEMMMS study remain valid in relation to the need for the SEMMMS Road Scheme. The road scheme can be seen to be justified from the analysis of network congestion and journey patterns. No solution other than a road could cater for the very dispersed,

orbital journeys currently taken across the scheme corridor albeit using north-south routes in order to make east-west journeys.

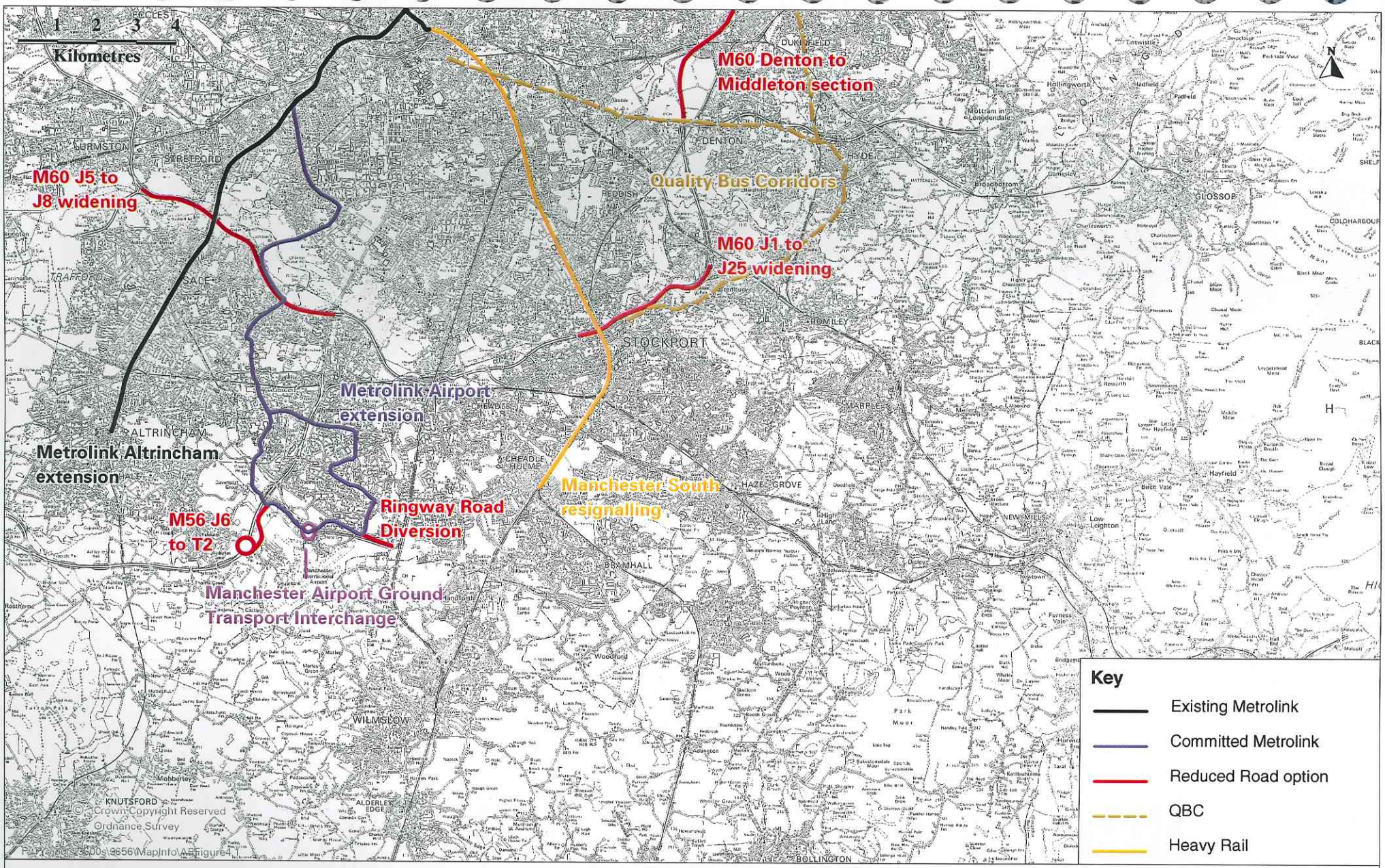
Analysis based on the Do Something forecasts confirms that dual 2-lane road is the most appropriate carriageway standard for the SEMMMS scheme. Technically, some sections could justify a higher standard and the eastern sections of route, between the A5149 Link and the A6 could be constructed as a single carriageway, but it has been demonstrated that this would not be appropriate in terms of continuity of standards, given the remainder of route will be a dual carriageway. Furthermore, the construction of the western section as a single carriageway will necessitate future dualling if the A6 Bypass or the Poynton Bypass is constructed.

For the purpose of the Business Case, an appropriate Low Cost Alternative scheme will be assessed consisting of a single carriageway between the A5149 Link and a new junction on the existing A6. The A6 diversion currently proposed as part of the preferred scheme will be omitted. However, for scheme cost purposes, it will be assumed that any structures are constructed to enable a future dualling of the road.

Appendices

Appendix A

SEMMMS Study – Strategy Options



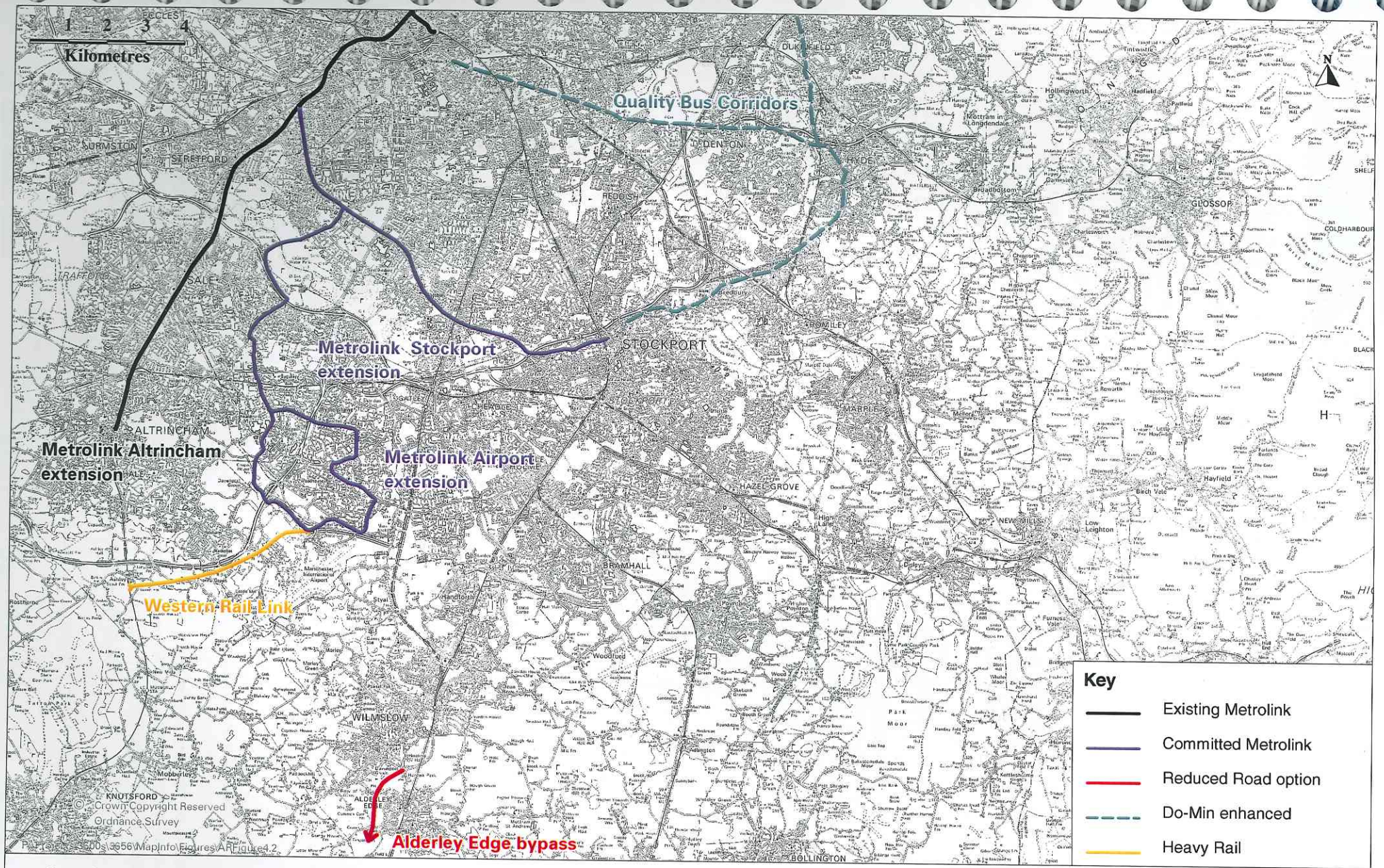
South East Manchester Multi-Modal Study

Figure 4.1: Do Minimum Schemes

steer davies gleave

Llewelyn-Davies

WS Atkins



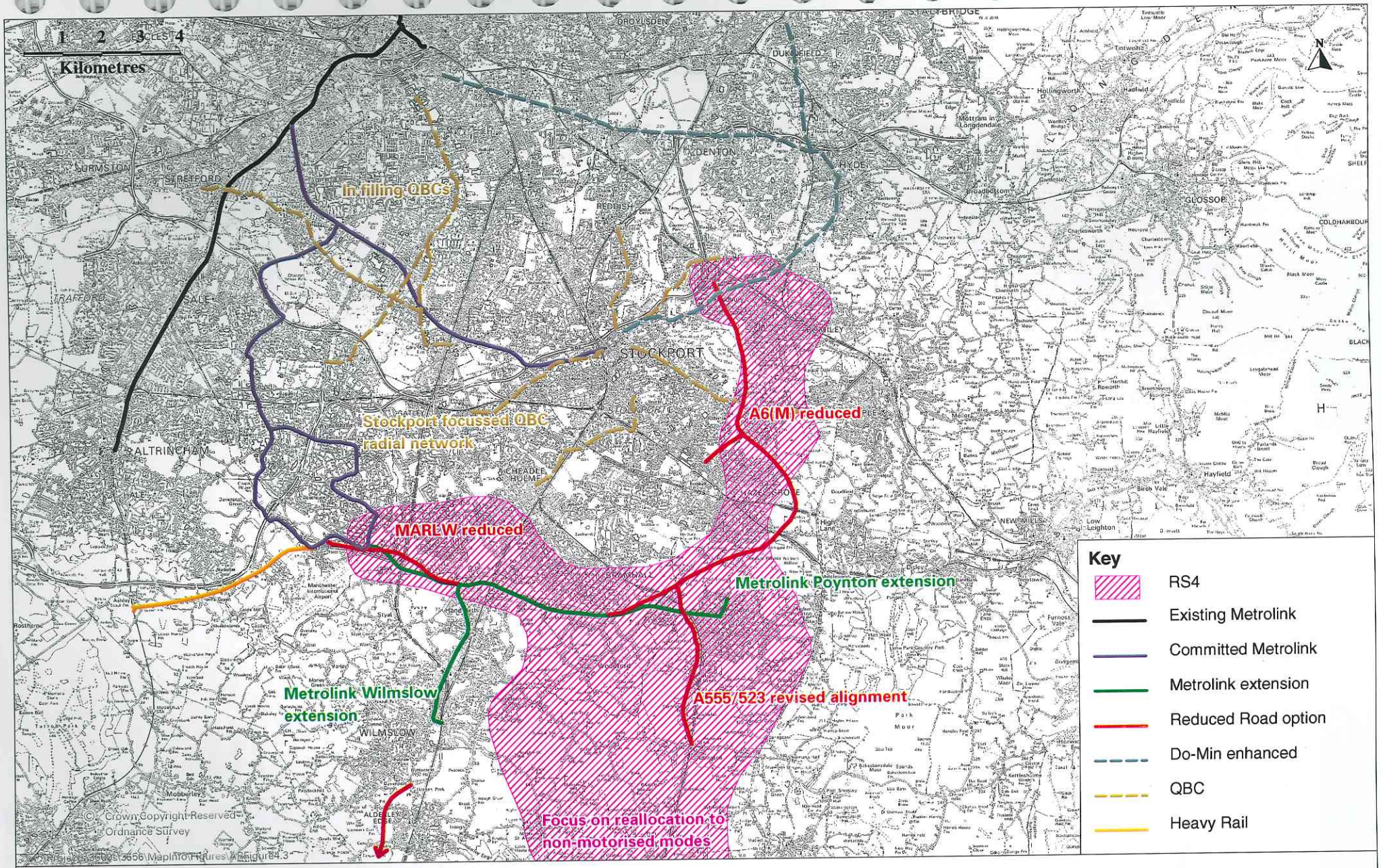
South East Manchester Multi-Modal Study

Figure 4.2: Do Minimum Plus Schemes

steer davies gleave

Llewelyn-Davies

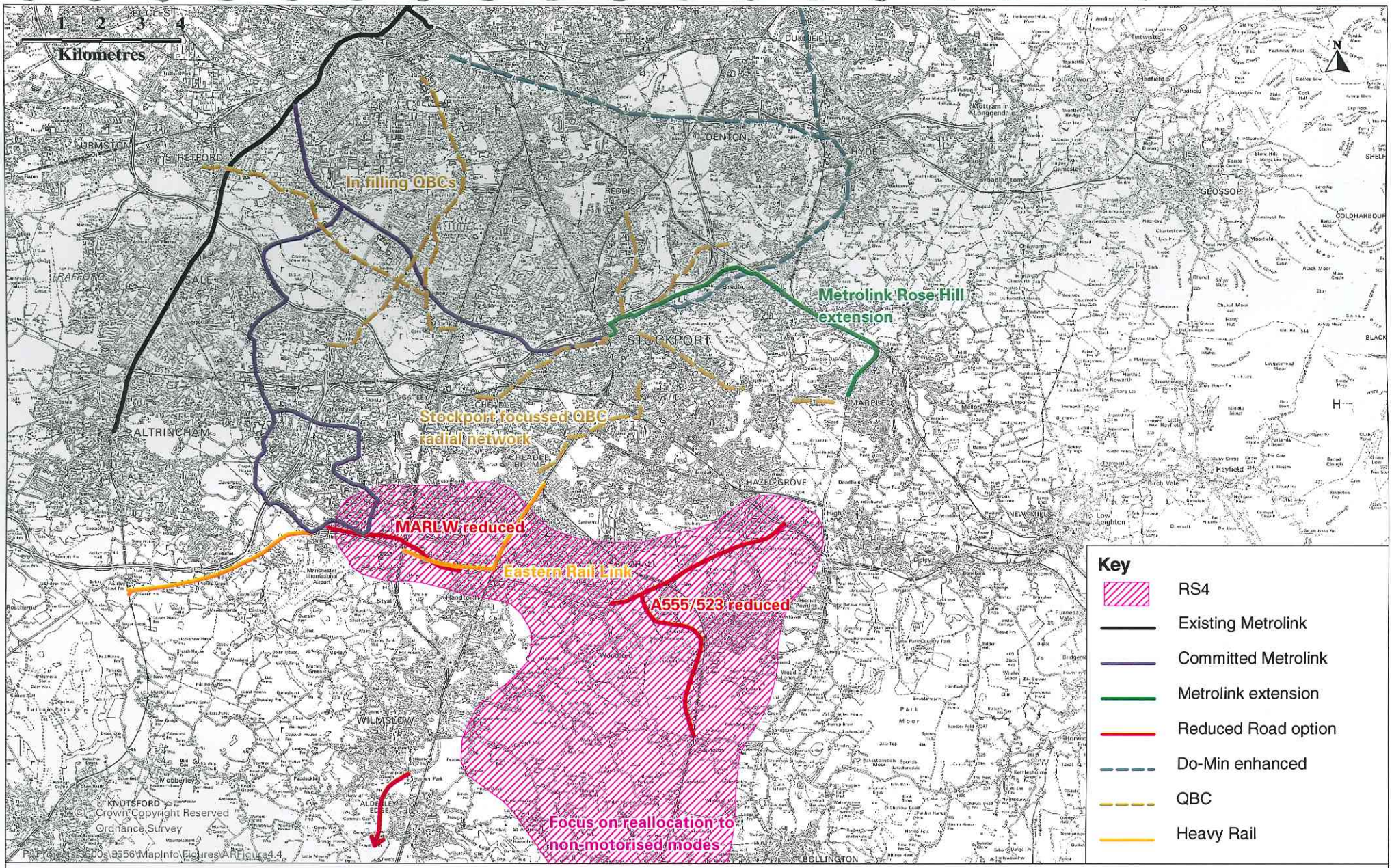
WS Atkins



South East Manchester Multi-Modal Study

Figure 4.3: Red Schemes

steer davies gleave Llewelyn-Davies WS/Atkins



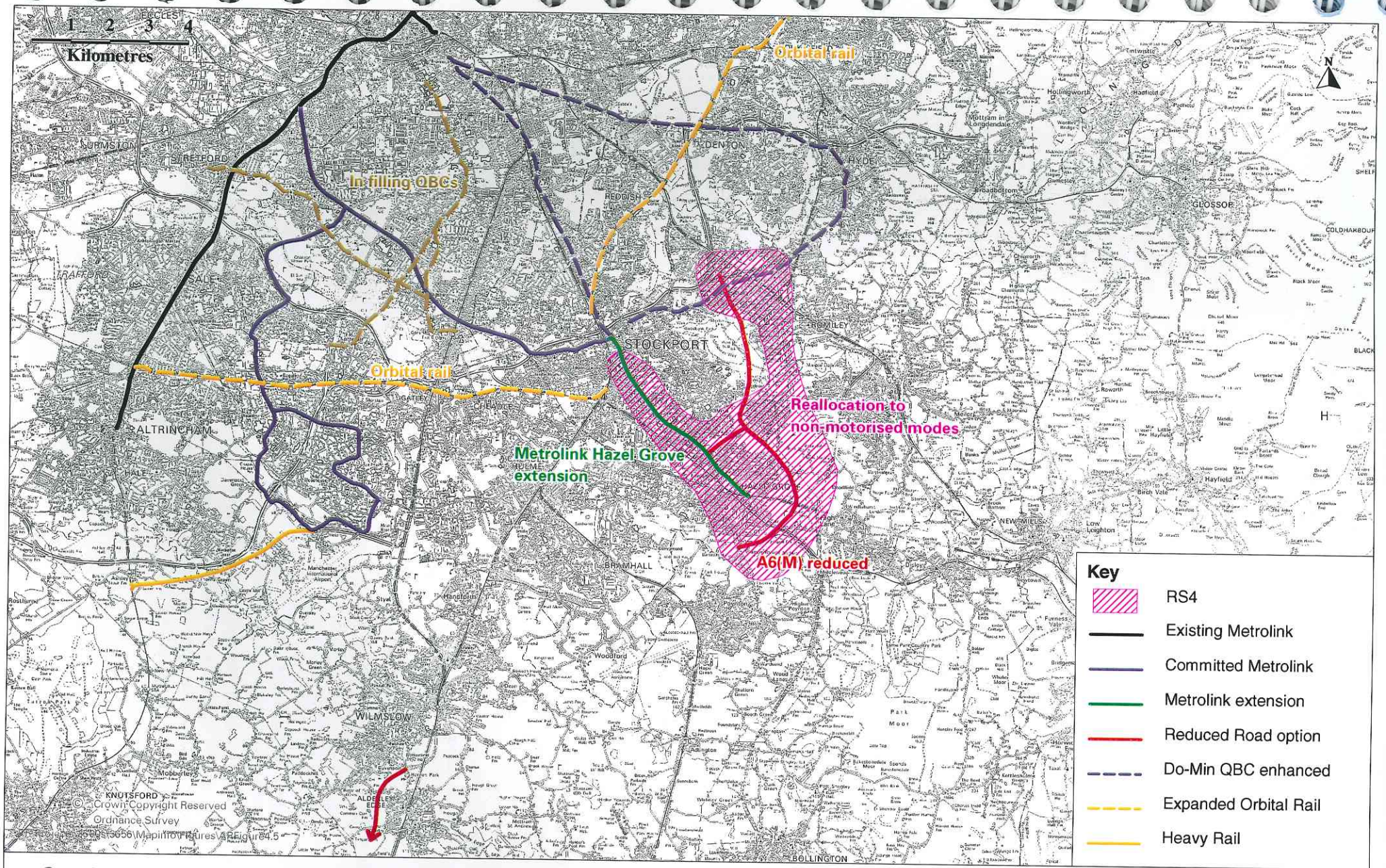
South East Manchester Multi-Modal Study

Figure 4.4: Orange Schemes

steer davies gleave

Llewelyn-Davies

WS Atkins



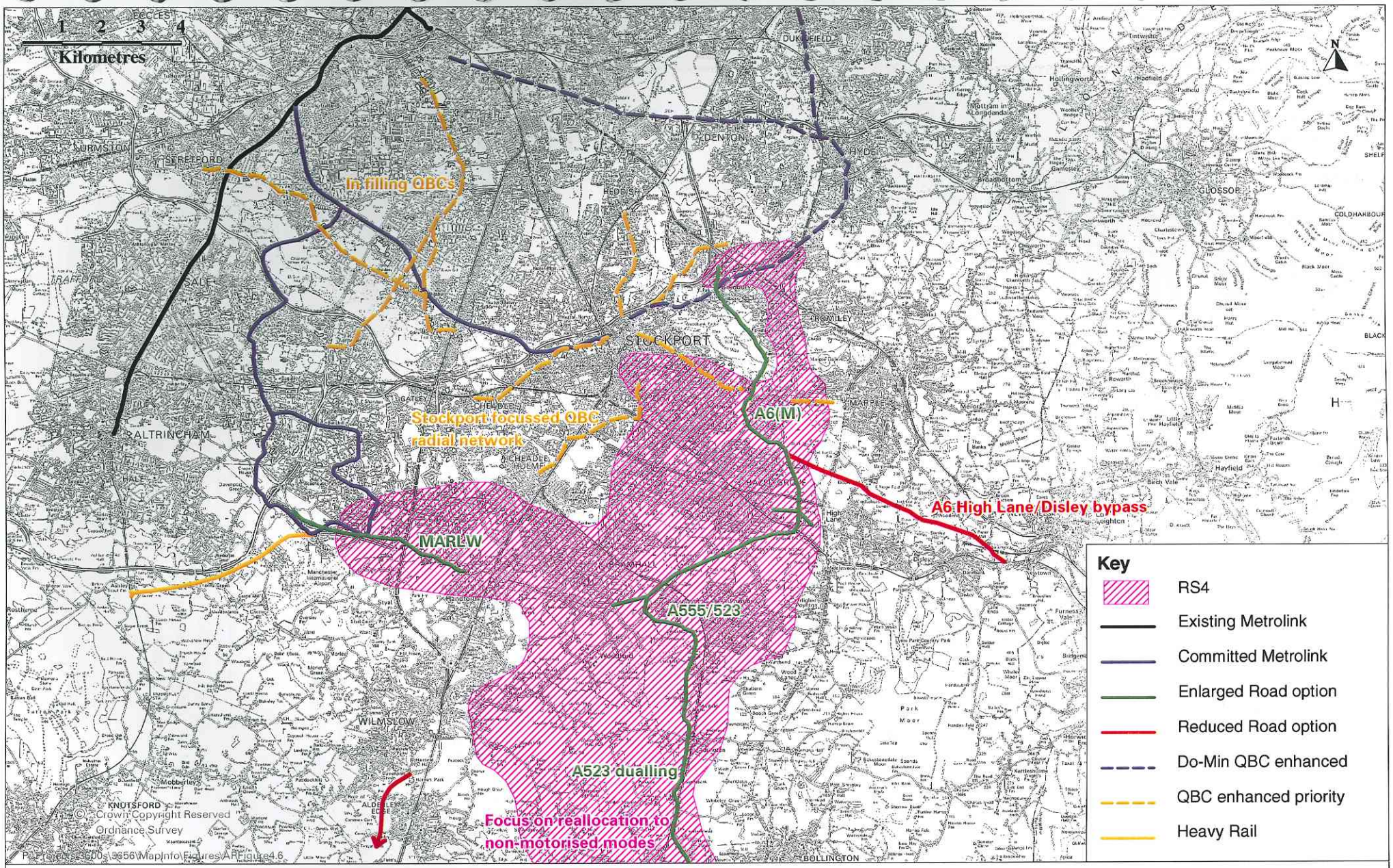
South East Manchester Multi-Modal Study

Figure 4.5: Yellow Schemes

steer davies gleave

Llewelyn-Davies

WS Atkins



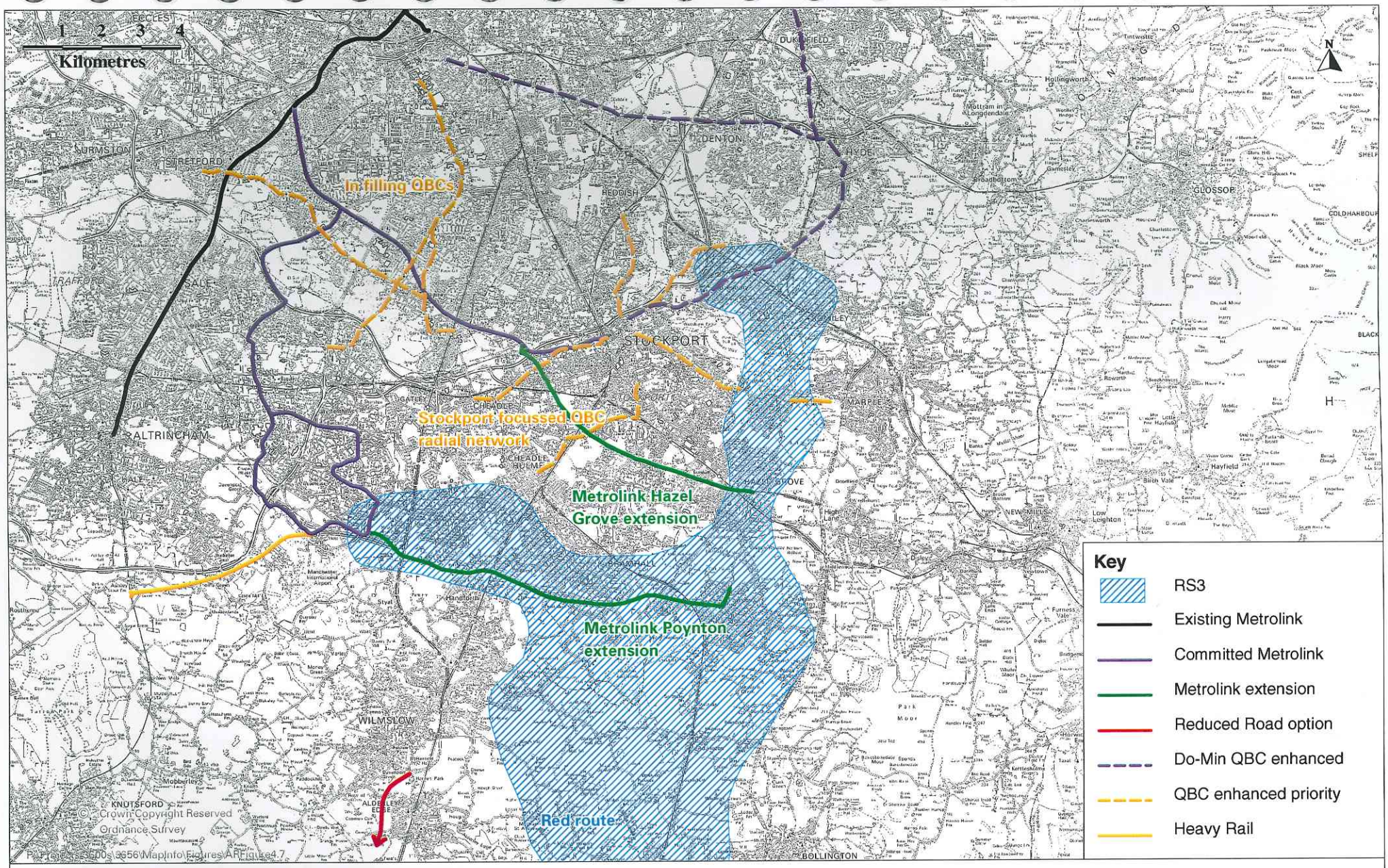
South East Manchester Multi-Modal Study

Figure 4.6: Green Schemes

steer davies gleave

Llewelyn-Davies

WS Atkins



South East Manchester Multi-Modal Study

Figure 4.7: Blue Schemes

steer davies gleave

Llewelyn-Davies

WS Atkins

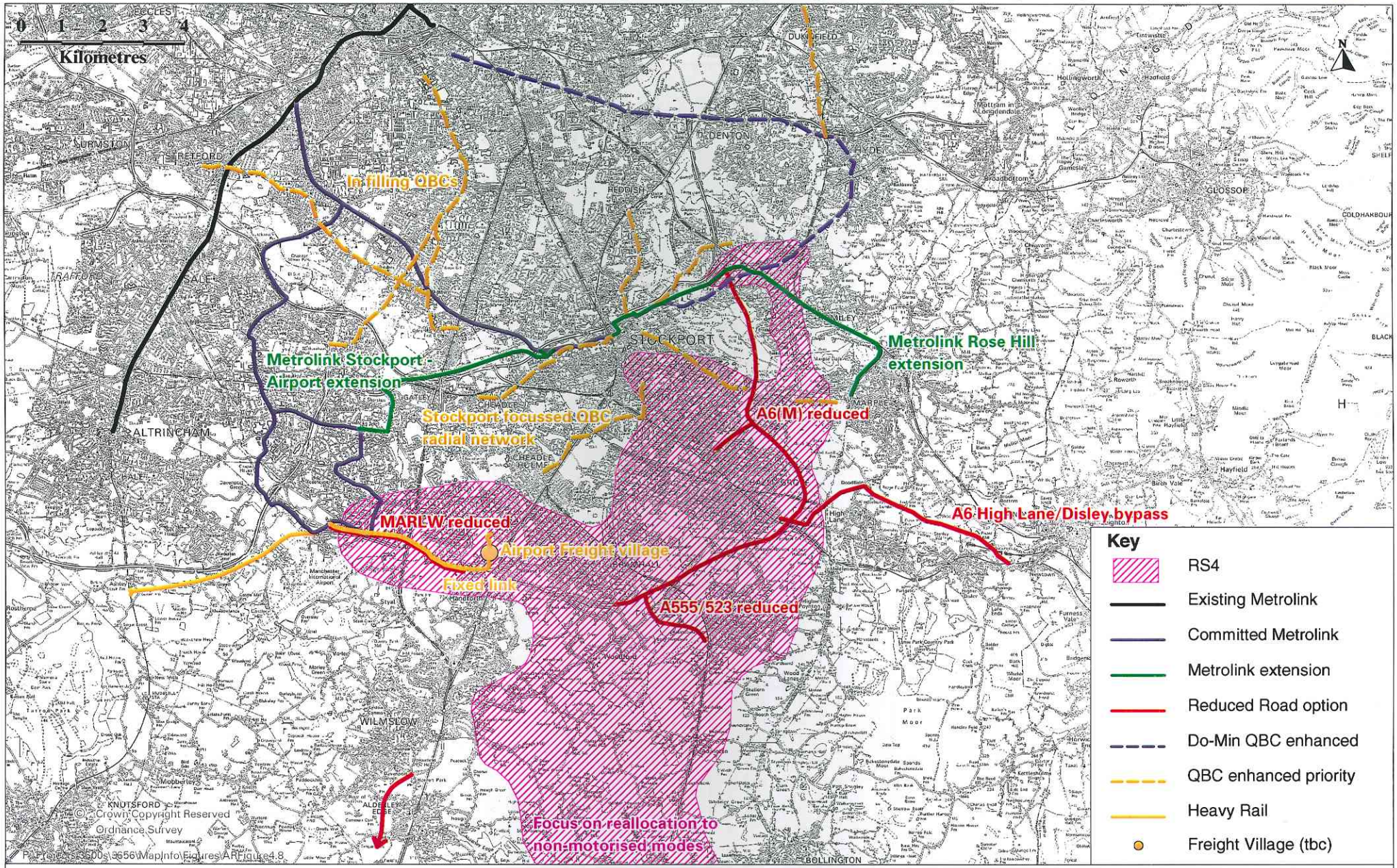


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Figure 4.8: Violet Schemes

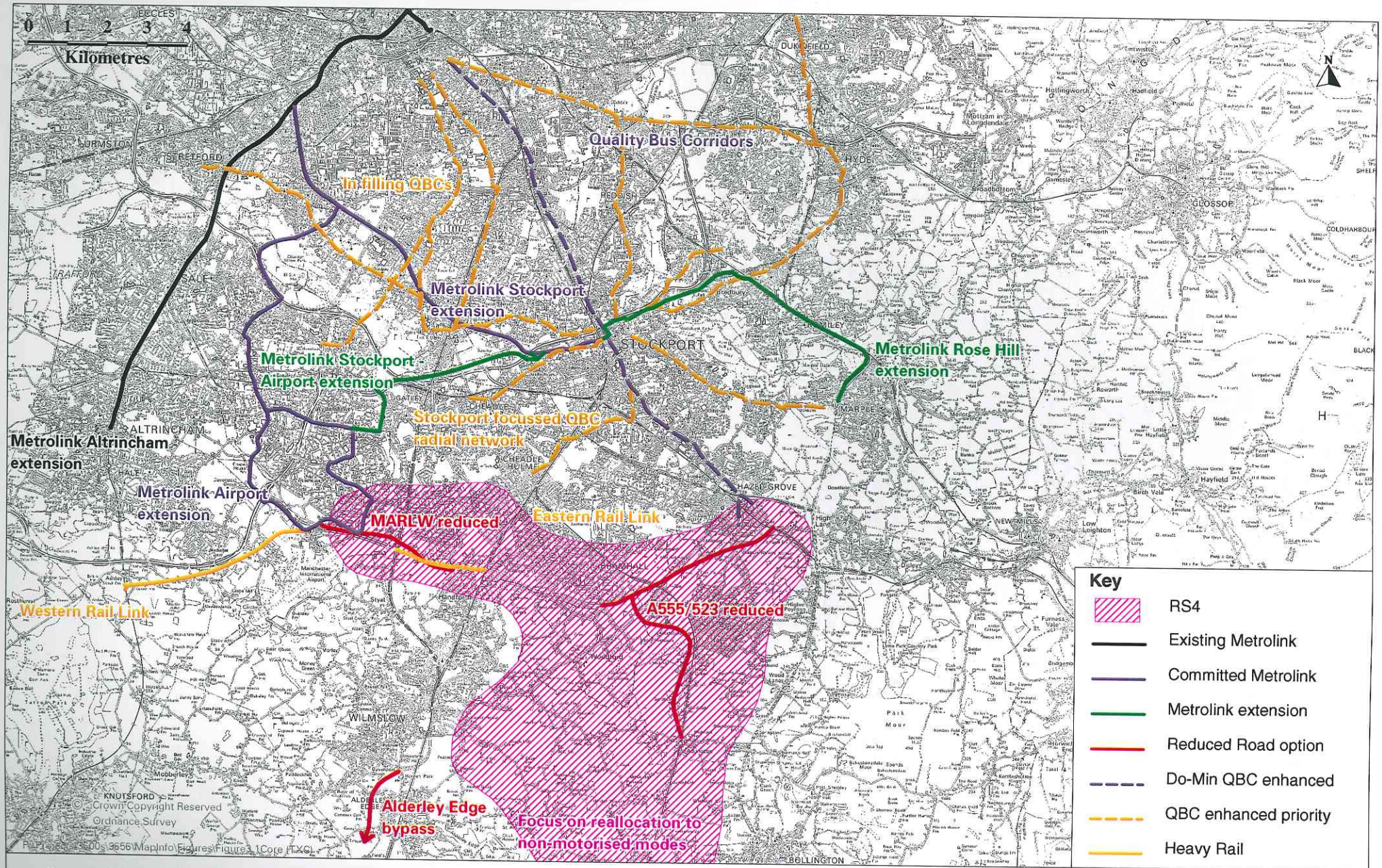
steer davies gleave

Llewelyn-Davies

WS Atkins

Appendix B

SEMMMS Study – Core Strategy



South East Manchester Multi-Modal Study

Figure 3.1: Core Strategy Schemes

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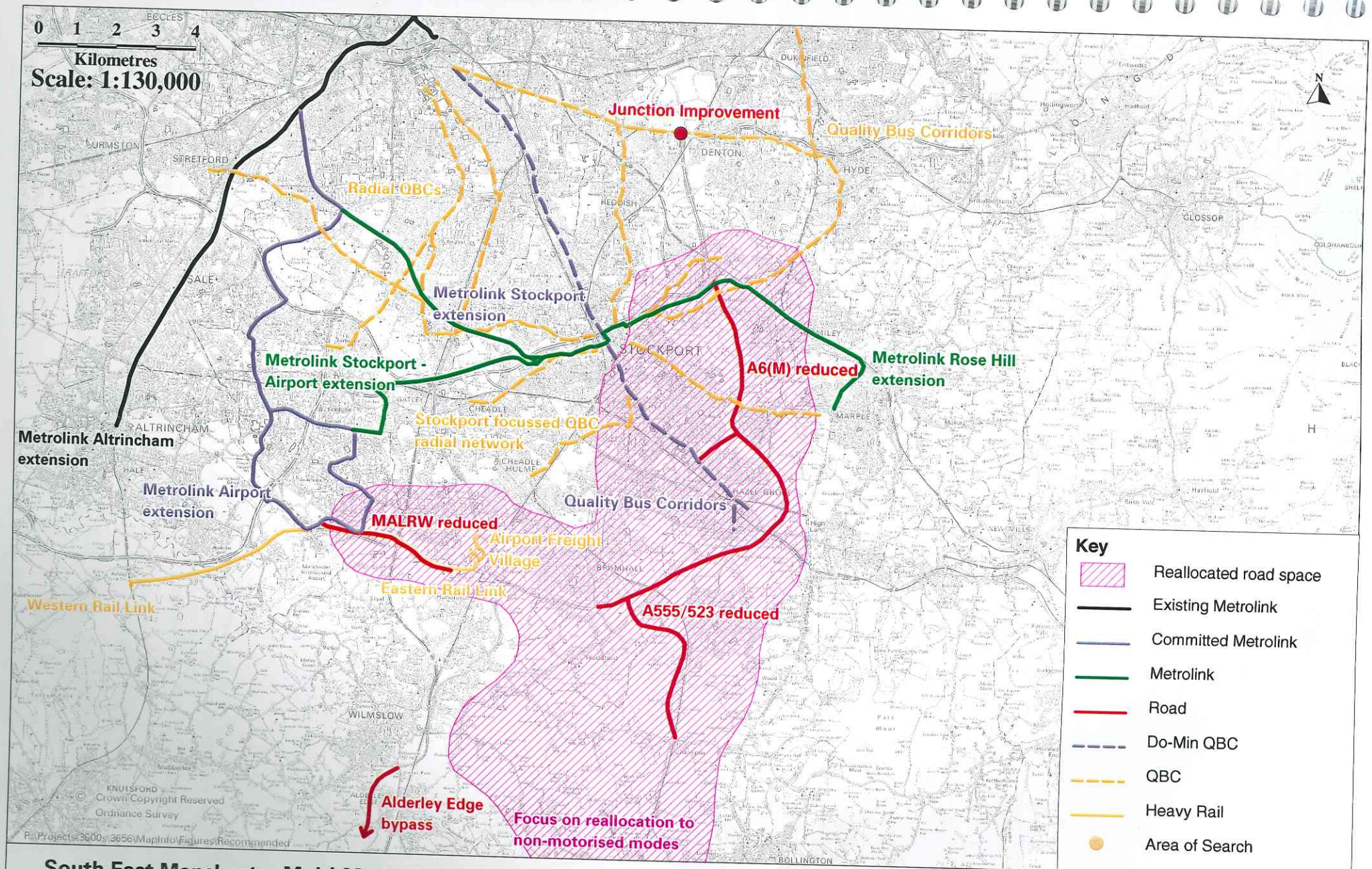
Appendix C

SEMMMS Study – Recommendations



South East Manchester Multi-Modal Study

Figure 3.1: Recommended Strategy Schemes

steer davies gleave

Llewelyn-Davies

WS Atkins