A6 to Manchester Airport Relief Road

Volume 1 - Environmental Statement – Main Text

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STOCKPORT METROPOLITAN BOROUGH COUNCIL

MANCHESTER CITY COUNCIL

Cheshire East Council

A6 to Manchester Airport Relief Road Environmental Statement

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Acronyms

AOD	Above Ordnance Datum
ALC	Agricultural Land Classification
BAP	Biodiversity Action Plan
CEC	Cheshire East Council
CEMP	Construction Environment Management Plan
DEFRA	Department for Environment, Food and Rural Affairs
DMRB	Design Manual for Roads and Bridges
EA	Environmental Agency
EIA	Environmental Impact Assessment
ES	Environmental Statement
EPS	European Protected Species
EU	European Union
FFD	Freshwater Fisheries Directive
FP	Footpath
FRA	Flood Risk Assessment
HER	Historical Environmental Record
IAQM	Institute of Air Quality Management
IEEM	Institute of Ecology and Environmental Management
IEMA	Institute of Environmental Management
LCA	Landscape Character Areas
LLCA	Local Landscape Character Area
MCC	Manchester City Council
NERC	Natural Environment and Rural Communities
NMU	Non-Motorised Users
OS	Ordnance Survey
PRoW	Public Rights of Way
SAC	Special Area of Conservation
SEMMMS	South East Manchester Multi Modal Strategy
SMBC	Stockport Metropolitan Borough Council

SPT	SEMMMS Project Team
SSSI	Site of Special Scientific Interest
SUDS	Sustainable Urban Drainage Systems
SWMP	Site Waste Management Plan
TA	Transport Assessment
TCPA	Town and Country Planning Act
WCML	West Coast Main Line
WFD	Water Framework Directive
ZTV	Zone of Theoretical Visibility

1 Introduction

1.1 The Project

1.1.1 Stockport Metropolitan Borough Council (SMBC), Manchester City Council (MCC) and Cheshire East Council (CEC) are jointly promoting the development of the A6 to Manchester Airport Relief Road (the proposed scheme). The new road is approximately 10 kilometres long, predominantly of dual 2-lane carriageway standard, and would include seven new junctions and four improved junctions. It also incorporates a further 4 kilometres of existing A555 dual carriageway to the south of Bramhall (the central section of the scheme).

1.1.2 As indicated in Figure 1.1 the proposed scheme is located close to Hazel Grove, Poynton, Bramhall, Handforth, Cheadle Hulme and Gatley. Access from neighbouring communities and integration with the existing road network will be provided by a number of new junctions and modifications to existing junctions on the A555.

1.1.3 A cycle path catering for cyclists and pedestrians and separate from the main carriageways will also be provided along the full length of the proposed scheme, including the previously constructed A555.

1.2 Planning Application and the Environmental Statement

1.2.1 All three authorities are each seeking planning permission for the proposed scheme in accordance with the Town and Country Planning Act 1990 (TCPA). Each application will be considered individually by the relevant authorities.

1.2.2 The promoting authorities have concluded that the proposed scheme constitutes an environmental impact assessment (EIA) development as defined in the Town and Country Planning (Environmental Impact Assessment) Regulations 2011 and that an Environmental Statement (ES) is therefore required as part of the application documentation.

1.2.3 This ES provides the environmental information required of the applicant by the Regulations.

1.3 The Environmental Statement

1.3.1 The purpose of the ES is to ensure the applicant provides relevant information to the competent authority relating to potentially significant environmental effects which it is predicted will be associated with the construction and future use of the proposed

scheme, and an explanation of measures which have been included as part of the proposals to mitigate the effects.

Content of the ES

1.3.2 Regulation 2(1) and Schedule 4 of the Regulations stipulate and set out the information that an applicant is required to include within an ES. An outline of the requirements, together with an indication of where the information can be found in the ES, is provided below.

- a description of the development comprising information on the physical characteristics, land-use requirements, processes, and expected residues and emissions (Chapter 5);
- an outline of the main alternatives studied by the applicant including the main reasons for the choice taking into account environmental effects (Chapter 3);
- a description of the aspects of the environment likely to be significantly affected by the development (Chapters 8-17);
- a description of the likely significant effects of the development on the environment (Chapters 8-17);
- a description of the measures envisaged to prevent, reduce and where possible offset any significant adverse effects on the environment (Chapters 8-17);
- a non-technical summary of the information outlined in the above 5 bullets; and
- an indication of any difficulties encountered by the applicant in compiling the required information. (Chapters 8-17).

Format of the ES

1.3.3 The ES is composed of three Volumes. Volume 1 comprises the written statement. Volume 2 comprises figures that support Volume 1. Volume 3 comprises appendices including reports of surveys, technical reports, reference documents, explanatory notes and calculations relied on and referred to in Volume 1.

1.3.4 There are 18 chapters in Volume 1:

- Chapter 1 introduces the proposed scheme, describes the statutory basis relative to the EIA process and scope of the ES and outlines the structure adopted for the ES.
- Chapter 2 describes the need for the proposed scheme and the scheme objectives.

- Chapter 3 describes the principal alternatives considered during the planning and design of the proposed scheme and outlines the factors leading to the choice of the proposed scheme including environmental factors.
- Chapter 4 provides an overview of the existing environment associated with the proposed scheme and surrounding areas.
- Chapter 5 describes the key design components and construction activities that constitute the proposed scheme and associated operational characteristics.
- Chapter 6 outlines the approach to consultation during the planning, design and assessment process.
- Chapter 7 explains the scope of the studies and assessments which have been undertaken and any modifications that have been made to the scope as the studies and assessments have progressed. It further describes the relationship between environmental impacts and their effects and terms referred to in the various assessments and sets out a common format for the assessments reported in Chapters 8-17.
- Chapters 8 – 17 report the findings of the studies and assessments undertaken and identify any likely significant environmental effects including cumulative effects.
- Chapter 18 comprises a Schedule of Environmental Commitments detailing in summary form the design and mitigation measures proposed in relation to the impacts identified in Chapters 8-17.

2 Need for the Scheme

2.1 South East Manchester Multi Modal Strategy (SEMMMS)

2.1.1 The proposed scheme is one element of SEMMMS, a strategy which seeks to improve transport provision within the south-eastern part of the Greater Manchester conurbation, Cheshire East and Derbyshire. The core objectives of the strategy are:

- the promotion of environmentally sustainable economic growth;
- the promotion of urban regeneration;
- the improvement of amenity, safety and health;
- the enhancement of the regional centre, town centres and local and village centres and the Airport; and
- the encouragement of the community and cultural life of the neighbourhood and of social inclusion.

2.1.2 The strategy provides for an integrated approach with proposals related to roads, rail and Metrolink whereby private and public transport modes including cars, commercial vehicles, buses, trains and trams cater for sub-regional transport needs. As a key part of the strategy the proposed scheme is intended to provide strategic connectivity to Manchester Airport and along the south Manchester corridor. It will provide much-needed congestion relief to local and strategic routes in the area, congestion that currently constrains the growth potential of the Cheshire East, Manchester and Stockport economies which is to the detriment of local communities.

2.2 The Proposed Scheme

2.2.1 Transport-related issues of relevance to the proposed scheme which were identified during the studies informing the strategy include:

- congestion in both the peak and non-peak periods resulting in environmental impacts such as deterioration in local air quality. Specific areas identified by the study included:
  - *Hazel Grove*
  - *Finney Lane in Heald Green*
  - *Poynton Crossroads*
  - *Gatley*
  - *A6 between Hazel Grove and Stockport.*
- congestion and a change in traffic patterns due to the construction and operation of the central section of the A555 and the A34 Wilmslow / Handforth

bypass affecting Bramhall, Woodford and Poynton and the A538 through Prestbury Village;

- increase in journey times and traffic flow dis-benefits along the A6;
- accident clusters associated with areas of high congestion as listed above;
- competition for road space on the M60 between local, conurbation wide and regional priorities. Due to the fact that the area is used to access developments and for inter and intra regional trips. The airports access routes face similar issues;
- development pressures around the airport; and
- low levels of cycling within the areas and a high level of public concern over cycle safety because of congestion issues.

2.2.2 The proposed scheme is supported and promoted by three local authorities: SMBC, CEC and MCC. All partners and supporters are committed to the efficient delivery of the scheme to ensure that the North West economy can thrive in the future.

2.2.3 The proposed scheme is also supported in principle by the Government, having been identified as a priority for funding as part of the Chancellor of the Exchequer's Autumn Budget Statement in November 2011 and included in the National Infrastructure Plan published in November 2011. This follows the announcement in March 2011 that Manchester Airport is to be one of 21 UK 'Enterprise Zones', offering incentives to businesses to locate and expand in the area known as 'Airport City' (granted planning permission in January 2013) and strengthening substantially the argument for investment in transport infrastructure to ensure the full benefits are realised.

2.2.4 The underlying philosophy of the proposed scheme is that it will provide priority for public transport and non-motorised modes of transport, providing a step-change in the allocation of existing road space in favour of sustainable modes of transport – improving access for public transport, pedestrians and cyclists, and improving quality of life in residential areas along the south Manchester corridor. The specific proposed scheme objectives are to:

- Increase employment and generate economic growth: provide efficient access and improved connectivity to, from and between Manchester Airport, local, town and district centres and key areas of development and regeneration (e.g. Manchester Airport Enterprise Zone);
- Boost business integration and productivity: improve the efficiency and reliability of the highway network, reduce the conflict between local and strategic traffic and provide an improved route for freight and business travel;

- Promote fairness through job creation and the regeneration of local communities: reduce severance and improve accessibility to, from and between key centres of economic and social activity;
- Reduce the impact of traffic congestion on local businesses and communities;
- Improve the safety of road users, pedestrians and cyclists: reduce the volume of through-traffic from residential areas and retail centres;
- Minimise and mitigate adverse environmental impacts during construction and operation of the scheme; and
- Support low carbon travel: reallocate road space and seek other opportunities to provide improved facilities for pedestrians, cyclists and public transport.

3 Alternatives

3.1 Introduction

3.1.1 Alternatives considered during the planning and design of the proposed scheme were developed over two stages; prior to public consultation and during public consultation.

3.1.2 The alternatives considered relate to ten junction arrangements along the route of the proposed scheme at a number of locations. Arrangements for the proposed crossing of the West Coast Main Line (WCML) were also considered.

3.1.3 In the development of information for the public consultation, alternative junction arrangement options were considered at an initial design stage by the project team. Where more than one option was deemed to be suitable for development these were subsequently presented at the Phase 1 public consultation.

3.2 A6/Buxton Road

Initial Design Stage

3.2.1 The following options were considered:

- At grade signalised roundabout
- Fully signalised T Junction

3.2.2 It was deemed that the T Junction arrangement provided sufficient capacity and therefore the larger roundabout structure was not necessary.

3.3 A6 Buxton Road Tie In Junctions (East and West)

Initial Design Stage

3.3.1 The following options were considered:

- Western Junction
  - *Priority T Junction*
  - *Signalised T Junction*
- Eastern Junction

- *Priority T Junction*
- *Signalised T Junction*

3.3.2 It was deemed that a priority T junction at the western end and a signalised T junction at the eastern end were necessary to allow sufficient capacity for the anticipated vehicle movements.

3.4 A 523 Macclesfield Road

Initial Design

3.4.1 The following options were considered:

- No junction provision
- At grade all movements cross road junction
- A grade separated junction with restricted movements
- An at grade signalised satellite T junction
- A grade separated all movement junction

3.4.2 The no junction provision option was not supported by the Local Authorities and the other two options were considered from a construction cost perspective and were found to be too expensive. The at grade junction and the satellite T junction were progressed to the public consultation phase.

Phase 1 Consultation (Figure 3.1)

Option 1 – All movements signal controlled cross road junction

3.4.3 This option comprises an at-grade signalised crossroad junction with Macclesfield Road catering for all traffic turning movements and with appropriate crossing facilities for Non-Motorised Users (NMUs).

Option 2 – Signalised satellite T-junction

3.4.4 This option involves the alignment of the proposed dual carriageway beneath the A523 Macclesfield Road with a new bridge carrying the existing road over the proposed scheme. Provision for access between the two roads is made via a link road with signalised T-junctions and crossings for NMUs at the junction of the link road with the dual carriageway some 200m west of the A523 and the link road with the A523 some 200m south of the Norbury Brook.

Comparison

3.4.5 Option 2 would require greater land take and involve greater severance of agricultural land.

3.4.6 Both options would potentially result in adverse impacts on local air quality, particularly for receptors at Darley Road, Ashbourne Road and Sheldon Road. Option 2 would also be likely to affect air quality for a small number of properties along Macclesfield Road adjacent to the link road junction with the A-road. In relation to noise the options would be likely to affect similar numbers of receptors.

3.4.7 Option 2 would have greater impact on landscape character, existing views from receptors in the local area and nature conservation interests. The link road would extend the influence of the new road, severing the composition of agricultural land and wooded corridor focused on the Norbury Brook and consequently be more intrusive in the landscape and detrimental to habitats and fauna they support.

3.4.8 Option 2 would involve a crossing of the Norbury Brook and hence higher risk relative to water quality, a factor recognised by the Environment Agency when indicating a preference for option 1 as the one which would have the least potential impact on the brook.

3.4.9 Option 2 would also involve severance of the Ladybrook Valley Trail. Notwithstanding provision that would be made for a crossing of the link road there would be adverse impact on the amenity value of the localised part of the trail.

3.4.10 During Public Consultation a clear preference for Option 1 was expressed by members of the public.

3.4.11 Following a review of all considerations, Option 1 was identified as the preferred option and developed as part of the proposed scheme described in Chapter 5.

3.5 Woodford Road, Poynton

Initial Design

3.5.1 The following options were considered:

- No junction provision (Woodford Road carried over the A6-MARR on a road bridge)
- At grade all movements stagger junction
- No junction provision (Woodford Road stopped up)

3.5.2 Having Woodford Road stopped up was not supported by CEC or SMBC and subsequently the road bridge and stagger junction options were proposed at public consultation.

Phase 1 Consultation (Figure 3.2)

Option 1 – Scheme passes under a new bridge for Woodford Road

3.5.3 This option provides for location of the dual carriageway in cutting with Woodford Road being carried over the new road via a new bridge. It made no provision for access onto the dual carriageway. Northbound traffic would be able to join the proposed dual carriageway using the junction at Chester Road and southbound traffic by using the proposed Macclesfield Road junction.

Option 2 – Woodford Road connects to the proposed dual carriageway via two staggered signal controlled T- junctions

3.5.4 This option involves an at-grade alignment of the proposed dual carriageway, closure of the local road either side of the dual carriageway and the introduction of two staggered signal controlled T junctions with Woodford Road. Traffic heading north and south on Woodford Road would have to join the Scheme in order to progress along Woodford Road.

Comparison

3.5.5 Option 1 would require substantial modification to the existing landform to enable the proposed road to pass beneath Woodford Road. Option 2 would require modification of the local road layout and would result in noticeable change to views along Woodford Road.

3.5.6 Location of the proposed scheme in cutting as envisaged in option 1 would partially mitigate traffic-related noise associated with the dual carriageway. Whereas option 2 would give rise to markedly higher levels as a result of its at-grade alignment and increased traffic flows along Woodford Road related to the availability of access onto the proposed scheme.

3.5.7 A clear preference for Option 1 was expressed by members of the public during public consultation.

3.5.8 Following a review of all considerations, Option 1 was identified as the preferred option and developed as part of the proposed scheme described in Chapter 5.

3.6 Chester Road Link,

Initial Design

3.6.1 The following options were considered:

- No junction provision (traffic transferred to the Woodford Road, Bramhall junction)

- At grade signalised cross road junction
- All movement grade separated junction
- Restricted movement grade separated junction
- At grade signalised roundabout

3.6.2 The Woodford Road, Bramhall junction would not be able to cater for the required traffic movements were a junction at Chester Road not be provided for. The grade separated junctions were also discounted as they would require a large footprint and it would be in close proximity to residential properties. As both the at grade signalised cross road and the at grade roundabout were able to accommodate the traffic movements they were therefore progressed to public consultation.

Phase 1 Consultation (Figure 3.3)

Option 1 – At-grade signalised roundabout

3.6.3 This option comprises a large elongated roundabout on the line of the dual carriageway with a short link road from the roundabout to Chester Road and a signal controlled access to the Bramhall Oil Terminal off the roundabout. A signal controlled T-Junction with facilities for NMUs provides for access between the link road and the eastern section of Chester Road.

Option 2 – At-grade signalised crossroad junction

3.6.4 This option involves a signalised cross road junction with an arm to Bramhall Oil Terminal and an extended link road to Chester Road. The arrangement for access between the link road and Chester Road is the same as that for option1.

Comparison

3.6.5 Option 1 would involve greater land take and would have a greater impact on landscape composition and character although the extent of agricultural land lost would be similar.

3.6.6 Members of the public expressed no clear preference during public consultation.

3.6.7 Following a review of all considerations, Option 1 was identified as the preferred option and developed as part of the proposed scheme described in Chapter 5.

3.7 Woodford Road, Bramhall

Initial Design

3.7.1 The following options were considered:

- No junction provision

- At grade all movements cross road junction
- A grade roundabout catering for all movements
- Grade separated junction (allowing all movements)
- Grade separated gyratory (restricted movements)
- Grade separated T-junctions (restricted movements)

3.7.2 It was deemed that having no junction at Woodford Road, Bramhall would lead to traffic and environmental impacts due to increased local traffic movements and was therefore discounted. The all movements options were also discounted as they would require the purchase of residential properties and because land restrictions did not allow such a structure to be built. The restricted movement grade separated options were therefore progressed to public consultation.

Phase 1 Consultation (Figure 3.4)

Option 1 – Grade separated gyratory junction

3.7.3 Option 1 would pass under Woodford Road which is on two bridges. An at-grade junction would create a circulatory configuration for vehicular movement. On Woodford Road, traffic heading south would use one bridge with traffic heading north towards Bramhall using the other bridge. Controlled crossing facilities for NMUs would be provided.

Option 2 – Grade separated T junction

3.7.4 Option 2 would pass under Woodford Road which is on a bridge. There would be a signalised T-junction at the top of each slip road to facilitate traffic movements linked by a single bridge structure spanning the relief road. The junctions of the slip roads and Woodford Road would be controlled by traffic lights. In addition, controlled crossing facilities for NMUs will be provided.

Comparison

3.7.5 Option 1 would result in significant modification to the existing road layout, the widened verges to the north and south would result in the majority of the existing recreation ground frontage and associated planting being removed. It would also result in residential properties having new or significantly increased views of the junction and slip road. Option 2 would more closely retain the width and scale of the existing highway and help to tie the new highway into the local streetscape.

3.7.6 Potential impacts on unknown archaeological sites and features would potentially be greater for Option 1 as a result of greater land take to facilitate works.

3.7.7 A clear preference for Option 2 was expressed by members of the public during public consultation.

3.7.8 Following a review of all considerations, Option 2 was identified as the preferred option and developed as part of the proposed scheme described in Chapter 5.

3.8 A34 / Stanley Road

Initial Design

3.8.1 Two options at the Initial Design phase were considered and both were considered suitable for further public consultation.

Phase 1 Consultation (Figure 3.5)

Option 1 – Upgraded roundabout with traffic lights

3.8.2 This option comprises a signal controlled four-arm roundabout at the junction of the A34 and Stanley Road. Pedestrians and cyclists would be able to cross the A34 in stages using the controlled crossings. This option has two crossing points making it a simpler crossing movement.

Option 2 – New cross roads with traffic lights)

3.8.3 This option comprises an all movement at-grade signalised crossroads junction. Pedestrians and cyclists would be able to cross the A34 in stages using controlled crossings. This option has more crossing stages for pedestrians and cyclists, making it more complex to cross.

Comparison

3.8.4 Adverse air quality impacts at local receptors are anticipated to be higher for Option 2 due to the potential for start-stop queuing at the signalised crossroads.

3.8.5 Provision for NMUs is included in both junction designs. However, Option 1 would reduce the extent of existing provision. Option 2 would increase the number of pedestrian crossings and maintain the same number of pedestrian footways.

3.8.6 A clear preference for Option 1 was expressed by members of the public during public consultation.

3.8.7 Following a review of all considerations, Option 1 was identified as the preferred option and developed as part of the proposed scheme described in Chapter 5.

3.9 B5358 Wilmslow Road, Handforth

Initial Design

3.9.1 The following options were considered:

- Existing junction layout (restricted movements to and from the west)
- Grade separated junction (all movements)

3.9.2 It was considered that having restricted movements at this junction would lead to increased traffic on local routes including Stanneylands Road, Finney Lane through Heald Green the B5094 Stanley Road and the B5166 Styal Road. For this reason it was discounted and no option arrangements were considered at Phase 1 public consultation

3.10 Styal Road, Wythenshawe

Initial Design

3.10.1 The following options were considered:

- Central route (adjacent to the existing electricity sub-station)
- Southern route (to the south of the existing electricity sub-station)
- Northern route (to the north of the existing electricity sub-station

3.10.2 The route to the south of the sub-station would require the demolition of two residential properties on Hollin Lane and for this reason was not considered suitable and therefore the central and northern routes were presented at public consultation.

Phase 1 Consultation (Figure 3.6)

Option 1 – Central route

3.10.3 Option 1 comprises an all movement at-grade signalised junction with facilities for NMUs constructed over the Manchester Airport Spur railway line, requiring additional structures either side of the existing bridge in addition to a clear span over the existing railway.

Option 2 – Northern route

3.10.4 Option 2 comprises an all movement at-grade signalised junction with facilities for NMUs located to the north of the existing bridge on Styal Road in the vicinity of the entrance to the electricity substation.

Comparison

3.10.5 Option 2 would locate traffic using the dual carriageway closer to residential receptors on Styal Road such that impacts relative to air quality, noise and vibration would be potentially greater.

3.10.6 Option 1 would be contained within an existing infrastructure corridor whereas option 2 would involve the establishment of second corridor north of the existing railway line It would involve the loss of an area of woodland to the north of the electricity substation and new fragmentation of the landscape composition in the vicinity of Moss Nook.

3.10.7 Option 1 would lead to the direct loss of two ponds with the potential to support Great Crested Newt (GCN). Option 2 alignment would not involve the direct loss of ponds but would be in close proximity to five ponds with GCN potential.

3.10.8 A clear preference for Option 1 was expressed by members of the public during public consultation.

3.10.9 Following a review of all considerations, Option 1 was identified as the preferred option and developed as part of the proposed scheme described in Chapter 5.

3.11 West Coast Main Line Crossing (Figure 3.7)

Option 1 - Road over Railway Line

3.11.1 Option 1 would pass under Woodford Road, before rising on embankments to pass over the WCML. The alignment would then descend to existing ground levels west of the WCML.

Option 2 - Road under Railway Line

3.11.2 Option 2 would follow the same horizontal alignment as option 1 and would remain in cutting of increasing depth beyond Woodford Road to enable the road to pass under the WCML.

Comparison

3.11.3 The elevated nature of Option 1 would involve higher levels of traffic-related noise for receptors in the vicinity of the crossing. The option would also result in the loss of a pond with GCN potential and involve greater visual impact.

3.11.4 Option 2 could result in the drawdown of the local water table which may require pumping of the groundwater during both the construction and operation phases. Greater excavation under Option 2 could encounter unknown archaeological resources.

3.11.5 Network Rail has expressed a strong preference for Option 1 as it would be less of a risk to the integrity of the railway during construction. A cost estimate of the options also priced the road under rail option at around £4 million greater than the road over rail option.

3.11.6 Following a review of all considerations, Option 1 was identified as the preferred option and developed as part of the proposed scheme described in Chapter 5.

4 The Existing Environment

4.1 General

4.1.1 As indicated in Figure 4.1, the proposed scheme corridor traces the southern fringe of the Greater Manchester conurbation between the A6 in the east to Manchester Airport in the west. It crosses several significant radial roads including the A6, A523 and A34. Rail crossings include the Hazel Grove to Buxton Line, WCML, the Styal Line and Styal Line Spur into Manchester Airport.

4.1.2 The corridor comprises a network of open green space and broader countryside , much of which is designated greenbelt. The principal land use outside of the urban areas that frame the corridor is agriculture. Other uses include golf courses, individual and small scale residential development, infrastructure related development and industrial and commercial activity.

4.1.3 To the north, dense settlement including Hazel Grove, Bramhall, Cheadle Hulme and Wythenshawe forms part of the core conurbation. To the south, settlements including Poynton, Woodford and Handforth are discrete and set within open countryside.

4.1.4 A network of public rights of way provides access to the countryside and open areas from the neighbouring communities. The principal rights of way include:

- Ladybrook Valley Interest Trail, a long distance footpath running between Cheadle Hulme and Lyme Park;
- National Cycle Route 55, which crosses the A6 Buxton Road near Hazel Grove;
- Regional Cycle Route 85; and
- sections of the Greater Manchester Cycle Routes.

4.2 A6 Hazel Grove to A555 / Woodford Road (A5102)

4.2.1 From the A6 to the A555 / Woodford Road (A5102) Junction the corridor is characterised by open agricultural land used for grazing, the wooded valleys of Norbury Brook and Lady Brook and the urban edge of Hazel Grove to the north, Poynton to the south and Bramhall to the west.

4.2.2 The eastern end of the corridor is marked by the parkland styled landscape of Hazel Grove Golf Course where Ox Hey Brook marks the course boundary. Ribbon

development highlights the line of the A6 whilst the nearby Hazel Grove to Buxton railway line, is by comparison, discreetly set within a tree-lined cutting west of the A6.

4.2.3 The wooded valley of the Norbury Brook defines the railway to the west. As it curves to the north and west the wooded valley contains the southern edge of Hazel Grove and defines the northern limit of an area of agricultural land punctuated by large areas of woodland which extends between the railway and the eastern edge of Poynton. A narrow strip of agricultural land separates the wooded valley from the southern edge of Hazel Grove.

4.2.4 Continuing west, there is a pinch point between Hazel Grove and northern Poynton where the two settlements are linked by the A523 Macclesfield Road. The Brookside Garden Centre (Figure 4.1,ref 1) is also located along the Norbury Brook within the gap between the settlements. To the north-west Norbury Hall (Figure 4.1,ref 2) appears prominently on a local spur of land.

4.2.5 West of the A523 there is a large area of predominantly agricultural land enclosed by Poynton and Woodford to the south, Bramhall to the west and Hazel Grove to the north. The wooded Lady Brook Valley extends north-west to south-east across the area, joining with the wooded Norbury Brook and Poynton Brook valleys north-west of Barlowfold Farm. The woodland associated with the valleys is visually prominent, as is that associated with Bramhall Golf Course. Other non-agricultural land use includes two small areas of settlement at Mill Hill Hollow and Hill Green, the Bramhall Oil Terminal (Figure 4.1,ref 3), Moorend Golf Course and Queensgate Primary School (Figure 4.1,ref 4) in the western part of the area. Access through the area is available along Woodford Road. The WCML runs north–east to south-west between Bramhall Golf Course and the oil terminal. There is a dense network of footpaths providing access to the open land and between the communities which frame the area, which includes a section of the Ladybrook Valley Interest Trail.

4.2.6 The A5102 Woodford Road and its associated linear residential development marks the western limit of this area of open land as it runs north to south between Bramhall and Woodford.

4.3 A555 / Woodford Road (A5102) to A555 / Wilmslow Road (B5358)

4.3.1 Where the A555 extends from a roundabout junction on the A5102 Woodford Road to a grade-separated junction with the A34, it is generally in cutting with well-established scrub and tree planting on the cutting slopes. As a result the road and its traffic do not appear prominently from the urban fringes of Bramhall and Cheadle Hulme to the north, ribbon development along Hall Moss Lane and open agricultural land to the south. Non-agricultural or residential land use in close proximity to the existing dual carriageway include the Woodford Recreation Ground located north-west of the roundabout on the A5102 (Figure 4.1,ref 5), Longfield Poultry Farm,

Andertons Nurseries (Figure 4.1,ref 6) and Chester's Park Croft, a residential caravan park (Figure 4.1,ref 7).

4.3.2 West of the A34 the existing dual carriageway rises out of cutting as it passes between and above mixed industrial and commercial development at the Stanley Green Trading Estate (Figure 4.1 ref 8). It then crosses over the WCML, beyond which the existing east facing slip roads diverge and rise to a pair of dumbbell roundabouts on the B5358 Wilmslow Road as they pass between Handforth to the south and residential development on the B5094 Stanley Road. An airport car storage facility (Figure 4.1 ref 9) and the Little Acorns Day Nursery (Figure 4.1,ref 10) occupy land immediately west of the dumbbell arrangement.

4.4 A555 / Wilmslow Road (B5358) to Shadowmoss Road

4.4.1 Beyond the B5358 there is an area of countryside extending north-east from Heald Green to Styal in the south-west. The area is framed to the north by Heald Green, to the east by Handforth and to the west by the runways, terminals and infrastructure of Manchester Airport. The Styal Railway runs north to south centrally through the area. East of the railway agricultural land and the Styal Golf Course are the principal land uses. Residential development is limited to the farmsteads of Outwood Farm, Yew Tree Farm and Bolshaw Farm and housing at points along Station Road which includes the Grange (Figure 4.1, ref11). There is a large commercial nursery on the fringe of Heald Green. There is also a well defined network of footpaths providing access to the open land and between the communities which frame the area.

4.4.2 Towards the northern part of the area and west of the Styal Railway Line, the Manchester Airport Rail Spur runs alongside Ringway Road and Primrose Cottage Nursery and Garden Centre (Figure 4.1, ref 12) with Moss Nook and Wythenshawe to the north and the airport to the south.

5 The Proposed Scheme

5.1 Overview

5.1.1 The proposed scheme (Figure 5.1) comprises a new dual carriageway connecting the A6 to Manchester Airport. The road travels adjacent to Bramhall, Cheadle Hulme, Hazel Grove, Handforth, Poynton and Wythenshawe District Centres and Gatley and Heald Green Local Centres.

5.1.2 The new road is approximately 10 kilometres long, predominantly of dual 2-lane carriageway standard, and would include seven new junctions and four improved junctions. It also incorporates a further 4 kilometres of existing A555 dual carriageway to the south of Bramhall (the central section of the scheme). There are four rail crossings in the new sections including the Hazel Grove to Buxton Line, West Coast Main Line (Stockport to Stoke), Styal Line and the Styal Line Northern Airport Spur. A pedestrian and cycle route is proposed for the whole length of the scheme, including retrofitting it to the 4 kilometre existing section of A555.

5.1.3 Seven new junctions and four modified junctions will provide for access from communities close by and for integration of the proposed scheme into the local and wider road network. In addition, new bridges will provide for access beneath or over the dual carriageway where existing roads and railway lines cross the proposed scheme and junctions are not proposed.

5.1.4 A new cycle path catering for cyclists and pedestrians will be introduced alongside the entire length of the dual carriageway, including the existing A555.

5.1.5 Additional footpaths and bridleways will also be provided along parts of the scheme and a number of existing public rights of way will be upgraded from footpath to bridleway status to improve linkages into the existing networks.

5.1.6 The proposed dual carriageway between the A6 and the A555 Styal Road and between the A555 and the B5166 Styal Road will be subject to a speed limit of 50 mph . The current national speed limit will apply to the existing A555. West of the B5166 Styal Road to the tie in to Ringway Road West the speed limit will be 40 mph.

5.1.7 A post and rail fence will mark the highway boundary.

5.2 Alignment

A6 to A555

5.2.1 Proposals for the eastern end of the proposed scheme involve the realignment of a 1km long section of the existing A6, Buxton Road, the new alignment being north-east of the existing road (Figure 5.2). A new light-controlled T-junction will provide for access off and onto the proposed dual carriageway approximately mid-way along the re-aligned section of road. Access to existing housing and other property located along or served by the section of the A6 which will no longer be part of the road will be maintained via new T-junctions at each end of the re-aligned section of the road. 5m high bunds will be introduced along the western margin of the diverted road as part of proposed screening of the road and its associated traffic from the rear of property which fronts onto the existing A6 Buxton Road and located on Cranleigh Drive.

5.2.2 The proposed dual carriageway will follow a south-westerly alignment from its junction with the realigned A6, descending into a deep cutting to pass beneath the existing A6 and Hazel Grove to Buxton railway line where the cutting will be 8m at its deepest. New bridges will carry the existing road and railway over the dual carriageway (Figure 5.3).

5.2.3 The crossing of the existing A6 Buxton Road and the proposed scheme is located on a relatively sharp curve. The proposed bus bridge will, therefore, be constructed off-line immediately east of the existing road. It will be a 26.1m clear span structure with pre-cast pre-stressed concrete beams and reinforced concrete slab deck supported on contiguous piling abutments as illustrated in Figure 5.3.

5.2.4 The new railway bridge will have a clear span of 27.5m. It will comprise a standard Network Rail deck comprising two plate girder beams with transverse girders with the deck supported on pre-cast reinforced concrete full height cantilever abutments. The bridge will have an approximate span of 27.5m (Figure 5.3).

5.2.5 On passing beneath the railway the dual carriageway will curve to the west, emerging from the cutting south of Old Mill Lane. It will continue in a westerly direction on sidelong cutting within a narrow corridor framed by the tree-lined Norbury Brook to the south and housing on Old Mill Lane, Ashbourne Road and Darley Road to the north. The carriageway will be some 15m south of the nearest garden boundary on Old Mill Lane and between 35-50m south of boundaries on Ashbourne Road and Darley Road. The sidelong cutting will vary in depth from 3.5m to 0.5-1.0m travelling east to west. It will be increased in height to 4m by the introduction of a false cutting as part of the screening of views of the road and its traffic where the dual carriageway will be located south of Darley Road and the sidelong cutting is at its shallowest (Figure 5.4).

5.2.6 A new bridge over the dual carriageway east of Old Mill Lane will cater for continued access from the lane to fields to the south which would otherwise be severed by the dual carriageway (Figure 5.5). The bridge will also provide continued access for pedestrians using FP109 as a means of access to a network of rights of way associated with the Norbury Brook and agricultural land south of the urban area. Access to the bridge from FP109 will involve diversion of the PRoW north-east along the top of the cutting above the road and onto embankment to establish the clearance required between the dual carriageway in the cutting below and the bridge. The cutting slope on the west side of the dual carriageway will similarly be heightened by the introduction of an embankment to accommodate access to the bridge. The bridge will be a 26 m clear span structure with pre-cast pre-stressed concrete beams and in-situ reinforced concrete slab deck supported on reinforced concrete abutments on piled foundations.

5.2.7 The alignment of the dual carriageway south of Old Mill Lane will involve the realignment of a 70m section of the Norbury Brook (Figure 5.6).The new section of watercourse will be constructed to be consistent with the channel width at each end of the diversion and reflect the width of the section which will be displaced to accommodate the dual carriageway. A new bridge for pedestrians using FP62 will be constructed over the eastern end of the diverted watercourse to ensure there will be continued access between the PRoW and FP109 (Figure 5.7). The bridge will be a 21.65 m single span structure with pre-cast pre-stressed concrete beams and in-situ reinforced concrete slab deck supported on reinforced concrete bank seats.

5.2.8 As the proposed scheme approaches and crosses the A523 Macclesfield Road it will encroach into part of the parking area at Brookside Garden Centre. A new at-grade signalised junction will cater for all movements between the new dual carriageway and the A523, Macclesfield Road. The arrangement will include Toucan facilities for cyclists and pedestrians. The introduction of left and right turning lanes catering for access of and onto the dual carriageway at the A523 will involve encroachment into land fronting onto the A-road which forms part of the curtilage to Norbury Hall (Figure 5.4).

5.2.9 West of the A523, the proposed dual carriageway will curve to the south-west, north of and following the course of the Norbury Brook and moving away from housing on Sheldon Road and Longnor Road. A 19.6m span bridge will carry the dual carriageway over the Lady Brook, the span being of sufficient width to accommodate the existing channel for the watercourse and diverted footpaths on line (Figure 5.8).

5.2.10 The dual carriageway will continue in a 6-7m deep cutting reducing in depth to 1-2m as it passes south of housing at Hill Green. A false cutting will be introduced in this location to increase the height of the earthworks and screen the road and its traffic from the housing (Figure 5.9). The north facing slopes of the false cutting will be

profiled with a maximum gradient of 1:6 in order that most of the land can be returned to agricultural use. FP31 will be diverted to cross over the dual carriageway at the highest point of the false cutting (approximately 7m above carriageway level) via a new bridge providing for pedestrian / equestrian use and access for farm vehicles.

5.2.11 Travelling west, the dual carriageway will pass beneath Woodford Road in a 5m deep cutting. The local road will be raised on low embankment immediately off-line to the south of the existing road between Hill Green Farm and Lower Park with an embankment height of 3m at the abutment walls which will support a new 33.7m clear span skew bridge to provide the required clearance above the dual carriageway. It will then rise at a relatively steep 1:25 gradient as it curves towards the south-west on embankment with a maximum height of 9m at the abutment walls of a proposed new 42m clear span bridge over the WCML (Figure 5.10). The embankment slopes will be increased in height by the introduction of false cutting adjacent to both sides of the carriageway east of the mainline and along the south side of the carriageway west of the mainline. The resultant outer facing slopes will be graded to a profile of 1:12, to reduce the impact a functionally engineered profile (1:2.5-1:3) would have. Much of the gently profiled outer facing slopes will be returned to agricultural use once the works are complete (Figure 5.10).

5.2.12 Upon crossing the WCML the proposed scheme will pass south of the Bramhall Oil Terminal as it descends on an embankment of reducing height. It will return to existing ground level in the vicinity of the existing access track to the terminal and then descend into deep cutting as it crosses the northern part of the Moorend Golf Club to tie into the existing A555 where it currently terminates in a roundabout on the A5102 Woodford Road (Figure 5.11). The golf club will cease to operate.

5.2.13 Access to Bramhall, the western parts of Poynton and Woodford will be provided in the form a new signalised roundabout and link road located east of the A5102 and south of the Bramhall Oil Terminal and modification of the existing roundabout junction between the A5102 and A555. The new roundabout will comprise an elongated arrangement providing for westbound access to west Poynton, Woodford and Bramhall via a new link road between the roundabout and the A5149 Chester Road and then via Chester Road and the A5102, dependant on destination. The roundabout will also provide for the most direct eastbound access to west Poynton (Figure 5.11). Eastbound access onto the dual carriageway from the three settlements and westbound access from west Poynton will also be via the new link road and roundabout. A dedicated northbound link off the roundabout will cater for access to the Bramhall Oil Terminal. Crossing facilities will be provided for pedestrians and cyclists.

5.2.14 Replacement of the existing roundabout at the eastern end of the A555 will comprise a grade-separated arrangement continuing the alignment of the A555 east with west-

facing slip roads catering for eastbound exit from and westbound access onto the dual carriageway from Bramhall and Woodford (Figure 5.11). There will be signalised T-junctions at the head of the slip roads on the A5102 and Toucan facilities for pedestrians and cyclists. A new 23.6 clear span bridge with concrete superstructure supported on contiguous piled abutment walls will carry the A5102 over the newly constructed continuation of the dual carriageway (Figure 5.12). Piled walls will continue for approximately 110m east of the new bridge to provide appropriate support for property located immediately each side of the gap in residential development along the A5102 which will be utilised for the continuation of the alignment of the existing A555.

A555

5.2.15 The proposals allow for the use of the existing A555. This will not involve any modification to the alignment of the existing dual carriageway but will require modification of the three junctions currently associated with the existing dual carriageway at the A5102, A34 and B5358. The modifications at the A5102 will be as described above.

5.2.16 Proposals for the A34 junction require no modification to existing structures. The existing roundabout on the A34 will be modified to provide for widened carriageways with traffic signal controls which will also enable Toucan controlled crossing facilities for pedestrians and cyclists to be introduced. North of the junction, the roundabout at the junction of the A34 and B5094 Stanley Road will be modified and traffic signals introduced to improve the management of flows through the junction. Toucan controlled crossing facilities for pedestrians and cyclists will also be maintained.

5.2.17 Proposals at the B5358 Wilmslow Road junction involve continuation of the existing alignment of the A555 beneath the existing bridge linking the dumb bell roundabouts on the B-road and construction of new west-facing slip roads off the two roundabouts.

A555 to Ringway Road

5.2.18 West of the B5358 the dual carriageway will be in cutting reducing in depth from 6m - 7m through the junction to 3m at the eastern boundary of Styal Golf Club.

5.2.19 East of the golf course, FP119 will be diverted via a new 28.6m clear span bridge catering for pedestrian use (Figure 5.13). Embankments required to achieve the headroom between the footbridge and dual carriageway in cutting below will be approx 5m high at the bridge abutments (Figure 5.14).

5.2.20 As the dual carriageway crosses the northern part of the golf course it will curve to the north-west moving out of cutting and onto a 2m high embankment on its approach to a new bridge over the Styal railway line. The bridge over the railway will

have a 30m clear span and will be of pre-cast reinforced concrete construction with full height reinforced concrete abutments on piled foundations. FP7 will be diverted beneath the bridge on the eastern side of the railway.

5.2.21 An at-grade signalised crossroad arrangement will be provided at the junction of the dual carriageway and B5166 Styal Road, incorporating Toucan facilities, for pedestrians and cyclists. The construction of the junction will require the extension of the existing road bridge over the northern airport railway spur. From Styal Road west, the Relief Road runs parallel to the airport rail spur where it will terminate as it merges with the existing Ringway Road/Ringway Road West junction west of Shadowmoss Road. Between Shadowmoss Road and the proposed main alignment, Ringway Road will be stopped up and a new layout arrangement with Shadowmoss Road constructed (Figure 5.15).

5.3 Cross section

5.3.1 The dual carriageway will comprise two 7.3m wide carriageways separated by a hard standing central reservation varying in width between 1.8m and 3.9m with a concrete central barrier. Between Styal Road and the tie-in to Ringway Road West, where the speed limit will be 40mph, the carriageways will be separated by a kerbed central reservation varying in width between 3.0m and 5.4m and there will be no central barrier.

5.3.2 Between the A6 and Styal Road, the cycle path will be located adjacent to the eastbound carriageway. It will be 2.5m wide with a 2m soft verge between it and the carriageway and a 1m verge between it and the wider roadside verge. There will be a 2m wide soft verge adjacent to the westbound carriageway.

5.3.3 Between Styal Road and the tie-in to Ringway Road, the cycle path will be directly adjacent to the eastbound carriageway. There will be a soft verge on the outside of the shared cycle path and adjacent to the westbound carriageway.

5.4 Junctions

5.4.1 Table 5-1 schedules the 7 new and 4 modified junctions along the line of the proposed dual carriageway and the off-line junction modification proposed on the A34.

Table 5-1 Proposed new and modified junctions

Junction Number	Junction Type	Side Road Link and Works
1	At - grade signalised T-junction	New junction at the proposed A6 diversion

Junction Number	Junction Type	Side Road Link and Works
2	At - grade signalised crossroad junction	New junction connecting to the A523 Macclesfield Road
3	At grade signalised T-junction	New junction at the proposed A6 diversion
4	At grade signalised T-junction	New junction at the proposed A6 East tie in with the existing A6
5	At - grade signalised roundabout junction	New junction connecting to the Bramhall Oil Terminal and the proposed link connecting to Chester Road
6	At - grade T-junction	New junction connecting the proposed Chester Road link to Chester Road
7	Grade - separated T-junctions with west facing slips	Modification of existing junction linking the A34 and B5094 Stanley Road to increase capacity
8	Large signalised roundabout junction	Modification of existing junction linking the A34 and B5094 Stanley Road to increase capacity
9	Grade - separated roundabout junction with west facing slips	New junction to replace the existing roundabout connecting the A5102 Woodford Road and the eastern end of the A555
10	Grade - separated junction with mini-roundabouts in a dumbbell arrangement	Modification of the existing junction at the B5358 Wilmslow Road and the western end of the A555, to accommodate new west facing slips
11	New signalised crossroads over the proposed Styal Road over airport spur rail bridge	New junction over the proposed new rail bridge to connect to the B5166 Styal Road

5.5 Earthworks

5.5.1 Table 5-2 summarises the earthworks volumes for different sections of the proposed scheme including topsoil removal and resoil volumes.

Table 5-2 Earthworks

Earthworks Section	Volumes (m^3)		Chainage
	Cutting	Embankment	
Realigned A6 to Hazel Grove to Buxton Railway Bridge	17380	117782	100 – 1389

Hazel Grove to Buxton Railway Bridge to Mill Hill Hollow Bridge	125723	25761	8315 – 9490
Mill Hill Hollow Bridge to West Coast Mainline Rail Over Bridge	247320	341180	9515 – 11915
West Coast Mainline Rail Over Bridge to A555 tie in	391061	252900	11955 – 13819
Existing A555 / A34 Junction	5902	18220	N/A
A555 tie in to Ringway Road tie in	159440	838154	100 - 3365

5.6 Structures

Bridges

5.6.1 There will be 13 bridges including over and under bridges across watercourses, railways, side roads; and public rights of way. These are listed and described in Table 5-3.

Table 5-3 Schedule of proposed structures

Bridge	Description
A6 Bus Bridge	A single span simply supported bridge (semi integral construction) supported on contiguous piling abutments. Clear span between abutments 26.1m. Overall width 7.87m with 3.65m wide roadway, one 1m wide verge and one 2m wide cycleway/footpath. Minimum clearance from carriageway 5.3m. Approx 1.8m deep superstructure of pre-cast pre-stressed concrete Y beams with reinforced concrete slab deck. Parapet to west verge 1.1m high steel with mesh infill. Parapet to east verge 1.4m high steel with mesh infill.
Hazel Grove to Buxton Railway Bridge	A standard Network Rail deck comprising two plate girder beams with transverse girders connected rigidly to the bottom flanges to form a U frame action. Approximate span 27.5m. Deck supported on precast reinforced concrete full height cantilever abutments. 1.8m high steel parapets.
Mill Lane Pedestrian / Cycle Bridge – Over Relief Road	A single span simply supported bridge on reinforced concrete abutments on piled foundations. Clear span between abutments 26m. Overall width 5m with 3m wide roadway and 4m clearance between parapets. Minimum clearance from carriageway 5.3m. Approx 2.14m deep superstructure of pre-cast pre-stressed concrete U beams and in-situ reinforced concrete slab deck. Parapets 1.8m high for equestrian use, steel with lower 600mm solid infill and upper mesh infill.
Mill Lane Pedestrian / Cycle Bridge –	A single span simply supported bridge on reinforced concrete bank seats. Clear span 21.65m. Overall width 4.5m with 3.5m clearance between parapets. Approx 1.2m deep superstructure of pre-cast pre-stressed

Bridge	Description
Over Norbury Brook	concrete TY beams and in-situ reinforced concrete slab deck. Parapets 1.8m above pavement level for equestrian use, steel with lower 600mm solid infill and upper mesh infill.
Norbury Bridge Widening	A single span simply supported widening to the existing structure 116 – Norbury Bridge. Clear span approx 19m. Width of the widening 13m. Superstructure of precast pre-stressed concrete Y-beams supporting an in-situ reinforced concrete (R.C.) slab deck supported on full height reinforced concrete abutments founded on bored piles. Parapet 1.4m high steel with galvanised mesh infill on footway side of the bridge to accommodate pedestrian and cyclist access
Mill Hill Hollow Bridge	A single span fully integral bridge with a 26 degree skew. Square span 16.2m between abutments. Overall width 26.8m. Minimum clearance from superstructure to footpaths below 7.2m. Approx 1m deep superstructure of pre-cast pre-stressed concrete beams and slab deck on full height reinforced concrete abutments on piled foundations. Parapet to west verge 1.4m high steel with mesh infill. Parapet to east verge 1.1m high steel with mesh infill.
Mill Hill Hollow Footbridge	The proposed structure would be a single span fully integral bridge. The superstructure would be in the form of a pre-cast pre-stressed concrete beams and slab deck. The bridge superstructure would be supported on a capping beam of an in situ contiguous bored pile full height abutment. The width of the bridge is 4m with a span of 8.05m.
Hill Green Accommodation Bridge	A single span supported on bank seat abutments. Clear span between abutments 27.5m. Overall width 5m with 3m wide roadway and 4m clearance between parapets. Minimum clearance from carriageway 5.3m. Approx 2m deep superstructure of pre-cast pre-stressed concrete U beam and reinforced concrete slab deck. Parapets 1.8m high for equestrian use, steel with lower 600mm solid infill and upper mesh infill.
Woodford Road Bridge	A single span simply supported on full height reinforced concrete abutments on piled foundations. Clear span between abutments 33.7m. Overall width 12.3m with 7.3m wide roadway and 11.3m clearance between parapets. Minimum clearance from carriageway 5.3m. Approx 2m deep superstructure of composite plate girder steel beams and reinforced concrete slab deck. Parapets 1.0m high steel with mesh infill.
West Coast Mainline Rail Over Bridge	A single span skew bridge simply supported on full height reinforced concrete abutments and wing walls on piled foundations. Clear span between abutments 42m. Overall width 25.7m with 2 x7.3m carriageways and 2.6m central reservation and 24.7m clearance between parapets. Minimum clearance from rail track 7.0m. Approx 2.4m deep superstructure of weathering steel composite plate girder & reinforced concrete slab deck. Parapets 1.8m high steel clad units.
Woodford	A Single span fully integral skew bridge supported on full height

Bridge	Description
Junction Bridge	contiguous piled wall abutments. Clear span between abutments 23.6m. Overall width 23.72m... Minimum clearance from proposed dual carriageway 5.3m. Approx 4.3m deep superstructure comprising stringcourse, pre-cast pre-stressed concrete beams, reinforced concrete slab deck, masking wall and propping beams. Parapet to west verge 1.1m high steel with mesh infill. Parapet to east verge 1.4m high steel with mesh infill.
Dairy House Lane Culvert	A pre-cast reinforced concrete box culvert. The length of the culvert will be 9m with a span of 2.4m
Spath Brook Twin Culvert Extension	An extension of 2 No. 600m diameter pipes with a reinforced concrete headwall and wing walls. The length of the proposed extension is 3m,
Yew Tree Footbridge	A single span simply supported bridge supported on full height reinforced concrete abutments on piled foundations. Clear span between abutments 28.6m. Overall width 4.5m with 3.5m roadway and clearance between parapets. Minimum clearance from proposed dual carriageway approx 6.2m. Approx1.8m deep superstructure of pre-cast pre-stressed concrete U beams and a reinforced concrete slab deck. Parapets 1.8m high for equestrian use, steel with lower 600mm solid infill and upper mesh infill.
Styal Main Line Over Bridge	A single span composite pre-cast pre-stressed concrete beam and slab deck. The bridge superstructure will be supported on full height reinforced concrete abutments and wing walls on piled foundations. The bridge will be 24.7m wide and have a span of 31.0m
Styal Road Airport Spur Bridge	A single span bridge with a superstructure constructed from pre-cast, pre-stressed beams and reinforced concrete slab integral with the abutment walls. The abutment walls will be constructed on bored pile foundations. The bridge will be 45m wide and have a span of 24m

Retaining Walls

5.6.2 Nine lengths of retaining wall are proposed as detailed in Table 5-4.

Table 5-4 Retaining walls

Retaining Wall	Details
1	It is located approximately 40m from the Woodford Road Bridge at an approximate chainage of 11452. The retaining wall is approximately 21.0m in length and runs parallel to the westbound carriageway. It is required to create an area outside of the main carriageway to locate the pumping station compound. The exposed face of the sheet pile wall will be faced with brick masonry.

Retaining Wall	Details
2	Two 100m long walls, 10m high to retain the ground adjacent to the Woodford Road Bridge Junction, at chainage 13235, on the West and Eastbound carriageways. The wall will be constructed from bored piles with a brick masonry face. A concrete capping beam and handrail will top the wall.
3	63m long, starting at ground level and rising to height of 3.7m, positioned on the eastbound off slip of the junction between the A555 and the A34. This wall is required to accommodate retain ground in order to accommodate a proposed new footpath/cycle route. A gravity wall section of 21m and a sheet pile wall section of 42m will be faced with brick masonry.
4	A contiguous piled wall is proposed to retain the eastbound slip road off the proposed scheme to the junction with Wilmslow Road (B5358). The total length of the retaining solution is approximately 160m. A capping beam will be formed on top and the face will be brick masonry.
5	Approximately 20m long, 1.8m in height and positioned at Styal Road Electricity Substation in order to minimise encroachment of the embankment into the boundary of the electricity substation. The exposed face of the wall will be faced with brick masonry.
6	21m long, 7m high at the south of the intersection of the proposed scheme and Styal Road. The wall will be a reinforced concrete cantilever wall on bored pile foundations.
7	21m long, 3m high proposed to retain an attenuation pond at approximately chainage of 10294. The wall will be constructed of sheet piles with a steel channel wielded to the top to finish and the face will be brick masonry.
8	244m long, 1.2m high and 70m long and 1.5m high; these two walls will support Dairy House Lane and a widened path respectively, The walls will be constructed with sheet piles and the exposed faces of the wall will be finished with brick masonry.
9	6 m long and 0.8m high for retaining a landing light at approximate chainage 3040. The brick wall will be backfilled to return the landing light foundation.

5.7 Cycletrack, footpaths and bridleways

5.7.1 There are a number of cycle paths, footpaths and bridleways proposed in addition to the cycletrack and footpath which will run adjacent to the dual carriageway for the length of the proposed scheme corridor.

5.7.2 There are also a number of sections of existing PRoW which will be stopped up where the alignment severs them and which will be diverted via new sections of footpath, bridleway or cycle path to maintain the right of way.

5.7.3 Footpath diversions and the proposed enhancements to the footpath network are indicated in Figure 5.16 and in Chapter 14 Effects on All Travellers; Figure 14.1 – 14.9.

5.7.4 Footpath (FP) 109 Hazel Grove and Bramhall (HGB) will be partly stopped up at the southern end of Old Mill Lane. A new section of path will be provided involving a 350m long diversion between the lane and crossing over the dual carriageway via the proposed Mill Lane bridge and tying into the existing footpath south of the dual carriageway at its juncture with Poynton with Worth (PW) FP62 (Figure 5.7). There will also be a short diversion on the initial section of PW FP62 travelling south which will cross the realigned Norbury Brook via the proposed Mill Lane Pedestrian / Cycle Bridge – Over Norbury Brook. A spur off the diversion north of the dual carriageway will provide access onto the proposed new cycle path along the length of the proposed scheme.

5.7.5 PW FP3, which also forms part of the Lady Brook Interest Trail, will be partly stopped up at the end of Mill Hill Hollow. Continued access will be provided by a 255m long new section of path which will be available for use by pedestrians and cyclists. The path will run east from Mill Hill Hollow descending to pass beneath the proposed dual carriageway along the western margin of the Lady Brook via the proposed Mill Hill Hollow Bridge and then climbing to rejoin the existing footpath to the west.

5.7.6 A new section of footpath will be provided along the south side of the dual carriageway between PW FP3 and Woodford Road at the southern end of the modified Woodford Road at Lower Park. The new footpath will be routed along the top of the roadside cutting slopes and onto the approach embankments to the Hill Green accommodation bridge. It will provide for continued access across the line of the dual carriageway for users of PW FP31, FP37 and FP21, in the first two instances via the accommodation bridge and, in the latter case, along the re-aligned Woodford Road.

5.7.7 FP19 HGB will be partly stopped up between the proposed scheme and Woodford Road. A new section of footpath path, some 445m, will run parallel with the proposed scheme at the bottom of the northern embankment slope before crossing, via an underpass, adjacent to the West Coast Mainline and connecting back into FP19 HGB along the bottom of the southern embankment slope.

5.7.8 At the Bramhall Oil Terminal, to the north of the proposed scheme, FP14a HGB, FP15 HGB and FP16 HGB will be partly stopped up at varying points along their length. Toucan crossings are proposed to allow NMU to cross the new junction safely and rejoin the footpaths on the southern side of the proposed scheme to access Poynton.

5.7.9 There is no footpath severance of any note to footpaths along the length of the existing A555 but the proposed cycleway and footpath will link with the existing footpath network. Where the A34 crosses the footpaths WFP38A and WFP81 will be slightly re-aligned to tie into the modified junction and the crossing facilities for NMUs will be upgraded.

5.7.10 Yew tree footbridge (Figure 5.13) will increase the length of WFP119 by 327m and cross the proposed scheme just east of Styal Golf Course. WFP7 which forms part of this will be partly stopped up and a new footpath passing under the proposed scheme via the new road over rail bridge crossing the Styal Rail Line will increase its length by 241m.

5.7.11 A new section of footpath will extend MCC FP253 by some 170m and will run south on the eastern side of Styal road before crossing the Styal Road and the northern slip roads of the proposed scheme via a toucan crossing. The footway and cycle track along the Styal Road will be severed by the proposed scheme. Users of this section of road will cross the proposed scheme via the same crossing as those that use MCC FP253.

5.8 Lighting

5.8.1 Lighting will be provided at the new and existing junctions as shown on Figures 5.17 – 5.23 and described in Table 5-5. All new lighting columns will be specified with full cut-off LED lanterns to minimise glare and upward dispersal of light.

Table 5-5 Lighting proposals

Location	Lighting Details
A6 junction including the new A6 diversion	1 new 6m high lighting column with single light fitting bracket on the golf course access road. 88 new 10m high lighting columns with single light fitting brackets at the new A6 junction and the realigned A6 link and 1 new 10m high lighting column with a twin light fitting bracket. 11 existing lighting columns along the existing A6 alignment will be removed.
A523 Macclesfield Road junction	69 new 10m high lighting columns with single light fitting brackets. 1 new 10m high lighting columns with twin light fitting brackets in the centre of the junction. 7 existing lighting columns along the A523 Macclesfield Road will be removed.
Bramhall Oil Terminal / Chester Road junction	12 new 10m high columns with single light fitting brackets at the oil terminal access road, 128 new 10m high lighting columns single light fitting brackets and 7 new 10m high lighting columns with twin light fitting brackets on the gyratory and Chester Road link. 5 existing lighting columns on the Chester Road will be removed.
Woodford Road / A555 junction	52 new 10m high lighting columns single light fitting brackets and 13 existing lighting columns around the existing junction will be removed.

Location	Lighting Details
The existing A34 / Stanley Road junction	62 new 10m high lighting columns with single light fitting brackets and 1 new 10m high lighting column with a twin light fitting bracket. 30 existing lighting columns will be removed.
The existing A34 / A555 junction	61 new 10m high lighting columns with single light fitting brackets at the junction and the junction approaches and 3 new 10m high lighting columns with twin light fitting brackets. 35 existing lighting columns will be removed.
Wilmslow Road / A555 junction	56 new 10m high lighting columns with single light fitting brackets on the new west bound slips, existing dumb bell junction and the eastbound east facing slip. 14 existing lighting columns on the eastbound east facing slip and the dumb-bell junction will be removed.
Styal Road junction	79 new 10m high lighting columns with single light fitting brackets are proposed along all approaches to the junction and 4 lighting columns 10m high with twin light fitting brackets. 21 existing lighting columns along Styal Road will be removed.
Tie in to Ringway Road	8 new 10m high lighting columns with single light fitting brackets at the western most extent of the tie in. 40 new lighting columns 5m high are immediately east of the tie in, and 5 new columns 5m high at the new Shadowmoss Road / Ringway Road configuration. 42 existing lighting columns along Ringway Road and Shadowmoss Road will be removed.

5.9 Watercourse diversions

5.9.1 There are two proposed watercourse diversions, one each for the Ox Hey Brook and the Norbury Brook. Approximately 260m of the Ox Hey Brook will be diverted where the proposed new A6 link passes across the southern section of the Hazel Grove golf course.

5.9.2 A section of the Norbury Brook approximately 70m long will be diverted as the watercourse approaches the southern end of Old Mill Lane at approximate chainage 8700. The realignments for both watercourses will be sized to maintain the existing flows, and not increase flood risk downstream. Further details of the diversions are currently not available and will be developed at the detailed design stage (Figure 5.6).

5.10 Drainage

5.10.1 The proposals provide for 8 drainage networks to address the collection and discharge of road related runoff, Networks A – F and Networks L and M. The location and extent of the networks is shown in Figures 5.24 – 5.27.Discharge rates for all drainage networks will be attenuated to greenfield run-off rates to minimise

downstream flood risk. All networks will be installed with oil separators upstream of any outfalls.

5.10.2 Earthworks drainage, which will be separate to the highway drainage networks will be conveyed via filter drains to the nearest watercourse in the first instance and to the highway drainage network where this is not possible. Earthworks drainage networks will incorporate sumps to remove sand and silt prior to discharge.

Network A

5.10.3 Network A drains the proposed A6 road (diverting current A6 route) and part of the dual carriageway and adjacent earthworks. The majority of the network will discharge to Ox Hey / Threaplehurst Brook. Online storage for the highway run-off will be provided via a hydrobrake and pond.

5.10.4 It has been agreed in principle with United Utilities that a portion of the new A6 (Buxton Road) will discharge into the public sewer.

Network B

5.10.5 Network B will drain to the Lady Brook. Online storage for the highway drainage will be provided via a hydrobrake and pond. The earthworks drainage will discharge to the Lady Brook and Norbury Brook. A diverted bus route at the location where the existing Buxton Road crosses the proposed scheme will discharge into the public sewer. This has been agreed in principle with United Utilities.

Network C

5.10.6 Network C involves the introduction of a pumping station located adjacent to a low point in the road to facilitate discharge into Lady Brook. Online storage for the highway runoff will be provided via a hydrobrake and pond. Earthworks drainage will discharge into Lady Brook and an unnamed tributary of the watercourse.

Networks D & E

5.10.7 Networks D and E will drain into the existing drainage networks on the A555 which is currently discharged into the Spath Brook via the existing Pumping Station 4 .

Network L

5.10.8 Network L will collect the highway drainage from the road east of Wilmslow Road to appoint 500m east of Styal Road. It will discharge via the existing Pumping Station 3 east of Wilmslow Road, adjacent to Spath Brook. The pumping station currently receives the highway drainage for the existing A555 to the east of Wilmslow Road. Online storage will be provided upstream of the pumping station.

Network M

5.10.9 Network M will drain the proposed road east of Styal Road and discharge to an existing culvert/pipe that flows in a northerly direction as it crosses the existing Ringway Road / Tedder Drive junction. The culvert/pipe discharges into Gatley Brook north of the proposed scheme . Further information on the existing culvert / pipe from Ringway Road / Tedder Drive junction to the outfall into Gatley Brook is required as discussions with The Environment Agency and United Utilities confirm that this pipe / culvert is neither an Environment Agency asset or a public sewer. The Environment Agency have confirmed that they have no objection, in principle, to discharging to Gatley Brook at greenfield runoff rates. Further investigations into the location and ownership of this infrastructure will determine whether any further agreements are required.

Network F

5.10.10 Network F will drain the section of the proposed scheme that runs from Styal Road to Shadowmoss Road. This drainage discharges into the existing Shadowmoss Lane pumping station. It will discharge to this location via the proposed Ringway Road Improvement Works drainage scheme, which is intended to be completed prior to the construction of the proposed scheme.

Culverts and field drains

5.10.11 A 600mm diameter culvert is proposed to divert the existing Ox Hey Brook between chainages 500 and 725m adjacent to the east side of the realigned A6.

5.10.12 A culvert is proposed to retain a connection between two existing ponds at chainage 12,480m and will be crossed by the proposed relief road.

5.10.13 Where field drains will be severed by the proposed works, provision will be made for the drains to be intercepted by the proposed earthworks drainage network.

5.11 Traffic Flows

5.11.1 Predicted traffic flows for the opening year and design year along the proposed dual carriageway between the tie-in on the diverted A6 and Ringway Road prepared by the Highways Forecasting & Analytical Services at Transport for Greater Manchester (HFAS) are summarised in Table 5-6.

Table 5-6 Predicted traffic flows (AADT) along the proposed scheme for the opening and design years

Proposed Scheme Section	Predicted Traffic Flows (AADT) at the Opening Year (2017)	Predicted Traffic Flows (AADT) at the Design Year (2032)

	Westbound	Eastbound	Westbound	Eastbound
A6 to A523 Macclesfield Road	11550	13350	13850	17450
A523 Macclesfield Road to Chester Road Junction	15100	18200	18800	23400
Chester Road Junction to A5102 Woodford Road	21350	24050	25100	29900
A5102 Woodford Road to A34	27200	31800	33700	40050
A34 to B5358 Wilmslow Road	21750	19950	24950	25950
B5358 Wilmslow Road to B5166 Styal Road	17900	20700	26000	22000
B5166 Styal Road to Ringway Road West	24450	27550	29300	34050

5.12 Traffic mitigation measures

5.12.1 A number of traffic management and mitigation measures will be introduced for parts of the local road network in support of the proposed scheme. Traffic management measures will be subject to sensitivity testing in consultation with the relevant planning authorities to determine the most appropriate solution in each of the locations as outlined below.

A6 Disley to Hazel Grove Golf Club

5.12.2 SMBC, CEC and Derbyshire County Council have committed to working together to develop a modal shift strategy for the A6 to Derbyshire which will complement the public transport enhancements the proposed scheme will secure in terms of increased reliability and efficiency of existing bus services in the corridor.

Threaphurst Land and Torkington Road

5.12.3 The predicted increases in traffic levels on Threaphurst Lane and Torkington Road, to avoid the new junction of the A6 with the proposed scheme, will be mitigated by designating both roads as 'Quiet Lanes'.

Clifford Road

5.12.4 Monitoring has been committed to along Clifford Road in Poynton in order to inform potential mitigation measures in anticipation of predicted increases in traffic levels.

Gillbent Road

5.12.5 Predicted increases in traffic levels on Gillbent Road primarily associated with the proposed junction improvements to the A34/ B5094 Stanley Road junction will be mitigated by the implementation of speed restrictions and / or local access improvements.

Handforth

5.12.6 In Handforth predicted increases in traffic using the centre to avoid congestion at the A34 / Stanley Road roundabout will be deterred from travelling along the B5358 Wilmslow Road by the introduction of local traffic management measures.

Wythenshawe

5.12.7 In the Wythenshawe area traffic levels are predicted to increase along Portway and residential streets south of Simonsway. Local traffic management measures will be introduced on select residential routes to discourage strategic traffic routeing through the Wythenshawe area, whilst retaining local accessibility to Manchester Airport for Wythenshawe residents.

5.13 Construction

5.13.1 Subject to approval, it is anticipated construction will commence in 2014 and that the dual carriageway will be open to use in 2017. There will be two main phases of work including a 39 week environmental mitigation period and a 104 week construction period.

5.13.2 Working hours are expected to be 0800hrs to 1830hrs Monday to Friday and 0800hrs to 1300hrs on Saturdays subject to agreement with the relevant Local Authorities. Weekend working will not normally be undertaken. Certain activities may need to be undertaken outside of these normal working hours due to scheduling constraints. In particular this will include construction of the proposed rail crossings where disruption of the rail network must be kept to a minimum.

5.13.3 The principal activities during the 39 week environmental mitigation will be:

- construction of the boundary fence;
- site clearance;
- implementation of certain of the environmental mitigation measures identified in chapter 18 prior to commencement of the main construction contract; and
- topsoil strip and storage.

5.13.4 The principal activities during the 104 week construction period will be:

- enabling works including construction of the main site compound, equipment laydown areas, site access, temporary drainage networks, and temporary service requirements.
- diversion of Statutory Undertakers equipment.
- earthworks including excavation of cut areas, construction of embankments, bunding and finished levels.
- construction of structures including revetment walls, underpasses and bridges.
- piling including sheet and bored piles.
- installation of services including communications and power cabling.
- construction of the drainage networks and associated treatment features.
- pavement construction.
- construction of footpaths, cycle paths and bridleways;
- planting; and
- installation of safety barriers, signs, traffic signals and lighting.

Site access and haul routes

5.13.5 The location of proposed access routes and site access points is shown in Figure 5.28. The principal roads are indicated below:

- A6 Buxton Road
- A523 Macclesfield Road
- A5102 Woodford Road (between A555 and Chester Rd A5149)
- A5149 Chester Road
- A555
- A34
- Ringway Road West

Traffic management

5.13.6 The proposals will generally involve construction off-line such that there will be minimal disruption to traffic using the existing road network. In a number of locations, where new junctions and tie-ins connect with the existing road network, construction will be phased to minimise traffic disruption. Proposals specific to these locations are outlined below.

A6

5.13.7 Access along the existing A6 will be maintained while the new section of the road is constructed off-line. Once complete, traffic will be diverted onto the new section of the A6 whilst the new dual carriageway between the existing and new section of the road is constructed.

A523 Macclesfield Road

5.13.8 The main alignment will be constructed up to the east and west sides of the A523 Macclesfield Road. Lane closures of the east and west lane could be introduced using temporary traffic signals to construct the tie-in works as required.

Woodford Road crossing

5.13.9 A temporary diversion will be provided to the north of Woodford Road whilst the proposed bridge is constructed off-line but close the line of the existing road. Once the bridge and cutting is complete, traffic will be switched back onto the slightly modified line of local road.

Chester Road Link tie in

5.13.10 The tie in points will be constructed using temporary traffic signals for lane closures as required.

Woodford Road / A555 Junction

5.13.11 The new westbound slips and cutting slopes will be constructed whilst traffic access is maintained at the existing junction. Temporary supports will be erected in order that the eastern half of the bridge can be constructed and access for traffic can be continued along the west side of the road. Traffic will then be switched to the constructed eastern part of the bridge whilst the western part of the bridge is constructed.

A34/Stanley road Junction

5.13.12 The areas of road widening will be constructed using temporary traffic signals for lane closures as required.

A34/A555 Junction

5.13.13 The areas of road widening will be constructed using temporary traffic signals for lane closures as required.

B5358 Wilmslow Road

5.13.14 The slip roads will be constructed off-line, and the mainline constructed beneath the existing bridge structure with no requirement for traffic management. The slip road

tie-in points will be constructed using temporary traffic signals to effect lane closures as required. The relocated Clay Lane junction will be opened prior to the closure of the existing Clay lane junction to allow the continued movement of traffic.

Styal Road Junction

5.13.15 The junction will be constructed in three stages. Bridge widening will involve implementation of rail possessions whilst traffic will continue to use the existing Styal Road. The works above the structures to the east and west will then be completed in two stages using temporary traffic signals to effect lane closures as required.

Ringway Road West tie in

5.13.16 The dual carriageway will be constructed up to the existing Ringway Road West which will remain open to traffic. Traffic travelling along Ringway Road West will then be switched to the eastbound carriageway leading to Styal Road, whilst the new junction arrangement with Shadowmoss Road is constructed. The westbound carriageway will then be opened to traffic.

Earthworks

5.13.17 There will be an overall neutral cut / fill balance, achieved by adjusting the highway levels +/- 500mm at the detailed design phase, eliminating the requirement to import fill from off-site locations or dispose of excess cut materials at licensed waste management facilities. Excavated material will be transported within the site boundaries on unpaved haul routes and designated haul roads from areas of cutting to areas where fill is required to form embankments and bunds.

Contractors compound and working space

5.13.18 Two areas have been identified as potential site compounds. One is adjacent to the existing A34 / A555 junction, the second is adjacent to the proposed Chester Road link near the Bramhall Oil Terminal. The preferred option will be determined during the detailed design stage.

5.13.19 In addition to the main contractor's compound, a number of smaller satellite offices and lay-down areas will be required at key locations such as where the new structures will be built, 'licence' and 'easement' locations for construction are indicated on Figures 5.29 – 5.44. The total area of land required under licence for construction is 26ha.

Surface water run off

5.13.20 Temporary drainage networks will be constructed to attenuate and treat surface water flows from the working areas. At each watercourse, temporary bunding, silt

traps and potentially chemical dosing plant will be installed to treat and regulate surface water run-off.

Services

5.13.21 A number of service diversions will be required including the following major diversions:

- 600mm ductile iron water main west of the Hazel Grove to Buxton Railway Line.
- Low voltage, high voltage, and telecommunications cables running alongside the A523 Macclesfield Road.
- Oil pipeline and 700mm cast iron water main close to the proposed new link connecting the proposed scheme to Chester Road.
- 180mm low pressure gas mains and high voltage electricity cables along the B5102 Woodford Road where the new junction linking to the A555 will be constructed.
- 225mm cast iron water main and 4 no. high voltage electricity cables west of the A555 / Wilmslow Road junction
- 450mm medium pressure and 300mm polyethylene gas main running centrally through the Wilmslow Road / A555 dumb bell junction
- 6 no. extra high voltage and 2 no. low voltage cables crossing Styal Road to the electricity sub-station located adjacent to the airport rail spur
- 250mm medium pressure gas main and 180mm low pressure gas main running along Styal Road

5.14 Environmental mitigation

5.14.1 Design proposals which have been included as part of the environmental mitigation for the proposed scheme include:

- landscape proposals comprising mounding, earthworks and planting;
- ecological measures comprising habitat creation, mammal tunnels and design features to continue ecological corridors; and
- measures to mitigate traffic related noise.

Landscape proposals

5.14.2 The landscape proposals comprise a combination of earthworks and planting. They are focused on:

- integration of the proposed scheme and its associated traffic into the local landscape;
- mitigation where important character forming components will be removed to accommodate the proposed scheme;
- mitigation of visual impacts for specific receptors where the assessments have indicated there could otherwise be impacts of relatively high order.

Screen mounding

5.14.3 Where screen mounding is proposed it is used in conjunction with proposed planting. Mounding will typically be 2-5m high with 1 in 3 side slopes graded out to cutting slopes or embankment profiles at either end. The location of the proposed screen mounding and an explanation of its purpose is provided in Table 5-7.

Table 5-7 Screen mounding locations

Location	Reason
Extensive screening at the Eastern end of proposed scheme at the tie-in with the re-aligned A6.	To mitigate visual impacts to properties associated with the existing A6 in High Lane and Hazel Grove
Extensive mounding adjacent to eastbound carriageway between Old Mill Lane and the A523 Macclesfield Road.	To mitigate visual impacts to properties on Mill Lane, Old Mill Lane, Millbrook Ford, Ashbourne Road, Baslow Drive and Darley Road.
Extensive mounding adjacent to the eastbound carriageway from the south-western boundary of Norbury Hall to approximately 150m before the crossing at Mill Hill Hollow.	To mitigate visual impacts on properties associated with Norbury Hall, Sheldon Road, Longnor Road, Elton Drive, Wensley Drive, Malton Drive and Chester Road,
Mounding adjacent to the eastbound carriageway parallel with Mill Hill Farm to the southern edge of Hill Green Farm.	To mitigate visual impacts on properties associated with Woodford Road and Lower Park Crescent,
Mounding adjacent to the westbound and eastbound carriageways from west of Woodford Road to the West Coast Mainline.	To mitigate visual impacts on Bramhall Golf Club to the north and properties to the south.
Mounding on the westbound carriageway between the Manchester to Buxton railway line and the eastern edge of Moorend Golf Course including the junction tie-in with Chester Road.	To mitigate visual impacts on properties associated with Chester Road and the Western Edge of Poynton.

Location	Reason
Extensive mounding adjacent to the westbound and eastbound carriageway from the Junction of Wilmslow Road Junction with the A555 to the West Coast Mainline	To mitigate visual impacts on properties close to the proposed Wilmslow Road / A555 junction and on Styal Golf Course and its associated buildings.

Planting

5.14.4 Planting proposals include the introduction of woodland, scrub, stands of open tree planting, species rich hedgerows along the highway boundary and grassland with semi-natural characteristics, Combinations of planting types have been used to reflect and complement existing components and compositions. The proposals are illustrated in Figures 5-29 to 5-44. A key indicating the various planting types proposed is provided in Figure 5-29. Mixes for the various woodland, scrub, hedgerow and tree planting types will generally be based on the use of native species. They will be of local provenance where woodland planting is proposed to replace ancient woodland which will be lost at Carr Wood.

A6 – A555 (Figures 5-29 to 5-38)

5.14.5 New blocks of woodland planting will be introduced along the western and eastern edges of the new A6 realignment and either side of the main alignment up to the new bridge on the existing A6 (Figures 5.29 and 5.30). Species-rich grassland will be established in association with proposed ponds north of the new section of the A6.

5.14.6 West of the bridge dense woodland planting is proposed to compensate the loss of existing woodland and enclose the Mill Lane Pedestrian / Cycle Bridge (Figure 5.31). Continuing west, woodland planting will give way to dense linear belts of scrub with intermittent tree planting on proposed roadside mounding to enhance the lower level screening provided by the mounding and establish a link with existing woodland along the brook. South of the dual carriageway amenity grassland will be planted between the road and Norbury Brook.

5.14.7 Between the A523 Macclesfield Road and Mill Hill Hollow, the dual carriageway will be enclosed by woodland planted on the proposed mounding adjacent to the eastbound carriageway and woodland which will extend the existing planting along the Norbury Brook south of the road (Figure 5.32). The woodland north of the road will reinforce the screening provided by the proposed roadside mounding. The woodland south of the road will enclose a series of open elongated glades with species-rich grassland through which the proposed bridleway linking the A523 and Mill Hill Hollow will be routed.

5.14.8 Where the dual carriageway crosses over the Lady Brook and breaks through the woodland enclosing the watercourse below Mill Hill Hollow dense woodland will be planted adjacent to both sides of the road. The objective is to reduce the severance of the existing woodland and enclose the complex arrangement of bridge, footpath diversions and attenuation pond where it is cut into the sloping ground rising from the confluence of the Lady Brook, Norbury Brook and Poynton Brook.

5.14.9 West of the crossing, the highway boundary will be defined by newly planted hedgerows to reinstate the enclosure of the fields which will be severed by the alignment of the road. The cutting slopes will be grassed. East of Hill Green woodland panting will be introduced onto the embankment slopes where the accommodation bridge provides continued access for FP 31 over the dual carriageway and will be continued on the false cutting and cutting slopes as the road approaches Woodford Road (Figure 5.35). This will establish a woodland framework east of the settlement and screen traffic on the dual carriageway from the properties located along the Woodford Road.

5.14.10 West of Woodford Road large-scale woodland planting on the upper part of the extended approach embankment at the crossing of the West Coast Main Line will mask the scale of the embankments (Figure 5.36). In combination with the false cuttings proposed along both sides of the dual carriageway the woodland will also screen traffic on the elevated road from view for users of the Bramall Golf Course and residents and drivers on Woodford Road to the south.

5.14.11 The woodland planting will be continued on the roadside screen mounds adjacent to the westbound carriageway as the road descends from the bridge over the railway. The embankment slopes to the north side of the road will be planted with dense scrub and tree planting as the road passes south of the oil terminal.

5.14.12 Dense areas of scrub and tree planting will be introduced at the extended junction on the approach to the A5102 Woodford Road to establish a matrix of planting which will frame and contain the complexity of the junction arrangement whilst complementing the form of existing planting associated with the area (Figure 5.38). The scale of the planting will increase as the dual carriageway approaches the retaining walls at the Woodford Road junction with woodland being

A555

5.14.13 Planting along the existing A555 will involve the introduction of narrow woodland belts adjacent to the new west facing slip roads and shrub planting between the dual carriageway and slip roads as the road emerges from beneath the Woodford Road bridge. The woodland planting will screen and frame the Woodford Recreation Ground to the north and screen properties on Jenny Lane to the south from views of traffic in the cutting and to the west along the dual carriageway. Scrub and tree

planting will also be introduced where the construction of the cycle path adjacent to the eastbound carriageway will involve the removal of some of the dense scrub and woodland edge which is well established along the roadside.

5.14.14 Linear belts of dense shrub planting with groups of trees will be planted at the top of the slip roads linking the A34. This form of planting will also be planted on the eastern slopes of the A34 as it approaches from the north to reinstate planting lost during the localised widening of the A-road (Figure 5.39).

A555 to Ringway Road West

5.14.15 West of the A555 as far as the Styal Railway planting will comprise a combination of substantial areas of dense scrub with groups of intermittent tree planting, occasional linear belts of woodland and open areas of species-rich grassland associated with a series of new ponds (Figures 5.41 and 5.42). This will introduce a substantial corridor of diverse habitat types and significant landscape component in the area. The corridor will define the northern boundary of the re-organised Styal Golf Course and combine with proposed roadside mounding to screen the road and its traffic from the urban edge of Heald Green and properties to the south on the fringe of Handforth.

5.14.16 West of the railway planting comprises a simple definition of the corridor with boundary hedgerows as the road becomes part of an ad-hoc mix of land use associated with the rail infrastructure and the airport approaches.

Agricultural handback

5.14.17 There are a number of areas which will be returned to agricultural grassland to enable the areas to be handed back to the landowner following completion of the works. The principal areas are:

- between the A6 re-alignment and Old Mill Lane (Figures 5.30 to 5.32);
- south of Hill Green (Figure 5.33);
- east and west of the WCML (Figure 36);
- in the vicinity of the Chester Road Link (Figure 37);
- on the approach embankments to the Styal Railway (Figure 5.42);and
- in the vicinity of Moss Nook (Figure 5.43)

Ecological mitigation

5.14.18 Proposals focused on mitigation of ecological impacts, in addition to those associated with planting described above include bat-hops, new ponds, sett replacement for badgers and mammal underpasses. The location and form of the proposals are shown in detail in Figures 11.18 to 11.25.

Bat hop overs

5.14.19 Trees and scrub will be planted on bat commuting lines to provide "hop overs", which are high points of vegetation close to the roadside. Bats flying along these commuting lines echo-locate the taller trees and vegetation which forces them to fly up and over the carriageway, avoiding potential collision with moving vehicles.

New ponds

5.14.20 New ponds will be designed to maximise ecological value, with each having a profile to maintain open water whilst providing areas for aquatic plants to root and grow. Planting will ensure an ecologically valuable flora develops.

Sett replacement

5.14.21 Two new badger setts will be constructed in advance of the main construction works as part of the preliminary environmental mitigation works.

Mammal tunnels

5.14.22 A number of tunnels will be built under the road to provide habitat connectivity for a variety of wildlife including mammals and amphibians. The tunnels will be accompanied by planting and fencing either side of the tunnel which will prevent animals from crossing the road and direct them towards the tunnel.

Noise mitigation

5.14.23 The proposed roadside mounding described in Table 5-7 will have the effect of reducing traffic related noise. In addition, low noise surfacing is proposed along the new section of dual carriageway. The assessment of traffic-related noise has also identified a number of locations where it has been concluded additional mitigation to that which will be provided by the mounding should be included and locations where mounding is not proposed but noise mitigation is to be provided. In these locations the proposals provide for the noise barriers. Table 5-8 identifies the relevant locations and the length and height of barrier proposed.

Noise barriers

Table 5-8 Noise barriers

Location	Height	Length	Carriageway
Buxton Road	1.8	178	Off Scheme
Woodford Road, Poynton	1.8	403	Eastbound
Woodford Road, Poynton	1.8	392	Westbound
Mill Hill Hollow	1.8	255	Eastbound

Location	Height	Length	Carriageway
Mill Hill Hollow	1.8	154	Westbound
W of Macclesfield Road	1.8	396	Eastbound
S of Old Mill Lane	3.0	101	Eastbound
E of Macclesfield Road	3.0	545	Eastbound
E of Woodford Road (Queensgate)	1.8	1034	Eastbound
E of Woodford Road (Queensgate)	1.8	280	Westbound
N of Styal Golf Course	1.8	519	Eastbound
N of Styal Golf Course	1.8	574	Westbound
Ringway Road	1.8	121	Eastbound
S of Old Mill Lane	1.8	81	Eastbound

Construction Environmental Management Plan (CEMP)

5.14.24 Implementation of the mitigation measures identified in Chapter 18 – Environmental Commitments and other statutory measures and protocols which will be adopted during construction as part of the detailed construction methods will be formalised and enforced by way of a Construction Environmental Management Plan (CEMP) for the contract. A draft CEMP has been prepared and can be seen in Appendix 5A. It describes the mitigation measures, procedures and processes the contractor will be required to develop in a detailed plan and which the contractor will be required to agree with the relevant local authorities in advance of the commencement of construction.

5.14.25 The CEMP will include:

- a description of each specific element of the construction programme along with the mitigation which will be incorporated to eliminate or reduce the risk of adverse environmental impacts.
- the relevant obligations which are placed on the construction contractor in respect of their commitments to implement the necessary mitigation measures as part of the construction contract, including liaison with third parties and relevant statutory and non-statutory bodies.

5.14.26 The contractor will also be required to develop a detailed Site Waste Management Plan. A draft form that the detailed plan will be required to take is provided in Appendix 5B.

6 Consultation

6.1 Overview

6.1.1 Information relating to the nature and status of the existing environment associated with the proposed scheme, views relating to the preferred development option and views concerning the focus of the studies and assessments which should form the subject of the ES have been sought from a wide range of consultees.

6.1.2 This has involved meetings and consultation requests to statutory and non-statutory bodies, as well as with other stakeholder groups and the general public.

Objectives

6.1.3 Consultation has been undertaken with the purpose of:

- collecting, verifying and obtaining available environmental data relevant to the assessed study area;
- seeking comment relating to the assessment process, the scope of the ES and the methods of assessment to be adopted;
- conducting consultation with all stakeholders and the public and to ensure all audiences have an opportunity to have their say;
- demonstrating what the key issues are, enabling stakeholders to maintain an accurate understanding of the proposed scheme;
- providing feedback to all taking part, evidencing the impact of consultation outcomes on a revised proposed scheme; and
- discussing mitigation requirements and measures.

Outline Consultation Programme

6.1.4 Consultation has been undertaken throughout the development of the proposed scheme which previously included the A523 Poynton Bypass, the route from the A6 Hazel Grove to M60 Bredbury, the Stepping Hill Link Road and the proposed scheme. This previous consultation has comprised the following:

- initial engagement with statutory and non-statutory consultees was undertaken in March 2003;
- views and opinions on the proposed scope of the ES was sought from statutory and non-statutory consultees in July 2004 (including a scoping forum);

- a series of technical consultations with various statutory consultees was undertaken between 2004 and 2006; and
- a programme of public engagement was undertaken between 2003 and 2006.

6.1.5 The development of the proposed scheme was put on hold at the end of 2006. In 2009 design and planning work re-commenced with amendments to the design and alignment. The proposed scheme would now be progressed in phases with the first phase the proposed scheme Consultation recommencing in 2009 as follows:

- statutory and non-statutory consultees were re-engaged in 2009 to update them with the new proposals;
- views and opinions from statutory and non-statutory consultees were sought in 2010 and 2012/13 on the revised scope of the ES;
- a series of forums for statutory and non-statutory consultees and interest groups were held between March 2012 and July 2013;
- specific consultation with affected land owners was undertaken throughout the autumn / winter of 2012 and spring / summer 2013;
- A series of Local Liaison Forums were held during January 2013 and May to July 2013; and
- Public exhibitions were undertaken between November and December 2012. Further Public consultation and exhibitions took place in June and July 2013 which sought further views on the emerging preferred scheme having taken on board the views from the previous events.

6.2 Summary of consultation

6.2.1 A summary of the responses obtained from the consultation for the proposed scheme since re-engagement in 2009 can be found in Appendix 6A.

Initial Engagement

6.2.2 In March 2003, a number of statutory and non-statutory bodies were approached and asked to provide background information relevant to the preferred corridor for the proposed scheme. The information was used to inform the scoping exercise for the ES. Consultees were also invited to provide initial opinion on developing a relief road within the preferred corridor.

Consultation on Scoping

6.2.3 The various statutory and non-statutory bodies that were initially engaged were re-approached in July 2004 to comment on the proposed scope of assessment for the ES. In addition to the range of written responses, a scoping consultation forum was

held in July 2004 to address any questions on the proposed scope of assessment. A follow-up summary letter was then issued to all respondents.

Technical Consultations

6.2.4 A series of technical consultations were undertaken between 2004 and 2006 with various statutory and non-statutory consultees to inform the preparation of the ES, agree detailed methods of assessment, discuss potential impacts, highlight any development opportunities and develop suitable mitigation strategies. These included a number of specific groups and forums focussing on vulnerable road users, nature conservation interests, tunnel design and construction safety, landowner issues and health impacts.

General Public Engagement

6.2.5 In October 2003 the SEMMMS partner authorities issued 250,000 leaflets to members of the public seeking people's opinions towards the principle of the proposed scheme and the proposed route options.

6.2.6 A second set of leaflets were then issued in November 2003. These contained provisional scheme information as well as feedback from the initial leaflet distribution. The leaflets also provided information on a series of public consultations that occurred in November 2003.

6.2.7 Prior to the scheme being put on hold a number of further consultations were planned, some of which were partially or fully completed. These included further public exhibitions and leaflet drops, advertisements, visual media presentations and the creation of a dedicated scheme phone line. Further consultation with the public, stakeholders, landowners and elected members was also planned.

6.2.8 The Project Team has established a dedicated website (www.semmms.info). The website has served to support the overall consultation strategy for the project, providing an additional means by which statutory bodies, the public and private stakeholders have been given access to scheme updates and announcements.

Re-engagement

6.2.9 In October 2009 following the recommencement of the planning and design of the revised proposed scheme, the statutory and non-statutory bodies previous consulted in 2003 and 2004 (plus a number of new organisations) were re-engaged. Letters and outline scheme drawings of the revised proposed scheme were issued inviting comment and opinion on the potential effects of the current proposals as well as any updated information on the baseline environment.

Revised Scoping Consultation

6.2.10 In February 2010 opinion on the proposed scope of assessment presented in the Scoping Report was sought from the statutory and non-statutory bodies. In accordance with the EIA Regulations, statutory organisations were consulted by SMBC as the competent authority in order to inform the Scoping Opinion.

Stakeholder Forums

6.2.11 A number of issue specific forums were organised with selected interested consultees. The following interest group forums were held:

- ecological forum (7th March 2012);
- vulnerable road user groups forum (28th March 2012, December 2012 and 12th June);
- historical forum (10th May 2012);
- environmental forum (17th December 2012 and 19th June 2013); and
- health impact assessment forums (February 2013).

6.2.12 At these forums, invited consultees were updated on the development of the proposed scheme since they were previously contacted, and a summary of the identified environmental constraints and relevant mitigation proposals presented.

6.2.13 Invited consultees were given the opportunity to discuss the findings to date within groups, present any comments and ask questions. The next steps in the process were then outlined and the process summarised. The forums were also used as an opportunity for the assessment team to gather any additional local knowledge which could be used in the various environmental assessments.

Landowners and Other Affected Parties

6.2.14 A series of detailed consultations were undertaken with individual landowners, whose land would be impacted by the proposed scheme.

6.2.15 Other potentially affected parties, such as local schools were also consulted with. Further details and assessment can be found in Chapter 15 – Community and Private Assets.

Phase 1 Consultation: Leaflet Distribution

6.2.16 Two leaflets were distributed to properties within the area surrounding the proposed scheme and made available at public venues across Stockport, Manchester and Cheshire East. A brief summary of each leaflet is given below:

- Leaflet one – this leaflet was distributed prior to the start of the consultation period, with the purpose to raise awareness of the proposed scheme.
- Leaflet two – the second leaflet was a call to action for proposals. It also provided further information about the proposed scheme and the six junction options. A response form included questions covering overall support and preferences on the layout of the six junctions along the proposed route. It also provided respondents with the opportunity to comment on the scheme.

6.2.17 The postal distribution of the leaflets covered an area of approximately 85,000 properties and businesses adjacent to the proposed Scheme.

Phase 1 Consultation: Public Exhibitions

6.2.18 A series of public exhibitions were held from 3rd November 2012 to 12th December 2012 at the following locations:

- Disley Community Centre;
- High Lane Village Hall;
- Poynton Civic Hall;
- Hazel Grove Civic Hall;
- Woodford Community Centre;
- The Bramley Centre, Bramhall;
- Heald Green Civic Hall;
- Handforth Dean Community Centre; and
- Forum Centre, Wythenshawe.

6.2.19 Exhibitions lasted for 2 days at each location, and were advertised via local radio, newspaper adverts, notifications on the website and leaflet drops to local residents. The purpose of the exhibitions was to engage with local residents and interested members of the public, with staff present at each exhibition to answer any questions.

Phase 1 Consultation: Local Liaison Forums

6.2.20 Local Liaison Forums (LLF) were undertaken in areas most affected by the proposals, these are listed below:

- LLF 1. Hazel Grove - Buxton Road Area;
- LLF 2. Hazel Grove - Mill Lane Area;
- LLF 3. Hazel Grove - Norbury Hall Area;
- LLF 4. Poynton - London Road South Area;

- LLF 5. Poynton - Mill Hill Farm Area;
- LLF 6. Poynton - Glastonbury Drive Area;
- LLF 7. Poynton - Woodford Rd / Chester Road Area;
- LLF 8. Bramhall - Woodford Road Area;
- LLF 9. Bramhall - Albany Road Area;
- LLF 10. Heald Green - Bolshaw Road Area;
- LLF 11. Handforth - Clay Lane Area;
- LLF 12. Moss Nook - Styal Road Area; and
- LLF 13. Queensgate Primary School.

6.2.21 These meetings were considered to promote a two-way dialogue between the local community, the Local Authorities and eventually, the appointed contractor. The LLF is considered a fixed element of ongoing consultation for the proposed scheme.

Local Planning Authority (LPA) Scoping Opinion 2012/13

6.2.22 A letter was sent to LPA's (SMBC, CEC and MCC) to seek confirmation that they considered the Scoping Opinion provided by SMBC on 5th May 2010 to be still valid in light of updates to the proposed scheme design.

6.2.23 The three LPA's confirmed that they considered the Scoping Opinion remained valid.

Phase 2 Consultation: Leaflet Distribution

6.2.24 Leaflets and response form was distributed to properties within the area surrounding the proposed scheme. The postal distribution of the leaflets was to an area of approximately 85,000 properties, including residential and business properties.

6.2.25 The leaflet was a call to action for the scheme. As well as providing summary feedback from the Phase One consultation, further information about the emerging preferred scheme was provided. A response form was included with the leaflet along with an enclosed FREEPOST envelope. The self-completion response form included questions covering overall opinion on environmental and traffic/ access topics. A total of 4,898 postal response forms were received up to and including 26th July 2013.

Phase 2 Consultation: Website

6.2.26 Information about the consultation was provided on the website www.semmms.info. As well as a source of information, the website provided an opportunity for respondents to directly submit their comments by completing an online response form and also via an interactive map. 471 online questionnaires were completed during the Phase Two consultation period.

Phase 2 Consultation: Public Exhibitions

6.2.27 A total of nine exhibitions were held between 13th June and 4th July 2013. The primary purpose of the exhibitions was to provide attendees with an opportunity to find out more about the feedback from the Phase One consultation and about the emerging preferred scheme. There was an opportunity to discuss and provide feedback to members of the Project Team. Leaflets were provided at the exhibitions and attendees were encouraged to comment using the response forms.

Phase 2 Consultation: Local Liaison Forums

6.2.28 The same LLF groups were used for Phase 2 consultation as were used in Phase 1. An additional LLF area has been added which includes properties in the vicinity of the A34/ Stanley Green junction. The Phase Two LLFs focussed on:

- providing feedback from the Phase One consultation;
- informing residents of the emerging preferred scheme; and
- obtaining further comments on the proposals in the LLF areas.

7 Scoping and Introduction to the Assessments

7.1 Scoping of Potential Impacts

7.1.1 An underlying principle of the EIA process is that it should be focused on environmental impacts associated with a proposed development project which have the potential to result in a significant effect on the environment. The proposed scheme has, accordingly, been subject to a process of scoping to determine those impacts which should be addressed and the form that the assessments should take.

7.1.2 The Design Manual for Roads and Bridges, Volume11, Section 3 (DMRB) provides a framework for identifying and considering potential impacts associated with major road projects. Impacts are identified under a range of environmental aspects as indicated below;

- air quality;
- cultural heritage;
- landscape effects;
- ecology;
- geology and soils;
- noise;
- effects on all travellers;
- community and private assets; and
- road drainage and the water environment

7.1.3 The framework has been adopted by the assessment team for the proposed scheme as the basis for examining and establishing the scope of the assessments which are reported in this ES. The results of the team's scoping exercise are available in Volume 3 Appendix 7A - SEMMMS A6 to Manchester Airport Relief Road Environmental Scoping Report (February 2010)

7.1.4 Regulation 13 of the Environmental Assessment Regulations makes provision for an applicant to request a scoping opinion from the planning authority indicating the information which should be included in an ES for a proposed EIA development project.

7.1.5 A request for such an opinion was submitted to SMBC in February 2010. The request was supported by the scoping report which comprised the initial appraisal of impacts potentially associated with the construction and future use of the proposed scheme

which could have a significant effect on the environment. It also included a description of the surveys and assessments which the applicants considered should form the focus of the ES.

7.1.6 A scoping opinion in response to the request was received from SMBC in May 2010, a copy of which is provided in Volume 3 Appendix 7B.

7.1.7 Following modifications to the proposed scheme a further request was issued to SMBC in October 2012 seeking clarification as to whether any further potential impacts, studies and assessments should be included within the scope of the project ES in light of the modifications to the proposed scheme. The request was accompanied by a copy of the scoping report issued with the original request for an opinion in 2010. The Council responded in November 2012 confirming the original scoping opinion remained valid.

7.1.8 Copies of the 2010 scoping report prepared by Mouchel and the scoping opinion received from SMBC in 2010 were also sent to CEC and MCC in April 2013 with a request that the two Councils consider the opinion received and comment accordingly.

7.1.9 MCC responded in April 2013 indicating it was the council's view the 2010 scoping opinion was valid. The council also provided information correcting two points of factual error contained in the scoping report.

7.1.10 CEC responded in May 2013 indicating it was the council's view the 2010 scoping opinion was valid. The council also indicated it was its view that three assessments relating to air quality, contaminated land and traffic-related noise should be included in the scope and newly published guidance should inform the landscape and visual impact assessments.

7.1.11 Following consideration of the scoping opinions and responses it was concluded by the applicants and their assessment team the surveys and assessments described in the following sections should be included in the ES.

7.2 Air Quality (Chapter 8)

7.2.1 Potential impacts recognised as being associated with major road schemes in Volume 11, Section 3, Part 1 (HA207/07) of the DMRB and identified in the scoping report relate to:

- nuisance associated with dust arising from construction activity;
- potential impacts on local air quality associated with construction vehicle movements on the local road network during construction of the proposed scheme;

- potential impacts on local air quality associated with changes in concentrations of traffic-related pollutants, where the introduction of the proposed scheme will have an effect on the volumes of traffic and the patterns and characteristics of use within the local road network; and
- potential impacts on regional emissions associated with changes in volumes of traffic and the patterns and characteristics of use within the local road network.

7.2.2 The proposed assessments were confirmed in the councils' scoping opinions and responses. With regard to local air quality, the scoping report made particular reference to Air Quality Management Areas (AQMAs) and indicated the extent of the AQMAs which would be considered (Appendix 7A - Figure 2a). CEC in its response identified Disley as an area which should be included in that part of the assessments. The area has accordingly been included in the assessment relating to local air quality reported in Chapter 8.

7.3 Cultural Heritage (Chapter 9)

7.3.1 Volume 11, Section 3, Part 2 (HA208/07) of the DMRB sub-divides cultural heritage into three areas of interest for the purposes of undertaking and presenting assessments for major road schemes; archaeology, built heritage and historic landscapes. It is, of course, the case that sites and features individually or collectively do not always in reality fit conveniently into these three categories and that the understanding of cultural heritage assets and their value involves an appreciation of them and their relationships, irrespective of the categorisation. Sub-division as recommended in the guidance does however, provide a useful way of collating and presenting the information and has been adopted for the purposes of identifying and undertaking the assessments for the proposed scheme. All three areas of assessment were identified as being required in the scoping report and confirmed as being appropriate in the scoping opinion and responses.

7.3.2 Preliminary studies relating to the planning, design and assessment of the proposed scheme were focused on a study area extending some 300m either side of the preferred alignment. Consideration was also given to assets beyond this where it was recognised the relationship between the dual carriageway and its associated traffic and the asset may have an impact on the setting of the asset. The location of assets identified against these two criteria, which were consequently included in the initial scoping report and confirmed in the scoping opinion, are indicated in Figure 2b in Volume 3 Appendix 7A, Figure 2a.

7.3.3 Preliminary assessment of the identified assets, as the design for the proposed scheme was refined and finalised, indicated there will be no impact on many of the assets or their setting and that these would not require further consideration. These

assets are accordingly not considered in the detailed assessment reported in Chapter 9. Their location is, however, indicated in Figures 9.1 -9.8 in Volume 2 and the name and nature of the asset along with references relating to designation is scheduled in the gazetteer in Volume 3, Appendix 9A.

7.4 Landscape Effects (Chapter 10)

7.4.1 Volume 11, Section 3, Part 5 defines two areas of potential impact relative to landscape effects, impacts on landscape character and visual impacts. During scoping for the proposed scheme it was recognised the introduction of a dual carriageway and its associated traffic into a landscape typified by open agricultural land, golf courses, linear wooded watercourses, infrastructure in the form of roads, railways and the airport and settlement would have a potentially significant effect on the composition and character of parts of the landscape. It was also recognised there would be the potential for marked changes in views experienced by residents living on the fringe of the conurbation, in settlements such as Poynton, Woodford and Handforth and in small groups of houses and individual properties by virtue of the proximity of the proposed scheme.

7.4.2 It was accordingly concluded in the scoping report and confirmed in the scoping opinion and responses, that the ES should include an assessment of impacts on landscape character and on views experienced by residents, visitors to the area and users of the countryside.

7.4.3 An preliminary assessment to determine the potential impact on the landscape character and views from the Peak District National Park, which lie approximately 3.5km to the east of the proposed scheme, was undertaken and comprised an appraisal of views of the proposed scheme corridor. It was concluded that impacts to the landscape character of and views from, the Peak District National Park would not require further assessment as the combination of the landscape within which the proposed scheme would be constructed along with the intervening distance was considered to negate significant effects.

7.4.4 CEC in its response made reference to the publication of updated guidance relating to landscape and visual impact assessment (Guidelines for Landscape and Visual Impact Assessment – Landscape Institute and Institute of Environmental Management and Assessment). The assessments reported in chapter 10 have been informed by the 2013 guidance referred to by the council.

7.5 Ecology and Nature Conservation (Chapter 11)

7.5.1 Volume 11, Section 3, Part 4 of the DMRB provides guidance on the assessment of sites designated for their nature conservation value, habitats and fauna in the context of potential impacts associated with major road projects.

7.5.2 Desk-based studies and habitat surveys undertaken during the preliminary planning and design stages for the proposed scheme established there are no European or nationally designated sites in the vicinity of the proposed scheme which could be potentially affected.

7.5.3 One statutory and six non-statutory sites which are recognised as being of nature conservation value were identified within an area of search extending for 1km from the proposed scheme alignment. As the design for the proposed scheme was refined and finalised it was established that the Norbury Brook Site of Biological Interest (SBI) could be potentially subject to impact. It was recognised that at Norbury Brook SBI there would be a direct impact. No such direct impact or linkages with the potential to have an impact on any of the six other sites were identified. The detailed assessments reported in chapter 11 have accordingly been limited to the Norbury Brook SBI.

7.5.4 The scoping report indicated, and the scoping opinion confirmed, the need for a Phase 1 habitat survey to be conducted in accordance with the Joint Nature Conservation Committee (JNCC) standard methodology for habitat survey. The survey, which was undertaken in June 2011, identified eleven habitat types which would be potentially subject to impact by virtue of the construction or future presence of the proposed scheme. A copy of the report detailing the findings of the Phase 1 habitat survey is available in Volume 2, Appendix 7A.

7.5.5 Of the eleven, five were identified as being of biodiversity interest of a local or higher biodiversity interest in a geographic context and have been subject to detailed assessment as reported in Chapter 11. The remainder were deemed not to be of sufficient biological value such that impacts on them would be likely to have a significant effect. The five types considered in Chapter 11 comprise:

- semi-natural broad-leaved woodland;
- semi-improved grassland;
- running water;
- species-rich hedgerows; and
- species-poor hedgerows

7.5.6 Open water in the form of a network of ponds found throughout much of the proposed scheme corridor were also identified for survey and assessment, primarily in relation to their potential role as host to great crested newts (GCN).

7.5.7 The scoping opinion indicated that surveys should also be undertaken to determine the presence of invasive plant species and Japanese knotweed and Himalayan balsam in particular. The surveys have been undertaken and are reported in Chapter 11.

7.5.8 The scoping report identified surveys and assessments relative to the following fauna:

- badgers;
- bats;
- otters;
- great crested newts;
- breeding birds;
- wintering birds; and
- habitat potential for invertebrates

7.5.9 The scoping opinion received from SMBC noted that surveys relating to GCNs should be undertaken up to 500m in the vicinity of know concentrations and/or where there is good terrestrial habitat connectivity with ponds. The surveys were extended to cover the suggested study area and are reported in Chapter 11.

7.5.10 In the light of consideration of desk study records, the results of habitat surveys and work on site by ecologists, it became apparent that the study area supported common, widespread bird species of limited ecological value. Habitat to support more valuable bird species was not present, and thus breeding and wintering bird surveys deemed unnecessary and not undertaken. The information gained the through desk study records was sufficient to inform the assessment in relation to birds. As exceptions to this were kingfisher, where surveys and consultation to identify nesting habitat along watercourses was undertaken, and barn owl, where a study of trees along the route and consultation was undertaken to inform the assessment.

7.5.11 In the case of invertebrates, no suitable habitats were identified during the Phase 1 Habitat Survey and no further studies were undertaken.

7.5.12 The scoping report also indicated that assessments would be considered for the following species subject to the extended Phase 1 habitat survey and further consultation with Natural England:

- common toad;
- white-clawed crayfish survey;
- water vole;
- deer;
- brown hare;
- European hedgehog; and

- reptiles

7.5.13 The scoping opinion received from SMBC indicated the ES should be informed by:

- an assessment of risk relative to common toad, to be undertaken in conjunction with the proposed assessment of habitat potential for GCN;
- camera trapping to establish the approximate status of hedgehog populations within the vicinity of the proposed scheme;
- inclusion of brown hare by way of target note recording relating to sightings and habitat potential during the extended Phase 1 habitat survey, it being accepted the establishment of numbers would be problematic in light of the low density of populations of the species; and
- surveys for, water vole and barn owl in addition to the three studies identified above.

7.5.14 The scoping opinion and responses did not indicate a need for assessments relating to white-clawed crayfish and deer.

7.5.15 In relation to white-clawed crayfish, reptiles, deer and water vole, the preliminary data reviews, surveys undertaken along the proposed scheme corridor in 2003 and 2007 and the Phase 1 Survey undertaken in 2011 provided no evidence of the presence of the species or of habitats which would be conducive to the establishment of populations of the species and no further studies were undertaken.

7.5.16 In the case of barn owl, records of sightings and nesting potential relative to trees were recorded during the suite of surveys which were undertaken for habitats and other species.

7.5.17 In relation to common toad, hedgehog and brown hare the survey measures proposed in the scoping opinion were adopted.

7.5.18 In the case of hedgehog, camera trapping was attempted over a 10 day period in August 2011 where five camera traps were deployed. Two of the camera traps were stolen, and the remaining three captured no evidence of hedgehog. It was concluded further survey would not be undertaken. It was, however, recognised that suitable habitat for hedgehog occurs throughout the study area and precautionary landscaping and mitigation proposals were identified as described in chapter 11.

7.5.19 The scoping opinion received from SMBC noted reference to ridge and furrow in the context of the proposed cultural heritage assessments and suggested that detailed inspection of such areas should be undertaken to establish their value as potential habitats of importance. Preliminary review of these areas established that they comprise pasture where there is no evidence on the ground of the historic form of cultivation and hence the habitat potential referred to.

7.6 Geology and Soils (Chapter 12)

7.6.1 The scoping report identified two areas of assessment specific to geology and soils:

- an assessment of potential pollution risk related to disturbance of contaminated sites located in the vicinity of the proposed scheme; and
- an assessment of potential impacts on sites of geological interest located in the vicinity of the proposed scheme.

7.6.2 Chapter 12 also provides a detailed description of the baseline geology and soils associated with the proposed scheme corridor and wider area, information which is relied on by other topics of assessment such as landscape character, cultural heritage, drainage and the water environment and ecology.

7.6.3 CEC in its scoping response confirmed the need for assessment of potential pollution risk related to disturbance of contaminated sites.

7.6.4 As the planning and design for the proposed scheme was developed and following further consultation with Manchester Geological Association, it was established that local sites of geological interest at Norbury Brook are located outside of the proposed working areas and that further detailed assessment would not be required.

7.7 Noise and Vibration (Chapter 13)

7.7.1 Potential impacts recognised as being associated with major road schemes in Volume 11 of the DMRB and identified in the scoping report relate to:

- construction-related noise and vibration, both within the vicinity of the working areas required for the implementation of the proposed scheme and with haul routes and access routes likely to be used by traffic transporting materials and equipment to and from the site; and
- traffic-related noise and vibration associated with use of the proposed scheme once it is open to use. The report indicated the assessment for traffic-related noise would be focused on sections of road where it was predicted there would be changes in volumes of traffic of +25% or -20% (as defined in the DMRB) within 2km of the proposed scheme.

7.7.2 SMBC confirmed the assessments in its scoping opinion but noted that consideration should be given to locations outside of 2km where there might be similar orders of change. CEC in its scoping response supported SMBC's opinion. In light of the comments, areas beyond 2km were further reviewed and assessments were included where locations were identified that met the DMRB criteria.

7.8 Effects on all Travellers (Chapter 14)

7.8.1 The proposed scheme involves potential severance of local roads and of public rights of way comprising footpaths, bridleways, cycletracks and other non motorised user routes with consequent potential impacts on access and amenity value on local residents, ramblers, equestrians and cyclists. The proposals also provide for diversion of severed Public Rights of Way (PRoWs) and the introduction of a combined cycletrack and footpath along the entire length of the proposed dual carriageway corridor.

7.8.2 The introduction of new dual and single carriageway designed to modern standards can also result in benefits relative to driver stress where the new road offers an alternative to older existing roads with design characteristics and access arrangements that have evolved over time and at times of lower demand.

7.8.3 The scoping report accordingly indicated that the following assessments should form part of the information provided in the ES:

- an assessment of predicted severance and affects on amenity value for users of local roads and other PROWs;
- an assessment of driver stress relative to existing roads and the proposed dual carriageway; and

7.8.4 The scoping opinion and responses confirmed the scope of the assessments.

7.9 Community and Private Assets (Chapter 15)

7.9.1 The proposed scheme involves land take and severance of existing activities from a range of existing land uses. The scoping report accordingly identified a need for assessments as indicated below all of which are reported in Chapter 15:

- private land take and demolition of private property;
- loss of land used by the community;
- effects of land take on agricultural land owners; and
- effects on development land.

7.9.2 Development land is defined, for the purposes of the identified assessment, as areas of land for which planning applications have been approved but where construction is in its early stages or has not yet commenced.

7.9.3 SMBC, CEC and MCC in their scoping opinion and responses confirmed the proposed assessments. SMBC noted that they should include an evaluation of

impacts on Woodford Recreation Ground. The recreation ground has been included in the assessments relating to land used by the community in Chapter 15.

7.10 Water Quality and Road Drainage (Chapter 16)

7.10.1 Potential impacts recognised as being associated with major road schemes in Volume 11, Section 3, Part 10 (HD45/09) of the DMRB and identified in the scoping report relate to:

- assessment of construction-related impacts associated with the potential release of sediments and suspended solids and of the risk of accidental spillage of pollutants such as oil, fuel and concrete;
- assessment of potential pollution associated with routine road runoff and discharge to local watercourses;
- assessment of the risk of pollution due to accidental spillage once the road is open to use;
- assessment of increased flood risk due to development within the floodplain, increased runoff rates and volumes from hardstanding areas and proposed channel modifications such as culverting and watercourse realignment; and
- changes in groundwater flows and levels as a result of groundwater drawdown effects from the dewatering of deep cuttings.

7.10.2 The scoping opinion and responses received noted that reference should be made to the potential relationship between contaminated land and controlled waters. The potential impact has been included in the assessments in Chapter 17.

7.10.3 Two further areas of potential impact were identified as the proposed scheme has been refined and modified:

- changes in the geomorphological regime, such as erosion, deposition and channel migration as a result of proposed channel modification such as culverting and watercourse realignment. A reduction in morphological diversity can subsequently impact on water quality and biodiversity; and
- loss of standing waters where the proposed scheme will be constructed through existing ponds;

7.10.4 Both have been included in the assessments relating to road drainage and the water environment.

7.11 Cumulative Impacts (Chapter 17)

7.11.1 Two types of cumulative impacts were considered:

- those which arise from changes caused by a combination of impacts from existing or planned developments and the proposed scheme;
- those which arise from a combination of impacts identified by different environmental disciplines within the ES.

7.11.2 The planned developments that were considered for cumulative impacts were:

- Airport City development;
- the Metrolink extension to Manchester Airport and
- a car park north of Ringway Road West.

7.11.3 The above were considered in relation to Landscape and Visual impacts.

7.11.4 Air quality and noise were not considered when assessing cumulative impacts of planned developments as these have been accounted for in the traffic model and have been included within the Do Minimum and Do Something scenarios. Therefore the cumulative effects of planned developments have already been assessed for these environmental disciplines.

7.11.5 An assessment was undertaken to identify those receptors that would be subject to adverse cumulative impacts as a result of localised deterioration in air quality, increases in traffic-related noise and visual impact as a result of the proposed scheme.

7.12 Materials

7.12.1 During the development and refinement of the proposed scheme it was identified that mineral assets, previous mineral workings, areas of peat and areas of historic mining were not going to be significantly affected by the proposed scheme.

7.12.2 Potential impacts of hazardous materials likely to be associated with the construction of the proposed scheme and the identification of appropriate storage and handling measures will form a part of the CEMP and SWMP (Appendix 5A and 5B).

7.12.3 Hazardous waste generated or invasive species removed during the construction would be stored in a controlled area preventing leaks or potential contamination to receptors prior to being disposed of by a licensed waste contractor at a suitably licensed waste disposal site. As such there would be no significant environmental effects resulting from the generation of hazardous waste during the construction of the proposed scheme.

7.13 Format of the Assessment Chapters

7.13.1 A common format has been adopted for the reporting of the assessments undertaken for each of the environmental aspects investigated.

Scope of the Assessment

7.13.2 This section describes the potential impacts identified during scoping, specific to the aspect reported in the chapter. It explains the nature of the potential impacts, the specific assessments considered appropriate, extent of the study area for each of the assessments and where appropriate, the timescales considered.

Study Areas

7.13.3 The extent of the study area for the assessments varies according to the specific assessment. They have been determined in light of an initial review of the relationship of the proposed scheme to sensitive receptors (people, environmental features or fauna) and the likelihood of consequential impacts. For some assessments, the study area is relatively localised to the proposed alignment. For others it may extend out to the surrounding road network, along watercourses or include more distant communities and environmentally sensitive areas. The extent of the study area for each assessment is described in each assessment chapter.

Timescales

7.13.4 Similarly, the timescales adopted for the assessments vary according to the environmental aspect being considered. For many environmental aspects, the DMRB guidance calls for an assessment based on predicted changes during construction, as the scheme would be opened to use (the Opening Year) and 15 years subsequent to the Opening Year (the Design Year). The latter represents the period generally adopted for forecasting the volumes of traffic using the road and within parts of the wider road network as the basis for designing the proposed scheme. The specific timescale for each assessment is described in each assessment chapter.

7.13.5 The adopted Opening and Design Years for the proposed scheme are 2017 and 2032 respectively.

Resources and Receptors

7.13.6 Environmental resources are defined as those aspects of the environment that support and are essential to natural or human systems. These include areas or elements of population, ecosystems, soil, water, air and climatic factors, material assets, landscape, water courses, community facilities etc.

7.13.7 Environmental receptors are defined as people (occupiers of dwellings and users of recreational areas, places of employment and community facilities) and elements within the environment (flora and fauna), that rely on resources.

Directives Statutes and Regulations

7.13.8 This section identifies directives statutes and regulations which have informed the conduct of the assessments.

Methods of Assessment

7.13.9 This section details the methods of assessment adopted for the various assessments. It explains the nature of the data relied on and the surveys, models and calculations used and undertaken to validate:

- the baseline environment with particular reference to environmental resources and receptors; and
- predicted impacts associated with the introduction of the proposed scheme into the baseline environment.

7.13.10 There is an explanation of the quantitative and qualitative criteria adopted to evaluate impacts and determine the order of beneficial and adverse impacts.

Baseline Environment

7.13.11 This section includes a description of the, context, key components, characteristics and status of the baseline environment specific to the potential impacts being considered.

Predicted Impacts and Mitigation

7.13.12 This section describes the predicted impacts in accordance with the criteria detailed in the methods of assessment. The assessment considers impacts during construction and once the proposed scheme is open to use.

7.13.13 Impacts comprise identifiable changes in the existing environment (the baseline environment) which would occur or be likely to occur as a consequence of implementation of the proposed scheme (e.g. the loss of a habitat or the pollution of a watercourse). Impacts are described in the form of ratings (thresholds) appropriate to the nature of the environmental aspect and in accordance with accepted terminology where standardised methodologies are used.

7.13.14 Impacts may be direct (e.g. the loss of woodland to accommodate the road) or indirect (e.g. pollution downstream arising from silt deposition during earthworks). They may be short-term / temporary (e.g. dust associated with construction) medium-term (e.g. cutting back of planting subsequently allowed to regenerate) or long-term /

permanent (e.g. improvement in local air quality). They may be beneficial (e.g. screening of an existing eyesore) or adverse (e.g. loss of an attractive landscape component).

7.13.15 The prediction of impacts has been based on:

- the known or likely presence of environmental receptors / resources;
- the environmental value of the resources / receptors, as determined through their designated status along with qualitative criteria such as rarity, status and condition;
- the vulnerability or sensitivity of affected resources;
- the number and sensitivity of affected receptors;
- the extent, nature and duration of physical change resulting from the construction or operation of the proposed scheme;
- the ability of the resource / receptor to respond to change; and
- the adaptability, and thus effectiveness, of the resource / receptor to controlled change (i.e. mitigation).

7.13.16 All of the assessments are based on comparisons between the environment immediately prior to the assumed construction of the proposed scheme and the predicted environment, assuming the proposed road is built and mitigation has been successfully implemented.

Mitigation

7.13.17 The principles adopted during the identification of mitigation measures is one of avoidance if possible, reduction where avoidance cannot be achieved or compensation where reduction cannot be achieved or would not achieve practicable levels of mitigation.

Conclusion and Significant Effects

7.13.18 This section describes which, if any, of the impacts are predicted to have a significant environmental effect. It describes the nature of any such effects and their geographic influence of the predicted effect such as local or national.

Conclusion and Significant Effects

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8 Air Quality

8.1 Scope of the assessments

8.1.1 The assessments for air quality have been focused on:

- local air quality associated with parts of the road network where volumes of traffic would be affected by the introduction of the proposed scheme into the network;
- changes in concentrations of oxides of nitrogen (NO_X) and levels of nitrogen deposition where changes in volumes of traffic within the road network affected by the introduction of the proposed scheme into the network could potentially affect sites designated for their ecological value;
- changes in greenhouse gas emissions (regional emissions) attributable to the introduction of the proposed scheme into the local road network;
- nuisance associated with construction related dust; and
- impacts on local air quality associated with construction traffic.

Local air quality and designated sites

8.1.2 The local air quality assessment has considered relevant public exposure receptors and designated sites prescribed within the Design Manual for Roads and Bridges (DMRB) Volume 11 Section 3 Part 1 – HA207/07 Air Quality.

8.1.3 The assessment has involved an evaluation of changes in concentrations of specific pollutants at particular sensitive receptors associated with parts of the road network where it is predicted changes detailed in the DMRB would occur. Existing concentrations and trends of the specified pollutants as well as the location of Air Quality Management Areas (AQMAs) relative to the proposed scheme have been investigated. The significance of impacts has been described in terms of receptor locations where increases or reductions in concentrations of pollutants have been identified and in relation to concentration levels detailed in The Air Quality Strategy (AQS) for England, Scotland, Wales and Northern Ireland.

8.1.4 The pollutants considered in relation to public exposure receptors comprise NO_2 and PM_{10}. The pollutants considered in relation to public exposure receptors comprise oxides of nitrogen (NO_X) relative to levels of nitrogen deposition.

8.1.5 Public exposure receptors and designated sites considered comprise:

- people living within 200m of the relevant sections of the existing road network and the proposed new road identified in accordance with the parameters detailed in the DMRB (affected roads);
- locations where significant numbers of the public and more vulnerable members of the public (sensitive receptors) regularly congregate (these include hospitals, schools, care homes etc); and
- the following designated sites identified within 200m of affected roads as defined in 8.1.6 are: Cotteril Clough East Site of Special Scientific Interest (SSSI); Cotteril Clough West SSSI and Lindow Common SSSI.

8.1.6 The parameters determining which parts of the existing road network qualify as affected roads that make up the study area for the assessment comprise sections of road which it is predicted would be subject to:

- a change in alignment of 5m or more; or
- a change in daily traffic flows of 1,000 Annual Average Daily Traffic (AADT) or more; or
- a change in heavy duty vehicle Heavy Duty Vehicles (HDVs) flows of 200 AADT or more; or
- a change in daily average speed by 10 km/hr or more; or
- a change in peak hour speed of 20 km/hr or more.

8.1.7 The extent of the study area is indicated in Figure 8.1

8.1.8 In relation to timescales, the assessment has been focused on prediction and identification of changes in concentrations of the specified pollutants at identified receptors in the opening year (2017) prior to(Do-Minimum) and following opening of the proposed road to use (Do-Something).

Regional emissions

8.1.9 The assessment of impacts related to regional emissions has involved a comparison of annual emissions of specified pollutants emitted by traffic associated with parts of the road network which it is predicted would be subject to defined changes in volumes of traffic identified in accordance with parameters defined in the DMRB. This defines the study area for regional emissions.

8.1.10 The specified pollutants comprise carbon dioxide (CO_2) hydrocarbons (HC) particulate matter (PM_{10}) and oxides of nitrogen (NO_X).

8.1.11 The parameters determining which parts of the road network have been included in the study area for regional emissions comprise sections of road which it is predicted would be subject to:

- a change of more than 10% in AADT; or
- a change of more than 10% to the number of HDVs; or
- a change in daily average speed of more than 20 km/hr.

8.1.12 In relation to timescales, the assessment has been focused on prediction and identification of changes in total emissions of the specified pollutants for the baseline and comparing the Do-Minimum (DM) scenario in the opening year with the Do-Something (DS) scenarios in the opening year and the design year.

Construction-related dust

8.1.13 The assessment of construction-related dust has generally been focused on receptors located within 350m of the defined working areas required for the purposes of construction. The pollutants considered comprise dust and PM_{10}. The distance adopted recognises the substantial proportion of dust associated with earthworks and construction activities of the type proposed comprises relatively large particles which will normally be deposited within 100m of such construction whilst acknowledging that smaller volumes of finer particles will be likely to be deposited some distance further.

Emissions associated with construction traffic

8.1.14 The assessment of construction-related impacts, specific to traffic-related emissions (NO_2 and PM_{10}), has been focused on sections of existing roads and haul routes which would be extensively used by construction vehicles and on areas of concentrated construction activity such as site compounds and storage areas which are located within defined centres of population.

8.2 Directives, statutes and regulations

8.2.1 The following directives and regulations have informed the conduct of the assessments. Further information is available in Appendix 8A.

European CAFE Directive (2008/50/EC) and Air Quality Standards Regulations 2010

8.2.2 The Directive details air quality limit values, target values, and critical levels for a number of air pollutants established by the European Parliament and Council for the protection of human health, vegetation and ecosystems. These have been transposed into UK legislation by the 2010 Regulations.

8.2.3 Nitrogen dioxide (NO2) and particulate matter in the form of Particulate Matter (PM_{10}) are two of the pollutants addressed by the Directive and Regulations for protection of human health with relevance to the current assessment.

Air Quality Strategy for England, Scotland, Wales and Northern Ireland and Air Quality (England) Regulations 2000 and Air Quality (England) Amendment Regulations 2002

8.2.4 The UK Government and the Devolved Administrations published the latest Air Quality Strategy for England, Scotland, Wales and Northern Ireland in July 2007 defining standards and objectives for each of a range of air pollutants.

8.2.5 These are as prescribed within The Air Quality (England) Regulations 2000 and The Air Quality (England) (Amendment) Regulations 2002 and coincide with the limit values presented in Table 8-1 and Table 8-2.

Table 8-1 Limit values for NO_2 and PM_{10}

Averaging Period	Limit Value	Measured as	Date by which limit value is to be met
Nitrogen Dioxide (NO_2)			
One hour	200 µg/m^3, not to be exceeded more than 18 times a calendar year	1-Hour mean	1 January 2010
Calendar year	40 µg/m^3	Annual Mean	1 January 2010
Particulate Matter (PM_{10}) (gravimetric)			
One day	50 µg/m^3, not to be exceeded more than 35 times a calendar year	Daily Mean	Already in force since 1 January 2005
Calendar year	40 µg/m^3	Annual Mean	Already in force since 1 January 2005

Table 8-2 Critical Levels for NO_x

Averaging Period	Critical Level	Date to be achieved and maintained thereafter
Oxides of Nitrogen (NO_x)		
Calendar year	30 µg/m^3	19 July 2001

The Environmental Protection Act 1990 (EPA)

8.2.6 The EPA (Section 79, Chapter 43, Part III - Statutory Nuisance and Inspections) contains a definition of what constitutes a 'statutory nuisance' with regard to dust and places a duty on Local Authorities to detect any such nuisances within their area. Dust arising from construction works could lead to statutory nuisance if it 'interferes materially with the well being of the residents, i.e. affects their well being, even though it may not be prejudicial to health'.

8.3 Methods of assessment

Local air quality (public exposure receptors)

8.3.1 The method of assessment for public exposure receptors has been based on the following guidance:

- Volume 11, Section 3, Part 1 – HA207/07 Air Quality of the DMRB;
- Local Air Quality Management Technical Guidance (LAQM.TG(09); and
- the Highways Agency's IAN 174/13 - Updated advice for evaluating significant local air quality effects for users of DMRB Volume 11, Section 3, Part 1 Air Quality (HA207/07).

8.3.2 The assessment has involved:

- establishment of the local air quality study area;
- establishment of background and baseline conditions using existing and newly collected air quality data including information relating to the extent and status of AQMAs associated with the study area;
- calculation of predicted concentrations of NO_2 and PM_{10} for the Do-Minimum (DM)and Do-Something (DS) scenarios for identified receptors in the opening year using ADMS-Roads, a dispersion modelling programme; and
- evaluation of the results of the modelling exercise against the advice provided in IAN 174/13 to determine the significance of changes in concentrations of the pollutants.

8.3.3 Information relating to AQMAs has been obtained from the Local Air Quality Management review and assessment documentation prepared by SMBC,MCC and CEC The Environmental Health Officers (EHOs) for the three authorities have also been consulted to verify data and trends in local air quality.

The study area and receptors

8.3.4 The extent of the study area shown in Figure 8.1 was defined by those sections of the road network (the affected roads) which satisfy the criteria detailed in 8.1.6.

Traffic data relied on to determine which sections of the road network would be likely to experience changes in volumes of traffic or operate at speeds detailed in the criteria was provided by the Highways Forecasting & Analytical Services at Transport for Greater Manchester (HFAS). Changes in flows were based on Do-Minimum and Do-Something traffic forecasts for the opening year of 2017. The base year adopted by HFAS for the purpose of preparing its forecasts was 2009.

8.3.5 The location and type of sensitive receptors (residential, hospitals, schools and care homes) within 200m of the affected roads (Figure 8.2) were identified using the Ordnance Survey's Address Layer 2 dataset.

Background and baseline data

8.3.6 The modelling process estimates concentrations for the two pollutants which are specific to the traffic associated with the local road network without and with the proposed scheme. Other contributions to concentrations, experienced by receptors have, therefore, to be identified and combined with the traffic-related concentrations to establish the predicted concentrations which are compared in the opening year. These other contributions are referred to as background concentrations,

8.3.7 Establishment and verification of background concentrations for NO_2 and PM_{10} has involved reference to the Pollution Climate Mapping Model for the UK (PCMM), the Automatic Urban and Rural Network (AURN) monitoring network, local authority monitoring and project-specific monitoring.

8.3.8 The Pollution Climate Mapping Model provides national data relating to background concentrations of a range of pollutants including NO_x and PM_{10} and which include traffic-related contributions. The information, which is produced for 1x1km grid squares on background maps provides a source of predicted background levels. Concentrations for NO_2 have been derived by converting the NO_X data using Defra's 'NO_2 Background Sector Tool (v3.2)'.

8.3.9 The available PCMM data most closely related to the 2009 base year adopted for the prediction of traffic volume forecasts was that for 2010. Following a review of monitoring data derived from the AURN network for years leading up to 2010, Defra issued advice in 2012 that published background data for concentrations of NO_X using the PCMM were in many instances some 15% higher than the monitoring figures suggested and provided a protocol for correcting the over-estimate[1]. The 2010 background data for the proposed scheme has accordingly been corrected as advised by Defra and is reflected in the projections for background data associated with the 2009 base year and the two scenarios in the opening year.

8.3.10 The background concentrations obtained from the PCMM have been adjusted to exclude the contributions from principal sources of traffic-related pollution;

motorways, trunk A-roads and primary A-roads. This avoids potential double counting of these sources of emissions which their inclusion, within the modelling process, would involve.

8.3.11 Data obtained from the PCMM has been reviewed against network specific data obtained from continuous and passive monitoring undertaken by SMBC, MCC and CEC. The locations of the monitoring sites relied on are shown in Figure 8.3 and detailed in Appendix 8B. Project-specific monitoring for NO_2 has also been undertaken to extend the coverage to relevant parts of the study area and the proposed scheme corridor in particular. This comprised a programme of diffusion tube monitoring undertaken between March 2009 and December 2009. The locations of the monitoring sites selected are shown in Figure 8.4 and detailed in Appendix 8C.

8.3.12 The diffusion tube programme involved co-location with the AURN monitoring sites. AURN is the UK's largest automatic monitoring network and is the main network used for compliance reporting against the Ambient Air Quality Directives. Co-location at the two sites most closely associated with the study area provided a basis for adjusting any bias that might occur in the relatively short-term project specific monitoring.

8.3.13 The data obtained from the local authorities and the bias adjusted project-specific monitoring was used to identify appropriate adjustment factors for the background concentrations derived from the PCMM data for the base year and the opening year.

8.3.14 Information relating to background concentrations of NO_x and N-deposition rates for the designated sites included in the assessment has been obtained from APIS (the Air Pollution Information System).

Modelling and prediction of concentrations

8.3.15 The prediction of pollutant concentrations in the base year and opening year has involved the use of ADMS-Roads, a computer programme which is widely used in the UK for the air quality assessments of road networks.

8.3.16 Data inputs to the model have included:

- Annual Average Daily Traffic (AADT) vehicle counts for affected links broken down into flows for the following categories: Light Goods vehicles (LGVs), and Heavy Duty Vehicles (HDVs);
- the diurnal variation (24-hour profile) in traffic flows for the roads affected;
- projected traffic flows and speeds with anticipated growth applied to enable predictions to be made in Opening Year (2017);

- speed (km/hour) of vehicles listed above on the identified roads for each year modelled. This included the free flowing speed of traffic and average speeds of approaches to junctions; and
- hourly sequential meteorological data obtained from Manchester Airport meteorological station.

8.3.17 Defra's Emission Factors Toolkit for Vehicle Emissions (EFT 5.2) has been used to calculate emissions of NO_x, NO_2 and PM_{10} for the roads identified within the study area. Projection factors for reductions in NO_2 have been applied in accordance with IAN170/12.

8.3.18 The model has been subject to verification. This involved comparison of modelled traffic-related concentrations based on known traffic flows for the base year, 2009, combined with the background concentrations derived from the adjusted traffic-excluded PCMM projections for 2009 against measured concentrations obtained from the local authority monitoring and the project specific diffusion tube survey.

8.3.19 Once the model had been verified, the two opening year scenarios have then been run to obtain the predicted traffic-related concentrations for receptors within the study area assuming the proposed scheme is complete and open to use.

8.3.20 The estimates have then been combined with the background levels derived from the adjusted, traffic-excluded data obtained from the PCMM for the relevant receptors to arrive at predicted concentrations for the receptors for the two scenarios in the opening year. Comparison of the concentrations for the Do-Minimum and Do-Something scenarios has enabled impacts in terms of increase or reduction to be identified.

8.3.21 The establishment of predicted levels of NO_X and rates of nitrogen deposition for the three designated sites identified in the local air quality study area has been informed by the guidance in Annex F of Volume 11 Section 3 Part 1 – HA207/07 Air Quality of the DMRB.

Evaluation of impacts

8.3.22 The evaluation of impacts relative to local air quality receptors and designated sites has been informed by the guidance provided in the Highways Agency's IAN 174/13. Section 2 of the IAN provides guidance on how to collate the information required in support of an informed professional judgement on the significance of local air quality effects.

8.3.23 This involves an analysis of the magnitude of increase or reduction in concentrations for public exposure receptors already or newly subject to exceedance of the annual mean limit value for NO_2 and PM_{10} as stipulated in 8.1.5. The magnitudes of change

considered comprise Large (>4 µg/m^3), Medium (>2 to 4µg/m^3) and Small (>0.4 to 2 µg/m^3). Changes in concentrations below 0.4 µg/m^3 are not considered material.

8.3.24 For designated sites, it involves similar analysis against the annual mean limit value for NO_X as stipulated in 8.1.5 with the magnitudes of change considered comprising Large (>3 µg/m^3), Medium (>1.5 to 3µg/m^3) and Small (>0.3 to 1.5 µg/m^3). It also involves consideration of predicted nitrogen deposition against annual critical loads defined by The United Nations Economic Commission for Europe (UNECE). Critical Loads are defined by the UNECE as 'a quantitative estimate of an exposure to one or more pollutants below which significant harmful effects on specified sensitive elements of the environment do not occur according to present knowledge .

8.3.25 Critical Load thresholds for N-deposition are expressed in terms of kilograms of nitrogen / hectare /year (kg N ha^{-1} y^{-1}). The relevant thresholds for the designated sites which have been subject to assessment are 5 – 15 kg N ha^{-1} y^{-1} for coniferous forest and 10 – 20 kg N ha^{-1} y^{-1} for northern wet heath.

8.3.26 The guidance then suggests ranges in the number of receptors for the six categories, based on magnitude of change and a worsening or improving in quality, which are indicative of the impacts being significant or not. It further identifies a number of criteria which should be considered as listed below:

- Is there a risk that environmental standards will be breached?
- Will there be a large change in environmental conditions?
- Will the effect continue for a long time?
- Will many people be affected?
- Is there a risk that designated sites, areas, or features will be affected?
- Will it be difficult to avoid, or reduce or repair or compensate for the effect?

Regional emissions

8.3.27 Emissions of CO_2, HC, NO_x and PM_{10} at the regional level for annual vehicular use associated with the roads identified within the study area have been calculated for traffic associated with roads qualifying for inclusion in the assessment study area using the Emission Factor Toolkit (EFTv5.2) released by the LAQM Helpdesk at Defra in January 2013.

Construction-related dust

8.3.28 The assessment has been informed by the Guidance on the Assessment of the Impacts of Construction on Air Quality and Determination of their Significance (2012) produced by the Institute of Air Quality Management (IAQM). Detailed explanation of the method and the criteria adopted is available in Appendix 8D. It has involved

evaluation of the risk of dust nuisance by virtue of construction of the form and scale of development proposed and taking into account the nature of the existing soils, within an area extending for 350m from proposed working areas and consequent identification of appropriate mitigation measures. The nature of the works and local soils have been considered to enable a dust emission class of large, medium or small to be identified. Distances from the working areas up to 350m have been considered to arrive at a risk rating for receptors located within set distance bands from the working areas. The two criteria have then been combined to arrive at risk ratings as indicated in Table 8-3.

Table 8-3 Dust deposition risk ratings

Distance to Nearest Receptor (m)		Dust Emission Class		
Dust Soiling and PM_{10}	Ecological	Large	Medium	Small
< 20	-	High Risk	High Risk	Medium Risk
20 – 50	-	High Risk	Medium Risk	Low Risk
50 – 100	<20	Medium Risk	Medium Risk	Low Risk
100 – 200	20 – 40	Medium Risk	Low Risk	Negligible
200 – 350	40 – 100	Low Risk	Low Risk	Negligible

8.3.29 Information on the potential programming of construction activities was obtained from the draft Consultant Contractor Report produced by Balfour Beatty Civil Engineering plc during November 2011[2] and drawings produced by Stockport Metropolitan Borough Council in April 2013.

8.4 Baseline environment

Air Quality Management Areas

8.4.1 There are two AQMAs located within the study area, the Greater Manchester AQMA and the Disley AQMA. The location of both in the context of the assessment study area is indicated in Figure 8.1.

8.4.2 The Greater Manchester AQMA which covers large areas of Manchester City Council, Oldham MBC, Rochdale MBC, Salford City Council, Stockport MBC, Tameside MBC and Trafford MBC has been declared for NO_2 and PM_{10}.

8.4.3 The Disley AQMA covers an area along the A6 Market Street Disley, running from the Market Street / Buxton Old Road crossroads in the west, to the junction with Redhouse Lane in the east and has been declared by Cheshire East Council for NO_2.

8.4.4 Air quality objectives for PM_{10}, benzene, 1,3-butadene, carbon monoxide (CO) and lead (Pb) were predicted to be met in all areas in 2011.

Background concentrations of NO_X, NO_2 and PM_{10}

Pollution Climate Mapping Model

8.4.5 The maximum, minimum and average background annual mean concentrations for NO_x, NO_2 and PM_{10} in the base year (2009) and opening year (2017) derived from Defra's PCMM background maps are presented in Table 8-4.

Table 8-4 Background Concentrations of NO_x, NO_2 and PM_{10} for Baseline and Opening Year

1 x 1km Grid Square Background Concentrations	2009 (Baseline Year) µg/m^3			2017 (Opening Year) µg/m^3		
	NO_x	NO_2	PM_{10}	NO_x	NO_2	PM_{10}
Minimum	9.1	7.1	11.8	6.5	5.1	10.9
Maximum	58.8	34.1	20.3	43.8	27.6	17.9
Average	19.0	13.5	14.3	13.4	9.9	13.0

Local air quality monitoring

8.4.6 Annual mean concentrations of NO_2 derived from SMBC,ECC and MCC continuous monitoring sites are presented in Table 8-5. Exceedances of the annual mean limit value of 40 µg/m^3 are highlighted in red, the principal locations where exceedances are found being in central Manchester and alongside major trunk roads in Cheshire East.

Table 8-5 Measured Annual Mean NO_2 Concentrations from Local Authority Continuous Monitoring

Local Authority	Site ID	Annual Mean NO_2 (µg/m^3)					
		2007	2008	2009	2010	2011	2012
Manchester	Piccadilly Gardens	44	43	42	45	44	41
Manchester	Oxford Road	-	-	-	64	66	62
Manchester	Manchester South	21	24	24	28	23	24
Stockport	Greek Street	28	28	27	31	-	-
Stockport	Hazel Grove	-	30	31	33	24	29
Cheshire East	Poynton	30	28	22	33	33	33
Cheshire East	Disley	33	32	-	32	31	-
Cheshire East	Mere	-	44	40	46	41	44
Cheshire East	Crewe	-	34	21	40	34	26

Local Authority	Site ID	Annual Mean NO_2 (µg/m^3)					
		2007	2008	2009	2010	2011	2012
Cheshire East	Knutsford	-	-	-	43	39	37

8.4.7 Data obtained from continuous monitoring stations in the three local authority areas for annual mean concentrations of PM_{10} is scheduled in Table 8-6 In all instances the levels are below the annual mean limit value of 40µg/m^3 for the pollutant.

Table 8-6 Measured Annual Mean PM_{10} Concentrations from Local Authority Continuous Monitoring

Local Authority	Site ID	Annual Mean PM_{10} (µg/m^3)					
		2007	2008	2009	2010	2011	2012
Manchester	Piccadilly Gardens	24	20	22	21	22	21
Manchester	Oxford Road	-	-	-	31	32	30
Manchester	Manchester South	26	24	18	17	-	-
Stockport	Greek Street	20	18	20	15	-	-
Stockport	Hazel Grove	-	20	17	20	24	23
Cheshire East	Poynton	18	20	-	-	-	-
Cheshire East	Disley	17	22	-	-	-	-
Cheshire East	Mere	21	19	21	-	-	-

8.4.8 Data from 63 diffusion tube monitoring sites operated by the three local authorities within the study area for 2009 is provided in Appendix 8B. The distribution of the sites in the context of the assessment study area is indicated in Figure 8.3.

Scheme specific diffusion tube data

8.4.9 Details of the data derived from the 64 diffusion tube locations included in the site specific survey of 2009 is provided in Appendix 8C.

8.4.10 The data demonstrates that existing roadside NO_2 concentrations vary between 15µg/m^3 and 73µg/m^3 and that 20 of the locations surveyed exceeded the EU limit value for the pollutant in 2009, the base year for the traffic forecasts for the proposed scheme.

Sensitive receptors

8.4.11 A summary of the number of sensitive receptors within the detailed study area according to type is provided in Table 8-7.

Table 8-7 Public Exposure Receptors

Types	No. of Receptors
Care Homes	17
Hospital and Medical Buildings	60
Schools and Nurseries	76
Other Non Domestic Long Term Exposure*	28
Residential (within AQMAs)	769
Residential (outside AQMAs)	9,947
Commercial	56
Other Exposure (Short Term)**	83
TOTAL	11,036
*Other Non Domestic Long Term Exposure – Hostel, inn or hotel. **Other Exposure (Short Term) – Playing field, playground, leisure facilities or bus station.	

Designated sites

8.4.12 The location of the three designated sites located within the assessment study area is shown In Figure 8.5. Detailed description of the sites is provided in Appendix 8E.

8.4.13 Cotteril Clough East SSSI is located some 3.3km south west of the proposed scheme. It comprises broadleaved and mixed woodland classed as being in an unfavourable recovering condition, a status which renders it potentially susceptible to NO_x and nitrogen deposition. The 2009 background NO_x and N-deposition rates for the site are 22.8 µg/m^3 and 34.4 N ha^{-1} y^{-1} respectively. The N-deposition rate exceeds the UNCE lower threshold limit range of 5-15kg N ha^{-1} y^{-1} for a coniferous habitat type.

8.4.14 Cotteril Clough West SSSI is a lowland beech and yew woodland located some 3.9km south-west of the proposed scheme. It is classed as being in an “unfavourable recovering” condition, a status which renders it potentially susceptible to NO_x and nitrogen deposition. The 2009 background NO_x and N-deposition rates for the site are 27 µg/m^3 and 34.4kg N ha^{-1} y^{-1} respectively. The N-deposition rate exceeds the UNCE lower threshold limit range of 5-15kg N ha^{-1} y^{-1} for a coniferous habitat type.

8.4.15 Lindow Common is an area of lowland heath located 3.3km south of the proposed scheme. It is also classed as being in an “unfavourable recovering” condition. Heathlands are by definition nutrient poor and N-deposition leads to nutrient enrichment as well as other effects. The 2009 background NO_x and N-deposition rates for the site are 19 µg/m^3 and 19.8 N ha^{-1} y^{-}1 respectively. The N-deposition rate

is at the upper extreme of the UNCE lower threshold limit range of 10-20kg N ha^{-1} y^{-1} for a northern wet heath habitat type.

8.4.16 Background NO_X concentrations for all three designated sites are below the annual mean limit value of 30µg/m^3 for the pollutant though Cotteril Clough West is approaching the value.

8.4.17 Predicted annual mean NO_x concentrations and N-deposition rates for transects from 0 to 200m from the nearest highway across the designated sites are presented in Table 8-8 and illustrated in Figure 8.6 and 8.7. Concentrations at all three designated sites exceed the limit value of 30µg/m^3 in the base year (2009), the highest concentrations being nearest the road.

Table 8-8 Range of Annual Mean NO_x Concentration and N-deposition at Designated Sites for 2009

Designated Site	NO_x (µg/m^3)		N-Deposition Rate (kg N ha^{-1} y^{-1})	
	Minimum	Maximum	Minimum	Maximum
Cotteril Clough (E)	18.5	162.1	34.5	36.6
Cotteril Clough (W)	29.8	169.8	34.5	36.6
Lindow Common	20.4	154.8	19.8	21.9

8.5 Predicted impacts

Local air quality (public exposure receptors)

NO_2

8.5.1 A summary of the predicted annual mean NO_2 concentrations without and with the proposed scheme for the 11,036 receptors identified within the assessment study area is presented in Table 8-9. Predicted concentrations for the Do-minimum and Do-Something scenarios in the opening year are illustrated in Figures 8.8 and 8.9.

8.5.2 The results demonstrate there will be a reduction in the number of receptors subject to concentrations exceeding the limit value for NO_2 totalling 844 and a corresponding increase in the number of receptors subject to concentrations below the annual mean limit value.

Table 8-9 Predicted Annual Mean NO_2 Concentrations in Opening Year 2017

Annual Mean NO_2 Concentration (µg/m^3)	Without Scheme (DM)	With Scheme (DS)
> 10 – 20	331	146

Annual Mean NO_2 Concentration (µg/m^3)	Without Scheme (DM)	With Scheme (DS)
> 20 – 30	1,669	1,896
> 30 – 36	2,007	2,323
> 36 – 40	2,463	2,949
>40 (Exceedance)	4,566	3,722

8.5.3 The results also demonstrate the number of receptors subject to annual mean NO_2 concentrations in excess 60 µg/m^3 (the indicator level for likely exceedance of the 1 hour mean NO_2 objective) will reduce from 217 to 145 should the proposed scheme be implemented.

PM_{10}

8.5.4 A summary of the predicted annual mean PM_{10} concentrations without and with the proposed scheme for the 11,036 receptors identified within the assessment study area is presented in Table 8-10. Predicted concentrations for the Do-Minimum and Do-Something scenarios in the opening year are illustrated in Figures 8.11 and 8.12.

8.5.5 The results demonstrate there will be a reduction in the numbers of receptors exposed to higher concentrations. They further demonstrate there will be no receptors subject to concentrations greater than 30µg/m^3 without or with the proposed scheme and hence no receptors subject to exposure in exceedance of the annual mean limit value of 40µg/m^3

Table 8-10 Predicted Annual Mean PM_{10} concentrations in Opening Year 2017

Annual Mean PM_{10} Concentration (µg/m^3)	Without Scheme (DM)	With Scheme (DS)
> 10 – 20	10,295	10,410
> 20 – 30	741	626
> 30 – 40	0	0
>40 (Exceedance)	0	0

8.5.6 Predicted changes in annual mean NO_2 and PM_{10} concentrations without and with the proposed scheme are presented in Table 8-11 and illustrated in Figures 8.10 and 8.13 respectively.

Table 8-11 Predicted changes annual mean NO_2 and PM_{10} concentrations in Opening Year 2017

Change in annual mean concentration (Do Something – Do Minimum ($\mu g/m^3$)	NO_2	PM_{10}
>4 Increase	209	1
>2 to 4 Increase	407	3
>0.4 to 2 Increase	1022	482
0 to 0.4 Increase	518	1432
No Change	193	2419
0 to 0.4 Decrease	1719	5921
>0.4 to 2 Decrease	5409	685
>2 to 4 Decrease	801	78
>4 Decrease	758	15

8.5.7 The figures indicate some 79% of all receptors will be subject to a reduction in annual mean NO_2 concentrations as a result of the implementation of the proposed scheme, and that some 19% will be subject to an increase.

8.5.8 Figures for PM_{10} indicate some 61% of all receptors will be subject to a reduction in annual mean concentrations as a result of the implementation of the proposed scheme and that some 17% will be subject to an increase.

Impact on AQMAs

8.5.9 Figures for numbers of receptors predicted to be subject to concentrations in exceedance of the air quality objective for both pollutants without and with the proposed scheme in the opening year are presented in Table 8-12. They indicate 780 properties within the Greater Manchester AQMA will be removed from exceedance relative to NO_2 and 3 additional receptors will be brought into exceedance relative to NO_2 within the Disley AQMA should the proposed scheme be implemented. They further indicate there will be no receptors subject to exceedance of the PM_{10} objective without or with the proposed scheme.

Table 8-12 Exceedances within AQMAs in the opening year (2017)

Exceedances of Objective Annual Mean Values for NO_2 and PM_{10}	Greater Manchester AQMA		Disley AQMA	
	NO_2 (>40 $\mu g/m^3$)	PM_{10} (>40 $\mu g/m^3$)	NO_2 (>40 $\mu g/m^3$)	PM_{10} (>40 $\mu g/m^3$)
2017 Do Minimum	4,357	0	85	0

Exceedances of Objective Annual Mean Values for NO_2 and PM_{10}	Greater Manchester AQMA		Disley AQMA	
	NO_2 (>40 $\mu g/m^3$)	PM_{10} (>40 $\mu g/m^3$)	NO_2 (>40 $\mu g/m^3$)	PM_{10} (>40 $\mu g/m^3$)
2017 Do Something	3,577	0	88	0

8.5.10 Predicted changes in annual mean NO_2 and PM_{10} concentrations within the two AQMAs are summarised in Table 8-13. The figures demonstrate 94% of the 8236 receptors within the Greater Manchester AQMA will experience a reduction in NO_2 concentrations and 4.5% an increase should the proposed scheme be implemented. Corresponding percentages for PM_{10} are 73% of receptors will experience a reduction and 2% an increase. Changes for the 104 receptors within the Disley AQMA will result in increases in concentrations for both pollutants.

Table 8-13 Changes in NO_2 and PM_{10} concentrations within AQMAs in Opening Year 2017 Do Minimum and Do Something

Change in annual mean concentration (Do Something – Do Minimum) ($\mu g/m^3$)	Greater Manchester AQMA		Disley AQMA	
	NO_2	PM_{10}	NO_2	PM_{10}
>4 Increase	39	1	63	0
>2 to 4 Increase	42	1	41	0
>0.4 to 2 Increase	100	62	0	103
0 to 0.4 Increase	192	126	0	1
No Change	120	2,100	0	0
0 to 0.4 Decrease	1,419	5,290	0	0
>0.4 to 2 Decrease	5,116	620	0	0
>2 to 4 Decrease	605	22	0	0
>4 Decrease	603	14	0	0

Significance for public exposure receptors

The figures scheduled in

8.5.11 Table 8-14 summarise the results of the modelling relative to the number of receptors already or newly subject to exceedance of the annual mean limit value for NO_2 against worsening and improving concentrations in bands ranging from small to large as recommended in IAN 174/13.

Table 8-14 Local Air Quality Significance – NO_2

Magnitude of Change in Annual Average NO_2 or PM_{10} (µg/m³)	Total Number of Receptors with:	
	Worsening of air quality that already exceeds objective or creation of a new exceedances	Improvement of an air quality that already exceeds objective or the removal of an existing exceedance
Large (>4)	95	548
Medium (>2 to 4)	49	446
Small (>0.4 to 2)	31	3033

8.5.12 Table 8-15 summarises the analysis of the figures in Table 8-11 as an indicator of potential significance as recommended in IAN 174/13.

Table 8-15 Guideline to Number of Properties Constituting a Significant Effect – NO_2

Magnitude of Change in NO_2 (µg/m³)	Number of Receptors with:			
	Worsening of air quality that already exceeds objective or creation of new exceedances		Improvement of an air quality that already exceeds objective or the removal of existing exceedances	
Large (>4)	1 to 10	Yes	1 to 10	Yes
Medium (>2 to 4)	10 to 30	Yes	10 to 30	Yes
Small (>0.4 to 2)	30 to 60	No	30 to 60	Yes

8.5.13 Predicted changes in NO_2 concentration are greater than the upper guideline band in five of the magnitude categories. In all five instances the number of affected receptors is markedly higher than the upper guideline band, indicating a strong likelihood the proposed scheme will involve significant effects which are both detrimental and beneficial relative to the pollutant.

8.5.14 The results of the modelling have demonstrated there will be no receptors already or newly subject to exceedance of the annual mean limit value for PM_{10} where there would be changes relative to worsening and improving concentrations above the 0.4 µg/m³ required to indicate potential significance.

Local air quality (designated sites)

8.5.15 The maximum and minimum predicted annual mean NO_x concentrations at the three designated sites within the study area for the two opening year scenarios are presented in Table 8-16 and Figures 8.14 to 8.16.

Table 8-16 Annual Mean NO_x Concentration at Designated Site Receptor Locations for 2017

Designated Site	EU Limit Value	Annual Mean NO_x Concentration ($\mu g/m^3$)		
		DM (Average)	DS (Average)	Change (DS-DM) Average
Cotteril Clough (E)	30	39.8	37.6	-2.2
Cotteril Clough (W)	30	43.3	41.4	-1.9
Lindow Common	30	31.2	29.5	-1.7

8.5.16 The results demonstrate that annual mean NO_x concentrations at the two Cotteril Clough sites will exceed the limit value, without and with the proposed scheme notwithstanding predicted reductions in the concentrations[3]. In the case of Lindow Common, the annual mean concentration will be above the limit value without the proposed scheme but will fall marginally below the limit value with the proposed scheme in place.

8.5.17 The predicted annual average nitrogen deposition rates for the designated sites are presented in Table 8-17 and Figures 8.17 to 8.19

Table 8-17 Annual Mean N-deposition Rate at the Designated Site Receptor Locations for DM and DS for 2017

Designated Site	N-deposition Rate (kg N ha^{-1} yr^{-1})			
	UNECE Critical Load	DM (Average)	DS (Average)	Change (DS-DM)
Cotteril Clough (E)	10 – 20	28.7	28.6	-0.1
Cotteril Clough (W)	10 – 20	28.7	28.6	-0.1
Lindow Common	5 - 15	16.4	16.4	0.0

8.5.18 The results show that the UNECE critical loads for the habitat types associated with the sites will be exceeded without and with the proposed scheme in the opening year and that the differences in rates without and with the proposed scheme will comprise a barely discernible reduction.

Significance for designated sites

8.5.19 A summary of the number of the impact of the proposed scheme on transect receptors across the designated sites in proximity to the proposed scheme is presented in Table 8-18 for NO_X.

Table 8-18 Local Air Quality Receptors Informing Scheme Significance at SSSI

Magnitude of Change	Total Number of Receptors with:

in Annual Average NO_x	Worsening of air quality objective, already above objective or creation of a new exceedance	Improvement of an air quality objective, already above objective or the removal of an existing exceedance
Large (>3)	0	8
Medium (>1.5 to 3)	0	7
Small (>0.3 to 1.5)	0	12

8.5.20 Changes in NO_x concentrations from the without scheme to with scheme scenario on the transect points ranged from -0.4 to -19.2 µg/m^3 suggesting an overall improvement with the scheme. The significance of this improvement is discussed in Section 8.6.

Compliance Risk Assessment

8.5.21 A Compliance Risk Assessment for the proposed scheme was undertaken in accordance with HA Interim Guidance Note IAN 175/13. A summary of the results is provided in Table 8-19.

Evaluating Significant Local Air Quality Effects

8.5.22 An overall judgement of the significance the scheme has on local air quality must include effect on public exposure and compliance. Professional judgement on the significance is summarised in Table 8-20.

Table 8-19 Compliance Risk Assessment Outputs

	Compliance Descriptors (Flow Chart in Annex A)						Outcome	
Compliant Zone ID	A - Change (increase) greater than 1% of EU LV	B- Does the Scheme cause a compliant zone to become non-compliant?	C - Delay Defra Compliance?	D- Does the Scheme Increase Change in Road Length that Exceeds	E - Does the scheme worsen air quality overall? (in exceedance)	If the answer to A,B,C or D is Yes Proceed to AQAP (Annex C)	AQAP effective?	Compliance Risk Rating (High / Neutral / Low)
UK0033	YES	NO	NO	YES	YES	N/A	N/A	Low
UK0003	NO	NO	NO	NO	NO			
Summary	YES	NO	NO	YES	NO			

Table 8-20 Checklist Questions to Evaluate Significant Local Air Quality Effects

	Checklist Questions to Evaluate Significance	Answers
1	If annual average NO_2 is the key pollutant alone or if other short term averaging periods and/or pollutants also need to be taken into account;	Yes
2	Whether any adverse large, medium, or small changes are predicted;	Yes
3	Whether any beneficial large, medium, or small changes are predicted;	Yes
4	Whether any of these exceed lower or upper guideline bands;	Yes
5	The schemes ability to detract or support measures set out in Air Quality Action Plans; Greater Manchester's AQAP relevant to development and planning are: • AP29 Assess the air quality impact of all proposed bypasses and new roads. • AP32 Develop Greater Manchester wide guidance for developers submitting planning applications, on air quality information to be provided on submission • AP33 Develop a checklist of mitigating measures, which could be included in section 106 agreements.	It is unlikely the proposed scheme would detract or support these actions in the AQAP.
6	If the scheme represents a low or high compliance risk;	Low Risk
7	The effects on any designated sites affected; and	Low Risk
8	Whether, if required, mitigation can be incorporated in to the scheme design, and the effectiveness of the specified mitigation measures.	Not applicable

8.5.23 Table 8-21 outlines the professional judgment of the evaluation of significant effects of air quality and supporting evidence for the proposed scheme.

Table 8-21 Overall Evaluation of Local Air Quality Significance

Key Criteria Questions	Yes / No
Is there a risk that environmental standards will be breached?	Yes
Will there be a large change in environmental conditions?	Yes
Will the effect continue for a long time?	Yes
Will many people be affected?	Yes
Is there a risk that designated sites, areas, or features will be affected?	Yes
Will it be difficult to avoid, or reduce or repair or compensate for the effect?	Yes
On Balance is the Overall Effect Significant?	Yes
Evidence in Support of the Professional Judgement Public exposure:	

Key Criteria Questions	Yes / No
Approximately 79% of receptors within the study area are predicted to experience a reduction in annual mean NO_2 concentrations as a result of the implementation of the proposed scheme, 2% of receptors will be unchanged and 19% will be subject to an increase in annual average NO_2. Adverse and beneficial changes in NO_2 concentrations are greater than the upper guideline bands provided in the guidance. However, the number of receptors in exceedance benefiting from the scheme out number those adversely affected by a factor of over 20. The large, medium and small improvement in annual average NO_2 objective exceedances at 548, 446 and 3033 receptors respectively, compare with the large, medium and small adverse changes of 95, 49 and 31 receptors respectively. Consequently, far more receptors already in annual average NO_2 objective exceedance will benefit from the scheme than will be adversely affected by it. 83% of sensitive receptors either benefit or are unchanged in terms of PM^{10} particulates as a result of the implementation of the proposed scheme. With existing guidance on long term trends, adverse and beneficial changes associated with the scheme will continue over extended periods. Designated Sites: All designated sites within the study area benefit as a result of the implementation of the scheme. Compliance with EU Directive is not affected - Low compliance risk. The scheme provides quantifiable mitigation of existing air quality for over 79% of sensitive receptors in the study area. For the proposed scheme itself, no effective, viable and quantifiable mitigation measures can be incorporated into its operational design at this stage to mitigate adverse impacts on local receptors along the alignment.	

8.5.24 In accordance with the guidance provided the scheme results in both significant adverse and beneficial impacts.

Regional emissions

8.5.25 Predicted changes in regional emissions for the parts of the road network affected by the proposed scheme as defined in 8.1.6 are scheduled in Table 8-22.

Table 8-22 Regional Emissions in Baseline Year 2009 and the Opening Year 2017

Emissions (Tonnes per year)	NO_x	PM_{10}	HC	CO_2
2009 Baseline	3,109	203	503	903,310
2017 Do Minimum	1,738	164	231	893,473
2017 Do Something	1,756	167	233	905,059

Emissions (Tonnes per year)	NO_x	PM_{10}	HC	CO_2
Change Do Minimum to Do Something 2017	18	3	2	11,586
Percentage Change (DS-DM) 2017 (%)	1.0	1.8	0.9	1.3

8.5.26 The figures demonstrate there will be increases ranging between 0.9% and 1.8% for the four pollutants considered when predicted emissions between the Do-Minimum scenario and Do-Something scenario in the opening year are compared.

Construction-related dust

8.5.27 The principal construction activities and locations which are likely to generate larger volumes of dust include:

- site clearance and topsoil stripping;
- cut and fill during establishment of the proposed alignment and levels and associated with the construction of proposed roadside mounding;
- excavation associated with drainage trenches, attenuation and balancing ponds and utilities trenches;
- laying and compacting of sub-base and base layer materials;
- areas associated with storage of soils, aggregates and materials for concrete batching; and
- site entrance points and roads providing access to entrance points which may be subject to trackout.

8.5.28 The land take for the proposed scheme comprises some 108 ha of predominantly agricultural land where soils are generally loamy and clay rich. Earthworks associated with establishment of the proposed alignment and levels and the construction of proposed roadside mounding will last for approximately 15 months between the eastern end of the proposed scheme corridor and the A555 and for some 16 months between the A555 and Ringway Road. There will be no major earthworks along the section of the corridor currently occupied by the A555. During these periods, earthmoving machinery and vehicles transporting excavated material to areas of fill over unpaved site haul routes will be a potentially large source of dust.

8.5.29 The area of the site, nature of the proposed works and soil types in the area place the proposed activity in the large dust emission class used as one of the two criteria to evaluate risk relative to receptors.

8.5.30 Areas where groups of receptors will be susceptible to dust deposition are indicated in Figure 8.20. Most comprise residential properties. There are also a small number of schools and nurseries. Those located closest to the working areas and to the north

and north-west of the working areas, downwind of the prevailing south-easterly winds associated with the area, are the most susceptible.

8.5.31 The numbers of receptors classified according to type and categorised relative to risk, taking into account the two risk evaluation criteria of dust emission class and distance from the working areas in bands up to 350m, are scheduled in Table 8-23.

Table 8-23 Risk of dust-related nuisance relative to receptors

Distance from construction boundary (m)	Risk Level for Potential Dust Emission Class "Large"	Sensitive Receptor Count		
		Residential	School/Nursery	Medical
<20	High Risk	165	1	-
20-50	High Risk	277	-	-
50-100	Medium Risk	568	2	-
100-200	Medium Risk	1,539	1	-
200-350	Low Risk	2,540	-	-

8.5.32 The number of vehicles accessing the site, which may track out dust is currently unknown. However, given the size of the scheme there could be times when up to 100 vehicles movements could occur accessing or exiting the site, with some travelling over potentially dusty surface materials and unpaved roads.

8.5.33 The locations of receptors in the vicinity of proposed site access points are shown in Figure 8.21. All are residential receptors. The numbers of receptors subject to the relative risk ratings adopted for evaluating potential dust impacts are presented in Table 8-24.

Table 8-24 Risk of dust-related nuisance associated with trackout

Distance from construction site boundary (m)	Risk Level for Potential Dust Emission Class "Large"	Residential Receptors
<20	High Risk	63
20-50	Medium Risk	115
50-100	Low Risk	234

Proposed mitigation

8.5.34 The proposed measures focus on mitigation of construction phase related dust and the described below will be implemented by the contractor through the Construction

Environmental Management Plan (CEMP) / Code of Construction Practice (CoCP) for the construction contract. The plan will include:

- The identification of a nominated Environmental Site Manager;
- Notification procedures where potentially significant dust generating activities are required;
- Method statements for the control of dust in such locations and complaint receipt; and
- Management procedures to ensure issues are addressed should they be raised by the public.

8.5.35 The following mitigation measures will be adopted to control and reduce potential dust deposition and potential nuisance:

- access roads and site entrances will be kept clean;
- grout or cement-based materials will be mixed using a process suitable for the prevention of dust emissions;
- fine material will not be stockpiled to an excessive height in order to prevent exposure to wind and/or dust nuisance;
- dust generating activities (e.g. cutting, grinding and sawing) will be minimised and weather conditions considered prior to conducting potentially dust emitting activities;
- if possible, plant will be located away from site boundaries close to residential areas;
- water will be used as a dust suppressant where applicable;
- drop heights from excavators to crushing plant will be kept to a minimum;
- distances from crushing plant to stockpiles will be kept to the minimum practicable to control dust generation associated with the fall of materials;
- skips will be securely covered;
- soiling, seeding, planting or sealing of completed earthworks will be completed as soon as reasonably practicable following completion of earthworks;
- wheel wash facilities will be provided at major site exits
- material will not be burnt on site; and
- engines will be switched off when not in operation.

Construction Traffic Emissions

8.5.36 Preliminary review of potential numbers of construction related HGVs using any of the seven principle access routes identified in Figure 5.28 has indicated that increases will not exceed the threshold identified in HA207/07 Air Quality signalling a need for local air quality assessment. No further assessment has therefore been undertaken and no significant is likely.

8.6 Conclusions and effects

Public exposure receptors

8.6.1 The assessments relating to NO_2 and PM_{10} indicate some 79% and 61% of receptors associated with affected roads will experience a reduction in annual mean concentrations of the two pollutants. They also indicate that some 19% will experience an increase in NO_2 concentrations and 17% in PM_{10} concentrations.

8.6.2 The assessments have demonstrated the large, medium and small improvement in the annual average NO_2 objective where receptors are already subject to exceedance, at 548, 446 and 3033 receptors respectively, compare with the large, medium and small adverse changes of 95, 49 and 31 receptors respectively. Consequently, many more receptors already in annual average NO_2 objective exceedance will benefit from the scheme than will be adversely affected by it.

8.6.3 83% of sensitive receptors either benefit or are unchanged in terms of PM_{10} particulates as a result of the implementation of the proposed scheme.

8.6.4 Taking into account the strong bias towards beneficial reductions compared to adverse increases, it has been concluded the proposed scheme will be beneficial in relation to the two traffic related pollutants and that this would constitute a significant effect.

Designated sites

8.6.5 The assessments indicate the proposed scheme will have a marginal beneficial impact relative to NO_x and nitrogen deposition in the context of the three designated sites considered. It has been concluded this will not constitute a significant effect.

Regional emissions

8.6.6 The assessments have indicated that future of the proposed scheme will result in a small increase in regional emissions between 0.9 and 1.8% for the pollutants considered. It has been concluded this will not constitute a significant effect.

Construction-related dust

8.6.7 The assessments have demonstrated the scale and nature of the proposed works pose a risk of dust-related nuisance for properties within the 350m study area considered. They have demonstrated the most susceptible will be those within 50m of the working areas and to the north / north-west, which will be down wind of the works. Appropriate mitigation measures have accordingly been identified which will be implemented to control and mitigate potential dust deposition. Taking into account the measures proposed, it has been concluded dust deposition associated with the works will not constitute a significant effect.

9 Cultural Heritage

9.1 Scope of the assessments

9.1.1 Cultural heritage assets include archaeological and built heritage features and historic landscapes. An archaeological asset can be buried remains, identified through previous investigations or survey including aerial photographic survey, or upstanding remains visible as earthworks or cropmarks. Built heritage assets are upstanding structures including buildings, monuments and ruins with historical, functional, aesthetic or architectural value. Historic landscapes are areas where social and economic activity has served to shape landscapes in which there is a discernable awareness of their evolution.

9.1.2 The assessments relative to cultural heritage have been focused on:

- archaeological assets and their setting;
- built heritage assets and their setting; and
- historic landscapes.

Study Area

9.1.3 The assessments have generally been focused on known heritage assets and areas identified as having archaeological potential within a 600m wide study area centred on the proposed scheme alignment.

9.1.4 Consideration has also been given to known sites and monuments beyond this where it has been recognised the proposed scheme may have a discernible impact on their setting, the Zone of Theoretical Visibility for the proposed scheme being adopted as a basis for determining such potential.

9.2 Directives, statutes and regulations

9.2.1 The following statutes have been considered;

Planning (Listed Building and Conservation Areas) Act 1990

9.2.2 The Act makes provision for the protection and conservation of historic buildings by way of a process of listing. Identified buildings are classified as being Grade I, Grade II* or Grade II. Once listed, Listed Building Consent must be obtained from the local planning authority before works to demolish, alter or extend a listed building can be carried out. Similarly, consent must be obtained for the demolition of buildings in a Conservation Area. The Act also provides guidance on protecting the setting of listed buildings and conservation areas.

9.3 Methods of assessment

9.3.1 The assessments have been informed by the following guidance;

- DMRB, Volume 11, Section 3, Part 2 HA 208/07 - Cultural Heritage;
- The Setting of Heritage Assets (English Heritage, 2011); and
- Standard and Guidance for Archaeological Desk Based Assessment (Institute of Archaeologists, Revised 2011).

9.3.2 All three areas of assessment have involved:

- establishment of the baseline environment relative to specific features, sites and areas of cultural heritage interest and potential;
- identification and evaluation of predicted impacts on the identified assets;
- identification of appropriate mitigation measures;
- evaluation of predicted impacts taking mitigation into account; and
- description of the resultant effects relative to significance.

Establishment of the Baseline Environment

9.3.3 Establishment of the baseline environment has involved reference to existing data sources, consultation with statutory bodies and other organisations and site-based surveys.

9.3.4 The following data sources have been referred to:

- Greater Manchester Historic Environment Record (HER) (records of previously recorded assets, historic landscape characterisation data and archaeological fieldwork reports);
- Cheshire Historic Environment Record (HER) (records of previously recorded assets, historic landscape characterisation data and archaeological fieldwork reports);
- Stockport Historic Environment Database (SHED);
- National Monuments Record (NMR) (records of previously recorded assets);
- Cheshire Record Office, Manchester Record Office and Stockport Heritage Library for the following:

- *19th and early 20th century Ordnance Survey (OS) mapping at a scale of 6 inch to a mile and 25 inch to a mile;*
- *18th and 19th century Tithe Maps;*[4]
- *18th and 19th century Enclosure Maps and Estate Maps;*
- *Primary and secondary sources and documents relating to the history of the site (see individual footnotes for specific references).*

- Greater Manchester Geological Unit (aerial photographs to identify any previously unrecorded features that may appear as cropmarks or earthworks);
- previous reports undertaken for the proposed scheme include:
  - *Greater Manchester Archaeological Unit (GMAU) 1991 A6(M) Stockport North–South Bypass: An Archaeological Assessment.*
  - *GMAU 1993 A6(M) Stockport North–South Bypass: An Archaeological Assessment of the Visibility Envelope.*
  - *GMAU 1992 Norbury Mill, Stockport: Excavation Report.*
  - *GMAC 1994 A6(M) to M56 (Manchester Airport) Link Western Section: Cultural Heritage Stage 2 Assessment.*

9.3.5 Data and views concerning the proposed scheme have been sought from the following authorities, organisations and groups:

- English Heritage
- Stockport Metropolitan Borough Council,
- Cheshire East Council;
- Manchester City Council;
- Archaeology Planning Advisory Service Cheshire and Greater Manchester Archaeology Advisory Service; and

9.3.6 Site walkover surveys were undertaken in June 2003 and 2007 to identify any previously unrecorded sites, existing topography and land use.[5]

Identification and evaluation of predicted impacts

9.3.7 The identification of impacts has involved a review of the sites, features and areas and consideration of the proposed scheme to establish those which will be directly affected by construction or the presence of the proposed scheme.

9.3.8 The evaluation of predicted impacts has involved consideration of the cultural heritage value of the identified assets and the magnitude of change on the site or feature and/or its setting taking into account mitigation measures which are proposed in light of the nature of the asset affected and the nature and extent of the impact.

Cultural Heritage Value

9.3.9 Determination of value has involved consideration of the heritage assets' individual or group qualities, either directly or potentially. These qualities may include

archaeological, architectural, historic, aesthetic or social values. It has involved professional judgement guided by legislation, national policies, acknowledged standards, designations, criteria and priorities. A summary of the factors considered is provided in Table 9-1.

Table 9-1 Factors for assessing the value of heritage assets

Value	Archaeological Assets	Built Heritage	Historic Landscapes
Very High	World Heritage Sites (including nominated sites). Assets of acknowledged international importance. Assets that can contribute significantly to acknowledged international research objectives.	Structures inscribed as of universal importance as World Heritage Sites. Other buildings of recognised international importance.	World Heritage Sites inscribed for their historic landscape qualities. Historic landscapes of international value, whether designated or not. Extremely well preserved historic landscapes with exceptional coherence, time-depth, or other critical factor(s).
High	Scheduled Monuments (including proposed sites). Undesignated assets of schedulable quality and importance. Assets that can contribute significantly to acknowledged national research objectives.	Scheduled Monuments with standing remains. Grade I and Grade II* Listed Buildings. Other listed buildings that can be shown to have exceptional qualities in their fabric or historical associations not adequately reflected in the listing grade. Conservation Areas containing very important buildings. Undesignated structures of clear national importance.	Designated historic landscapes of outstanding interest. Undesignated landscapes of outstanding interest. Undesignated landscapes of high quality and importance, and of demonstrable national value. Well preserved historic landscapes, exhibiting considerable coherence, time-depth or other critical factor(s).
Medium	Designated or undesignated assets that contribute to regional research objectives.	Grade II (Scotland: Category B) Listed Buildings. Historic (unlisted) buildings that can be shown to have exceptional qualities in their fabric or historical associations. Conservation Areas containing buildings that contribute significantly to its historic character. Historic Townscape or	Designated special historic landscapes. Undesignated historic landscapes that would justify special historic landscape designation, landscapes of regional value. Averagely well-preserved historic landscapes with reasonable coherence, time-depth or

Value	Archaeological Assets	Built Heritage	Historic Landscapes
		built-up areas with important historic integrity in their buildings, or built settings (e.g. including street furniture and other structures).	other critical factor(s).
Low	Designated and undesignated assets of local importance. Assets compromised by poor preservation and/or poor survival of contextual associations. Assets of limited value, but with potential to contribute to local research objectives.	'Locally Listed' buildings (Scotland Category C(S) Listed Buildings). Historic (unlisted) buildings of modest quality in their fabric or historical association. Historic Townscape or built-up areas of limited historic integrity in their buildings, or built settings (e.g. including street furniture and other structures).	Robust undesignated historic landscapes. Historic landscapes with importance to local interest groups. Historic landscapes whose value is limited by poor preservation and/or poor survival of contextual associations.
Negligible	Assets with very little or no surviving archaeological interest.	Buildings of no architectural or historical note; buildings of an intrusive character.	Landscapes with little or no significant historical interest.
Unknown	The importance of the resource has not been ascertained.	Buildings with some hidden (i.e. inaccessible) potential for historic significance.	

Magnitude of Change

9.3.10 The magnitude of change has been determined in accordance with the criteria described in Table 9-2 below.

Table 9-2 Magnitude of change

Value	Archaeological Assets	Built Heritage	Historic Landscapes
Major	Change to most or all key archaeological materials, such that the resource is totally altered. Comprehensive changes to setting.	Change to key historic building elements, such that the resource is totally altered. Comprehensive changes to the setting.	Change to most or all key historic landscape elements, parcels or components; extreme visual effects; gross change of noise or change to sound quality; fundamental changes to use or access; resulting in total change to historic landscape character

Value	Archaeological Assets	Built Heritage	Historic Landscapes
			unit.
Moderate	Changes to many key archaeological materials, such that the resource is clearly modified. Considerable changes to setting that affect the character of the asset.	Change to many key historic building elements, such that the resource is significantly modified. Changes to the setting of an historic building, such that it is significantly modified.	Changes to many key historic landscape elements, parcels or components, visual change to many key aspects of the historic landscape, noticeable differences in noise or sound quality, considerable changes to use or access; resulting in moderate changes to historic landscape character.
Minor	Changes to key archaeological materials, such that the asset is slightly altered. Slight changes to setting.	Change to key historic building elements, such that the asset is slightly different. Change to setting of an historic building, such that it is noticeably changed.	Changes to few key historic landscape elements, parcels or components, slight visual changes to few key aspects of historic landscape, limited changes to noise levels or sound quality; slight changes to use or access: resulting in limited changes to historic landscape character.
Negligible	Very minor changes to archaeological materials, or setting.	Slight changes to historic buildings elements or setting that hardly affect it.	Very minor changes to key historic landscape elements, parcels or components, virtually unchanged visual effects, very slight changes in noise levels or sound quality; very slight

Value	Archaeological Assets	Built Heritage	Historic Landscapes
			changes to use or access; resulting in a very small change to historic landscape character.
No Change	No change	No change to fabric or setting.	No change to elements, parcels or components; no visual or audible changes; no changes arising from in amenity or community factors.

Impact Ratings

9.3.11 A preliminary impact rating for each asset has been identified using the matrix detailed in Table 9-3 taking into account proposed mitigation Each rating has then been reviewed by the assessment team using professional judgement guided by legislation, national policies, acknowledged standards, designations, criteria and priorities. The ratings have then been confirmed or modified as appropriate. Where the rating has been modified, the reasoning behind the modification has been explained.

Table 9-3 Preliminary Impact Ratings

Value	Magnitude of Impact					
		No Change	Negligible	Minor	Moderate	Major
	Very High	Neutral	Slight	Moderate or Large	Large or Very Large	Very Large
	High	Neutral	Slight	Moderate or Slight	Moderate or Large	Large or Very Large
	Medium	Neutral	Neutral or slight	Slight	Moderate	Moderate or Large
	Low	Neutral	Neutral or Slight	Neutral or Slight	Slight	Slight or Moderate
	Negligible	Neutral	Neutral	Neutral or Slight	Neutral or Slight	Slight

Mitigation

9.3.12 Where impacts have been identified, and subject to the nature of the asset and the potential impact, consideration has been given to a range of mitigation measures with a view to reducing the order of impact. These include:

- preservation in-situ;
- investigations such as geophysical survey, trial trenching and controlled site stripping to determine the value of known assets and the presence / value of unproven assets and, subject to the findings, to inform the identification of any further investigations;
- full archaeological excavation;
- preservation by record involving part or all of the following: topographic survey, excavation of sections, detailed measurement, mapping and photographic recording of assets and their setting;
- planting or earthworks to reduce impacts on the setting of known assets; and
- interpretation and dissemination of information gathered as a result of any of the above to ensure that knowledge of local, regional or national significance is preserved or enhanced.

9.3.13 Where possible mitigation provides for avoidance of the impact on archaeological assets in order that they can be preserved in situ. Where this is not possible, the assets are to be investigated as detailed in Appendix 9A and outlined in the discussion of predicted impacts and mitigation in section 9.5 with a view to preservation by record.

9.3.14 In some instances mitigation may involve a progressive sequence of measures which will be dependant on the findings of initial measures which have been proposed. For example, where a watching brief, trial trenching or controlled site stripping is to be undertaken their may be no findings of archaeological interest and further investigation will not be appropriate. Should the investigations identify features of interest it may be appropriate to progress the investigations further by way of a combination of measures such as partial or full excavation, measurement, mapping, or photographic recording. The appropriate measures will be agreed with the relevant Archaeology Officers and the results of the archaeological investigations will be disseminated by means of analysis and report.

9.3.15 The mitigation which are proposed in Appendix 9A and outline in section 9.5 have been discussed with Heritage Management Director at Greater Manchester Archaeology Advisory Service (GMAAS) and the Planning Archaeologist at Cheshire Archaeology Planning Advisory Service. Subject to the outcome of the planning application, a detailed Written Scheme of Investigation will be developed and agreed with the Heritage Management Director at GMAAS and the Planning Archaeologist at Cheshire Archaeology Planning Advisory Service.

9.4 Baseline environment

Archaeological Assets

9.4.1 The location of known and potential assets which have been subject to detailed assessment is shown on Figures 9.1 – 9.8. Each asset has been given a project specific site reference number (e.g. site 1). Detail relating to National Monument Record or Historic Environment Record references, other listings and designations and the form and nature of each asset is provided in Appendix 9A: Gazetteer of Cultural Heritage Sites.

9.4.2 The assets are described below within the context of a timeline of archaeological periods from the prehistoric through to the modern. Dates and duration of these periods are defined as follows:

- Prehistoric 250,000 BC – AD 43
- Roman AD 43 – 410
- Anglo-Saxon AD 410 – 1066
- Medieval AD 1066 – 1540
- Post-Medieval AD 1540 – 1900
- Modern 1900 – Present
- Prehistoric
- Evidence of prehistoric archaeology within the North West of England is largely based on chance finds. One such find within in the context of the study area is a flint axe found at a market garden south-west of Heald Green and north of the proposed scheme corridor (Figure 9.7 - site 87).

9.4.3 Settlement and other activity within the area of Stockport is often concentrated close to watercourses or wetlands. The primary distribution of prehistoric settlement evidence, relevant to the proposed scheme, is concentrated along the Poise Brook and Norbury Brook. Other evidence has been uncovered along the river valleys of the Mersey, Tame and Goyt.[6]

9.4.4 Evidence for prehistoric land use and environment may survive in the area to the west of the proposed scheme in the area of Shadow Moss (Figure 9.8 - **site 101**) where peat layers have previously been referred to in documentary evidence.[7] A survey undertaken by Lancaster Archaeology Unit in 1995, however, suggests that no peat is likely to survive as a result of later development.[8] Other sites of potential palaeo-environmental evidence (specifically peat layers) include Hall Moss (Figure 9.5 - **site 68**) and Woodford Moss (Figure 9.4 - **site 63**).

9.4.5 Excavations undertaken in advance of Manchester Airport's runway expansion in 1997 and 1998 at Oversley Farm, Styal, revealed the site of a Neolithic (4,000 – 2,500BC) and early Bronze Age (2500 BC – 700 BC) settlement composed of roughly circular structures and associated buildings believed to have been used as granaries.[9] This site is outside the study area but serves to show that there is a potential for prehistoric settlements within the area.

Roman

9.4.6 The North-West came under Roman rule in the AD70s and remained so until Britain was abandoned by the Empire in the early 5th century. The region was part of a frontier zone dotted with forts, notable ones in the context of the study area being at Manchester and Melandra near Glossop. Settlements and a network of roads were established beyond the forts, supporting a central administration which aimed to cement the Roman occupation of Britain.

9.4.7 Whilst there is no evidence of settlement within the study area, there are three locations where evidence suggests the presence of Roman roads. The first of these is a road built by the Romans between Buxton and Manchester. The road is thought to have been on the line of the existing A6 Buxton Road (Figure 9.1 - **site 130**) although research in the mid 20th century suggests it may have followed Carr Brow and Jacksons Edge Road east of the proposed scheme corridor[10] Place name evidence of a field to the north referred to as 'Cold Harbour' may be a reference traditionally associated with a Roman road but this location does not relate to the suggested road alignment (Figure 9.1 - **site 22**).

9.4.8 Evidence for a second Roman road, believed to have been built between Buxton and Manchester via Cheadle, has been uncovered to the north of Chester Road and Woodford Road (Figure 9.4 - **sites 51, 52, 118 and 119**). Excavations by UMAU in 1994 on the north side of Chester Road near Walnut Tree Farm revealed a gravel spread with a cambered surface approximately 7.5m wide (Figure 9.4 - **site 52**).[11] Evidence of this road was also uncovered during excavations for the Woodford to Hazel Grove pipeline in 1998. This comprised a ditch and a compacted surface some 0.4m below existing ground levels (Figure 9.4 - **site 51**).[12] The same location has been subject to trial trenching as part of the assessment for the proposed scheme. It was, however, concluded that whilst there were ditches and a compacted road surface, these are more likely to be of modern origin, though they may perhaps overlie an earlier road or routeway (Figure 9.4 - **site 52** and Appendix 9B: Fieldwork Results). The road coincided with the south-eastern length of Lumb Lane which is the former routeway linking Bramhall with Chester Road (Figure 9.4 - **site 118**) The line of this lane is partly visible as a low earthwork with evidence of ditches at its northern end. It is identified on the 1882 Ordnance Survey map as the line of a Roman road. The feature was investigated by trial trenching as part of the assessment for the proposed scheme; the results were, however, inconclusive, there being no finds

relating to a road surface (Appendix 9B: Fieldwork Results).[13] A modern ditch was uncovered whilst a second western ditch may have been earlier. Further to the north and north-west of Lumb Lane (Figure 9.4 - **site 118**) is the projected line of the same Roman road between Cheadle and Buxton (Figure 9.4 - **site 119**).

9.4.9 It is thought that a third Roman road running from Cheadle to Alderley Edge (where Roman mining activity has been uncovered) may follow the line of or run close to the modern A34. A number of Roman coins found in the vicinity of Heald Green and Handforth suggest Roman activity within the area. An evaluation trench was excavated on the line of the present A34 as part of the previous assessment for this scheme. No archaeological remains were uncovered.[14]

Early Medieval

9.4.10 The Early Medieval period began with the fall of Roman Britain in AD 410. The infrastructure which was established during the Roman Era collapsed and Britain was brought under Anglo-Saxon control. Early medieval evidence is often difficult to detect within the archaeological record and this is sometimes because the infrastructure left by the Romans was being re-used or a community may have been 'Romanised' and continued to use many of their customs. It has also been suggested that the shortage of archaeological evidence from the Anglo-Saxon period in the region may be indicative of a high rate of reuse and redevelopment of settlements as medieval hall sites (Higham 1993, 210).

9.4.11 Within the North-West evidence for Anglo-Saxon settlement is principally derived from two main sources: place-names and the Domesday survey of 1086. Place names of likely Anglo-Saxon origin associated with the study area include Poynton, Torkington and Offerton.

9.4.12 Artefactual evidence is rare, few sites having produced in-situ remains from the period. Norbury is mentioned in the Domesday Book of 1086 and it is possible that Norbury Hall Farm (Figure 9.2 - **site 41**), may be located on the site of an Anglo-Saxon settlement with the hall being redeveloped as a later medieval hall site. Trial trenching undertaken to the south of the hall in 2003 did not, however, uncover any features relating to Anglo-Saxon activity in this area (Figure 9.2 - **site 42**. Appendix 9B: Fieldwork Results).[15]

Medieval

9.4.13 During the medieval period local urban centres began to develop, including the market towns of Stockport and Macclesfield and the smaller settlements of Bramhall, and Wilmslow.

9.4.14 Evidence of medieval activity within the study area relate to the site now occupied by the later 19th century farmhouse of Norbury Hall (site 41) and a water powered manorial corn mill located on the Norbury Brook (sites 35-39).

9.4.15 An estate survey of 1808 (GMCRO E17/210/166) and 19th century local historians[16] confirm that a ruined timber framed hall stood on the spur of land to the north of Norbury Brook now occupied by the 19th century Norbury Hall . Ormerod refers to the hall as being held by the Hyde Family in the early 12th century and to it becoming the family's principal residence by the 17th century. Evaluation trial trenching undertaken at Norbury Hall Farm south of the 19th century hall in 2003 by UMAU (Figure 9.2 - **site 42**) identified the presence of an irregular cut feature, potentially representing a former pond (Appendix 9B: Fieldwork Results). Finds from the same site included a shard of pottery from the late 16th century and a fragment of brick most likely dating from the same period. Not exclusively medieval, the site may also preserve palaeo-environmental data[17]. 16th - to 19th -century pottery, 17th - to 19th -century clay pipes and 19th to 20th -century plate glass were also found on the slope of the eastern spur. This largely un-stratified collection potentially indicates the dumping of artefacts.

9.4.16 Evidence from 1479 indicates that a group of men from Manchester, Poynton and Wilmslow were accused of breaking into the windmill of Thomas Hyde, burning it down and stealing money and grain. The location of this windmill is indicated by a Windmill Field, which was situated c 1km to the north-west of the water-powered Norbury Mill and is now built over.[18] It is believed that the water powered Norbury Mill replaced this windmill and was probably built in the late 15th or early 16th century (Figure 9.1 - **sites 34**, **35**, **36**, **37** and **38**). Certainly the earliest documentary evidence relating to the mill is an agreement between John Warren and Robert Hyde dating to 1571 outlining the right to build a mill weir at Norbury. This site will be discussed in further detail in the post-medieval section below.

9.4.17 Evidence of medieval agricultural activity survives within the study area in the form of earthworks; open fields with long strips of raised ploughlands separated by narrower furrows known as 'ridge and furrow'. Ridge and furrow have been noted in several locations within the study area including north-east of Buxton Road (Figure 9.1 - **site 20**); at Outwood Farm (Figure 9.7 - **site 89 and 91**) and at Beech Farm north-west of Styal Golf Course (Figure 9.7 - **site 144 and 145**). The evidence has been identified from an examination of aerial photographs but only faint traces can be seen on the ground at **site 20**. In the North-West a medieval origin for such earthworks cannot always be derived from appearance; this type of field form can originate from ploughing from a later period or modern drainage.

Post Medieval

9.4.18 The most common local surviving remains relevant to the post-medieval period are those of rural dwellings. A farmstead at Carrwood (now demolished; Figure 9.1 - **site 39**) adjacent to the Norbury Brook in Poynton and a house or cottage known as Bowerstump (also now demolished; Figure 9.4 - **site 53**) on Chester Road were referenced in an estate survey from 1770. Other farmsteads and dwellings indicated on maps from the early 19th century, include Hawthorn Farm in Woodford (Figure 9.4 - **site 59**) and a building at Moss Nook (**site 97**).

9.4.19 A linear settlement is shown to the north of Buxton Road in the area of the proposed scheme on Ogilby's road survey of 1674 and again on Swire and Hutchings map of 1830 (Figure 9.1 - **site 7**). The settlement is believed to be the site of Hessel Grave settlement. A linear feature identified on aerial photographs may also have been associated with this settlement (Figure 9.1 - **site 8**).

9.4.20 Norbury Chapel (Figure 9.2 - **site 40**) was built at the beginning of the 17th century and was demolished in the 1830s; it was replaced by a new church in Hazel Grove. The exact site of the chapel is unknown but it is believed to be located underneath the housing estate of Darley Road.

9.4.21 Norbury Mill (Figure 9.1 - **sites 34**, **35**, **36**, **37** and **38**) is recorded on a 1777 map[19] but there are documentary references relating to a corn mill at the site in 1571, 1693 and 1709.[20] The Mill does not survive as a complete standing structure although some features are still visible: at the inlet gate is a wall of sandstone with an outer layer of brick. On the west side of the site is a stone wall, with some brick work, possibly the remains of a building[21]. The site was excavated and recorded in detail in 1991 in advance of the proposed road scheme.[22]

9.4.22 Evidence revealed that during the 19th century the mill was enlarged and housed an engine house & boiler house. During the 1930s all machinery was removed and the wheel pit was infilled for safety in 1980s[23]. After an excavation in 1991 the site was backfilled and is now completely overgrown and is characterised by depressions, mounds and visible stonework in the bank of Norbury Brook[24]. The mill leat is visible above the site as a substantial earthwork (Figure 9.1 - **site 31**). None of the remains uncovered to date suggest that the mill pre-dates the 18th century but it is possible that a medieval predecessor was directly replaced by the existing structure or that the medieval mill referred to in documentary evidence may be located elsewhere.[25]

9.4.23 An 'Important Hedgerow' shown on Tithe maps as a town boundary, and defined by the archaeological and historical criteria in Part II, Schedule I of the Hedgerow Regulations 1997, crosses the proposed scheme. 'Historic' in this context means existing before 1850. The hedgerow is on the boundary between the township of Bramhall on the north and Woodford and Poynton on the south (Figure 9.3 - **site**

117). Other possible agricultural features include a possible enclosure and field boundaries (Figure 9.1 - **site 19** and Figure 9.7 - **88**) visible as cropmarks on aerial photographs.

9.4.24 The period from the late 18th to the mid-19th century is characterised by the increasing industrial activity within the region, particularly within the cotton industry. Populations particularly in the industrial towns and villages began to rise and there were vast improvements in transport with the expansion of the network of canals, turnpike roads and later, the establishment of the railways. The site of the Norbury Toll House (Figure 9.2 - **site 43**) marks the location of one such turnpike road. A number of historic railways also cross the site including the following:

- *New Mills South Junction and Heaton Mersey Railway (Figure 9.1 - site 129) opened in 1902;*
- *Stockport, Disley and Whalley Bridge Railway (Figure 9.1 - site 131) completed in 1863;*
- *Cheadle and Macclesfield Railway (Figure 9.3 - site 133) opened in 1845; and*
- *Manchester and Birmingham Railway opened in 1840 (Figure 9.6 - site 139) and Styal Railway opened in 1909 (Figure 9.8 - site 146).*

9.4.25 The presence of a brick-making site, implied by the 'Brick Kiln' field-names, is found within the study area on the north side of the A6 (Figure 9.1 - **sites 9, 13,** and **17**).

Modern

9.4.26 The modern period is considered to be post 1900. Within the study area two golf courses of early 20th century date have been identified including Bramhall Golf Course, an 18 hole meadow course founded in 1905 (Figure 9.3 - **site 132**) and Hazel Grove Golf Course, constructed in 1913 and consisting of 18 holes (Figure 9.1 - **site 128**).

9.4.27 South of the existing A555 and east of Wilmslow is the site of a large military depot (Figure 9.6 – **site 136**) which is now largely destroyed with no buildings surviving above ground.

Built Heritage

9.4.28 There are four Grade II listed buildings where their proximity to the proposed scheme has the potential to result in impact upon their setting. One is a pre-cast concrete generator house (Figure 9.2 – **site 120)** built by W A Turner late in the 19th century to supply hydro-electric power to Barlowfold, a house he had acquired. The house is surrounded by mature trees and vegetation and beyond that, pasture fields which are separated by hedgerows and trees. The building has filtered views to Woodford Road in the north / north-west and London Road to the south-east.

9.4.29 Three of the buildings, Dog Hill Green (Figure 9.3 - **site 121**); Haybrook (Figure 9.3 - **site 122**) and The Grange (Figure 9.7 - **site 126**) are houses. Dog Hill Green,

originally built in the 17th century, was largely rebuilt in the 19th century. It has whitewashed brick walls and a slate roof. The building is located on the existing busy Woodford Road with 20th century houses opposite. There are pasture fields separated by hedgerows to north and north-west. There is some planting opposite the property and lining the Woodford Road.

9.4.30 Haybrook was also originally built in the 17th century but was rebuilt in brick in the 19th century. The building has a slate roof. The building is set back from Lower Park Road with hedgerows marking the front and rear of the property. There are pasture fields to the south, west and north. A second farm stands to the east (possibly former farm buildings now modernised). There are views to properties along Woodford Road to the north.

9.4.31 The Grange, which largely dates to the 18th century with some 19th century additions, is also constructed of red brick with a hipped Welsh slate roof. The house is surrounded by high brick walls. There is a well maintained drive with grass borders to the front of the property and some new trees. To the south-west, north-west and north-east are mature trees and vegetation. The building is set within pasture fields which are separated by hedgerows and trees. To the south and south-east is a modern housing estate.

9.4.32 There are seventeen buildings which, though not listed, are recorded on the Historic Environment Record and / or Stockport's Local List and which are of historical or architectural significance.

9.4.33 Pinfold Cottage (Figure 9.1 - **site 11**) is a 19th century brick built farmhouse. Robin Hood Public House (Figure 9.1 - **site 12**) was probably constructed in the early 20th century on the site of an earlier building. Both are located along the busy A6 Buxton Road. There are tall hedgerows on the opposite side of road with some heavily filtered views to fields to the south. There are pasture fields north of the property with tree planting on the boundary of the Hazel Grove Golf Course beyond.

9.4.34 Mill Gate Farm (Figure 9.1 - **site 18**) is a building of three phases. The central section is red brick whilst the western end is rendered and the eastern end is timber framed. The majority of the house appears to be 19th century from the exterior but may incorporate earlier fabric as indicated by its layout. The building is located on a bend of the busy A6 Buxton Road. The property is well concealed to the south-west and south by vegetation and planting. The Hazel Grove to Buxton railway line is located immediately south of the property and there are industrial premises immediately to the east and west.

9.4.35 Hawthorn Farm (Figure 9.4 - **site 59**) comprises a series of brick buildings with slate roofs probably constructed in the early 19th century. The farm is located adjacent to the busy roundabout at the junction of the A555 and Woodford Road. There are 20th

century sheds to the north of the farm set within a yard surrounded by modern brick walls and hedgerows. The farm itself is contained within brick walls with planting to the east and west.

9.4.36 Norbury Hall Farmhouse (Figure 9.2 - **site 41**) is a three storey, double gable, double pile house with accompanying stable yard constructed of red brick with stone quoins and moulded window surrounds. It is located on the site of the medieval hall of Norbury Manor and may incorporate earlier fabric. The hall and stable yard, which are set back from the A533 Macclesfield Road, are accessed via a rough drive. The position of the property on a raised plateau and the height of the building mean the building has a strong presence within the landscape and affords views across the valley to the south and south-west. To the north, north-west and north-east is a modern housing estate. To the south are pasture fields with Norbury Brook and surrounding woodland at the bottom of the slope. The fields are believed to be the location of the former settlement of Norbury.

9.4.37 Millbank (Figure 9.2 - **site 46**) is an early 19th century rendered building. It is located on a raised plateau affording views across the surrounding landscape which is composed of pasture fields separated by trees and hedgerows.

9.4.38 Distaff Farm northern barn (Figure 9.3 - **site 49**) and Distaff Farm southern barn (Figure 9.3 - **site 50**) are late 18th century structures constructed of red brick which have been recently modernised. They are set back from existing Woodford Road. Pasture fields to north, east and west. Farm is situated on a raised plateau with long distance views to north and north-east.

9.4.39 Rose Cottages (Figure 9.4 - **site 57**) is built of handmade brick and rendered on south gable. It has a modern porch on north gable and modern windows. Walnut Tree Farm Cottage (Figure 9.4 - **site 54**); Walnut Tree Farmhouse (Figure 9.4 - **site 55**) and Walnut Tree Farm Shippon (Figure 9.4 - **site 56**) are three buildings that are built of timber framing or rendered. The buildings are shown on the Swire and Hutchins early 19th century map but may have earlier origins. They are set back from the busy main Chester Road and are well enclosed by existing hedgerows. To the north the properties are open to the pasture fields beyond. These pasture fields are separated by hedgerows and trees. The properties are located amongst a row of 20th century houses and 20th century housing is visible in long distance views to the north.

9.4.40 Rose Cottage and Cherrytree Cottage (Figure 9.8 - **site 102**) and Primrose Cottage (Figure 9.8 - **site 103**) are cottages constructed of brick and are of probable 19th century origin. They are located alongside the existing busy Ringway Road. There are pasture fields to the south separated by hedgerows with views of railway to south and 20th century properties adjacent.

9.4.41 Norbury Bridge (Figure 9.2 - **site 44**) is a stone built bridge first shown on the Ordnance Survey map of 1872. It is located along the busy A533 Macclesfield Road. To the east of the bridge is a small miniature railway which uses tunnels built into the side of the bridge. The bridge passes over the Norbury Brook. There is woodland to the east and west of the bridge. The bridge has shallow stone parapets visible from the road.

9.4.42 A boundary post for the manor of Poynton (Figure 9.2 - **site 45**) is an inscribed stone probably dating to the 18th or 19th centuries. It is located within an earthen bank amongst woodland lining Norbury Brook.

9.4.43 The clock tower (former engine house) of Norbury Colliery (Figure 9.1 - **site 5**) is a three-storey brick tower with a pitched roof at the end of two adjoining two storey cottages. The three storey tower is a former pumping engine house probably built c 1840. It is located beside a narrow busy lane (Norbury Hollow Road). It is enclosed by stone walls and planting. The railway line passes to the south. There are pasture fields to west and north-west. There is a busy main road to north (Buxton Road) with views to houses lining Buxton Road and pasture fields beyond to north.

Historic Landscapes

9.4.44 The Greater Manchester Historic Environment Record and Cheshire Historic Environment Record identify fourteen Historic Landscape Types within the proposed scheme study area (Figures 9.9 to 9.12) For the purposes of consistency the Greater Manchester data has been placed into categories that combine the period and broad landscape types adopted by Cheshire.

9.4.45 There are three areas where the proposed route will pass through ancient field systems: one to the east of Woodford Road and two to the west of Handforth (Figures 9.9 & 9.12 - **type 148**). These areas have been identified from aerial photographs but no evidence is visible on the ground. The area to the west of the proposed scheme is currently used as post medieval field systems but is also an area of former prehistoric wetland known as Moss Nook (Figure 9.12 - **type 149**). The area may contain peat deposits and palaeo-environmental evidence but is currently used as pasture.

9.4.46 The proposed scheme will pass through areas of post medieval settlement (**type 150**) and post medieval industry (**type 153**). These areas include scattered properties, mostly farmsteads, dating from the 17th to the 19th centuries. Other post medieval landscape character areas include post medieval communications (**type 152**) which includes the four historic railways described in the archaeology section above.

9.4.47 The majority of the types represent post medieval field systems or post medieval agricultural improvement (**types 151 and 155**) where field boundaries shown on historic mapping dating to the 19th century can still be seen. Many of the field patterns, however, have been altered where encroachment from surrounding development or agglomeration of fields has occurred.

9.4.48 The remaining character areas are modern (dating from c.1900 to the present day) and include three golf courses (**type 166**); modern commercial (i.e. shops, retail units etc) (**type 158**); modern settlement (**type 164**); modern industry (**type 168**) and modern field systems (**type 159**). Where the scheme incorporates the existing A555, this area has been characterised as modern communications (**type 157**).

9.5 Predicted impacts and mitigation

9.5.1 The impacts on known heritage assets have been scheduled in Appendix 9A and are summarised below.

Archaeology

9.5.2 There will be impacts on known archaeological remains of negligible to medium value as a result of construction activity such as site clearance, earthworks and excavation required to establish road levels and alignment, drainage including pipe runs, balancing ponds and attenuation ponds, establishment of working compounds and landscaping. The assets that will be directly affected by permanent construction works are scheduled in Appendix 9A which details the nature of the impacts and proposed mitigation. Known assets of low value which will be affected include Buxton Linear Settlement (**site 7**); linear features (**sites 8 and 14**); areas of possible brick making (**sites 9, 13 and 17**); possible enclosure (**site 19**); areas of ridge and furrow (**sites 20, 89, 144 and 145**); field boundaries (**sites 88 and 117**); Norbury Mill leat (**site 31**); Norbury Mill House (**site 38**); Carrwood (**site 39**); Norbury Settlement (**site 42**); Norbury Toll House (**site 43**); possible Roman roads (**sites 51, 52, 118 and 130**); Bowerstump (**site 53**); structure at Moss Nook (**site 97**).The following range of mitigation measures have been identified for this group of sites: watching brief, geophysical survey, trial trenching, record by plan and section and palaeo-environmental sampling. The magnitude of change for all of these sites of low cultural heritage value will be major and the impact will be slight and adverse.

9.5.3 The proposed scheme will encroach into Hazel Grove and Bramhall Golf courses (**sites 128 and 132**). Mitigation will involve completion of a photographic record for those areas which will be affected prior to construction. The magnitude of change on both sites which are of low cultural heritage value will be minor and the impact will be slight and adverse.

9.5.4 The introduction of new bridges over three historic railways (**sites 131, 133 and 146**) will involve a negligible magnitude of change on assets of low cultural heritage value such that the impact will be neutral.

9.5.5 The remains of Norbury Mill (**sites 34, 35, 36 and 37**) were backfilled following excavation in 1991 and no further survey work will be required for the structural remains. It is possible that underlying these are earlier remains which could require recording. With the possible exception of deep features such as the wheelpit and tailrace, the remains of this site are likely to be destroyed. An archaeological watching brief will be maintained during removal of the known structural remains in order to identify any underlying archaeological features. Should these be of significance, provision will be made for their excavation. The magnitude of change will be major on an asset of medium value and the impact will be moderate and adverse.

Built Heritage

9.5.6 The proposed scheme will not have a direct impact on the four Grade II listed buildings; the generator house at Barlowfold **(site 120)** Dog Hill Green (**site 121**); Haybrook (**site 122**) and The Grange (**site 126**). The dual carriageway and its associated traffic will have a slight or negligible visual impact on the buildings though mitigation in the form of proposed planting and roadside earthworks will largely screen the appearance of both road and traffic. The proposed scheme will intrude into the wider mid-distance setting of all four buildings but not to an extent which will markedly alter the quality of the setting. The magnitude of change relative to setting will be minor for assets of medium cultural heritage value and the impact will be slight and adverse.

9.5.7 The proposed scheme will involve the loss of a large portion of the pasture fields that are located to the south of Norbury Hall Farm (**site 41**). The at-grade junction with the A523 Macclesfield Road will also involve encroachment into the curtilage of the property. The scheme will also remove the historic relationship with the manorial corn mill and Norbury Brook. Proposed mitigation provides for the introduction of Woodland planting and linear belts of trees and shrubs to screen the proposed scheme. The magnitude of change will be moderate for an asset of medium cultural heritage value and the impact will be moderate and adverse.

9.5.8 Construction of the modified junction with the A5102 Woodford Road will involve the demolition of a former outbuilding at Hawthorn Farm (**site 59**). There will be no direct impact on the red brick farm buildings. The introduction of the proposed westbound slip road will increase the existing influence of the existing A555 and its associated roundabout on the asset. Mitigation will involve a photographic record of the outbuildings and their relationship to the main farm buildings prior to construction.

The magnitude of change will be moderate relative to setting for an asset of low cultural heritage value and the impact will be slight and adverse.

9.5.9 Alignment of the proposed dual carriageway adjacent to the eastern boundary of Mill Gate Farm (**site 18**) will result in the enclosure of the asset on three sides by existing Hazel Grove to Buxton railway, A6 Buxton Road and the proposed scheme. The magnitude of change will be moderate for an asset of low cultural heritage value and the impact will be slight and adverse.

9.5.10 There are thirteen other non-designated buildings of low cultural heritage value which will not be subject to direct impact but where the proposed scheme will have an impact relative to their setting (sites **5**, **11, 12, 44, 46, 49, 50, 54, 55, 56, 57, 102, and 103)**. Proposed mitigation provides for roadside planting and / or roadside earthworks to partially or totally screen the properties. The magnitude of change for these buildings will be minor and the impact will be slight and adverse.

9.5.11 Construction of the proposed scheme will require the removal of the boundary post associated with Poynton manor (Figure 9.2 - **site 45**). Mitigation will involve the production of an English Heritage level 1 historic building survey[26] of the asset in its setting prior to its temporary removal into storage It will be relocated within the proposed scheme boundaries upon completion of construction on the line of the historic manor boundary and as close as possible to its current position. The scheme will, however encroach upon the setting of the boundary stone and will involve the removal of a large part of its woodland environment. The magnitude of change relative to setting will be moderate on an asset of low value and the impact will be slight and adverse.

Historic Landscape

9.5.12 The proposed scheme will pass through fourteen Historic Landscape Types.

9.5.13 It will pass through the three areas of ancient field systems (**type 148**) associated with Woodford Road and the agricultural area west of Handforth. At Woodford Road the alignment is located centrally through the area and will sever hedgerows which are low and regularly maintained with frequent gaps, and which define fields where there is no evidence on the ground of past ridge and furrow husbandry. West of Handforth the alignment is on the margins of the two areas representing the type. This involves encroachment into part of one, which is now occupied by a car storage facility, and a second which will sever hedgerows which are low and regularly maintained with frequent gaps and which define fields where there is no evidence on the ground of past ridge and furrow husbandry. The magnitude of change will be medium at Woodford Road and minor west of Handforth for assets of low cultural heritage value and the impact will be slight and adverse.

9.5.14 There is a potential for unknown features to be uncovered within the area of ancient field systems (**type 146**) and prehistoric wetlands (**type 147**) and a large part of these landscapes will be lost through the proposed scheme. The magnitude of change on these character areas will be moderate and the impact will be slight and adverse.

9.5.15 Construction of the proposed scheme will involve encroachment into one area of post medieval field systems (**type 151**) and one of post medieval agricultural improvement (**type 155**). In the case of the post medieval field systems type, the alignment will run centrally through an area associated with the Lady Brook and Norbury Brook valleys (Figure 9.10). It will sever field boundary hedgerows and involve the loss of tree planting established within the narrow valleys. Mitigation will comprise a pre-construction landscape survey to record features such as earthworks and field boundaries. The loss of features associated with the type and intrusion of the dual carriageway into the existing composition of components will involve a moderate magnitude of change for assets which are of low cultural heritage value and the impact will be slight and adverse.

9.5.16 In the case of the post medieval agricultural improvement type, the alignment will run through an area west of Handforth which is contiguous with the ancient field systems type in this area. It will sever hedgerows which are low and regularly maintained with frequent gaps. Mitigation will comprise a pre-construction landscape survey to record features such as earthworks and field boundaries. The loss of features associated with the type and intrusion of the dual carriageway into the existing composition of components will involve a minor magnitude of change for an asset of low cultural heritage value and the impact will be slight and adverse.

9.5.17 The site of Norbury Mill will remove a fundamental part of the Post Medieval Industry character area (**type 153**) but the majority of this site remains under woodland. The mitigation for this asset has been discussed in the Archaeology section above. Similarly some post-medieval buildings will be removed from area of Post Medieval Settlement. The mitigation for these assets has been identified in the Built Heritage section above. The removal of major features from these landscape character areas will be expected to have a moderate magnitude on the character areas with an impact rating of slight and adverse.

9.5.18 The scheme will involve the loss of a large part of some historic golf courses (**type 166**) and the mitigation for these assets has been discussed in the Archaeology section above.

9.5.19 The scheme will pass over a number of Post Medieval Communications (**type 152**) and will change the views to and from these assets having a negligible magnitude and an impact rating of slight and adverse.

9.5.20 Where modern character areas (types **158, 159 and 168**) will be affected by the proposed scheme, this will result in the loss of some minor buildings and features of low or negligible value. The magnitude of change for these assets will be negligible with an impact rating of neutral.

9.6 Conclusions and effects

9.6.1 The assessments have demonstrated that all but one of the known and potential assets of archaeological interest considered will be subject to impacts which will be no greater than slight and adverse. They have further demonstrated the impact on the one other asset, Norbury Mill, will be moderate and adverse. It has been concluded the loss of the corn mill and its associated features such as the mill race and leat **(sites 34-38)** and of the relationship to the Site of Norbury Hall **(site 41)** does constitute a significant effect in the context of the Greater Manchester conurbation and its immediate hinterland.

9.6.2 The assessments have demonstrated the proposed scheme will not involve direct impacts on any listed buildings or buildings identified as being of historical or architectural importance and that impacts on their settings will be no greater then slight and adverse other than at Norbury Hall Farm **(site 41)**. The loss of some of the agricultural land to the south which contributes to the setting of the farmhouse and encroachment into the curtilage of the building will have a moderate and adverse impact on the setting of the asset. The relationship of the site and building to its surroundings will not however be altered to the extent that the understanding of its cultural heritage value will be compromised. It has, therefore been concluded the impact does not constitute a significant effect.

9.6.3 The assessments have demonstrated that impacts related to historic landscape types associated with the proposed scheme corridor will be no greater than slight and adverse. It has been concluded that such impacts do not constitute a significant effect.

9.6.4 Taking into account the nature, distribution and relationship of the cultural heritage assets which have been subject to assessment, and the order of impacts identified, it has been concluded the impacts do not constitute a significant effect collectively either in part or in their entirety.

10 Landscape and Visual Effects

10.1 Scope of the assessments

10.1.1 The assessments relative to landscape and visual effects have been focused on:

- likely impacts on the landscape character of the urban areas, urban fringe and countryside associated with the proposed scheme corridor between the A6 and Manchester Airport; and
- visual impacts on sensitive receptors associated with the proposed scheme corridor between the A6 and Manchester Airport;

Landscape character

10.1.2 Landscape character is defined as a distinct and recognisable pattern of physical and cultural elements that occur consistently in a particular area. Aspects such as landform, hydrology, vegetation and landcover, land use pattern and cultural and historic features and associations interact and combine to create a common 'sense of place' and identity which can be used to categorise areas into definable, homogenous units known as Local Landscape Character Areas (LLCAs). The level of detail and size of LLCAs can be varied to reflect the scale of definition required and can be applied at a national, regional and local level.

10.1.3 The assessment of impacts on landscape character has investigated how the composition of physical, natural and human features and activities that frame the existing character of the proposed scheme corridor will change as a result of the introduction of the proposed scheme and its associated traffic into the landscape.

10.1.4 The assessment considers how the scale and form of the proposed scheme and its associated earthworks and structures will conflict with the existing composition of landform, hydrology, habitats and planting structure, field boundaries and land use pattern and built form. It evaluates impacts in terms of loss and/or fragmentation of key landscape components, and the consequent effect on landscape character and considers to what extent planting and other landscape design measures will serve to mitigate impacts.

10.1.5 The study area for the assessment is shown in Figure 10.1. It comprises a composite of local character areas through which the proposed scheme will be aligned and which will be located in close proximity to the proposed alignment.

Visual effects

10.1.6 The assessment of visual effects has involved the identification of areas associated with the proposed scheme from which it is anticipated the proposed road, associated structures and design features and traffic using the road will potentially appear in existing views and the extent to which this will be detrimental or beneficial to the receptors affected.

10.1.7 The areas within which receptors, and hence views, could potentially be affected are collectively known as the Zone of Theoretical Visibility (ZTV). This constitutes the study area for the visual impact assessment and is shown in Figures 10.8 – 10.9.

10.1.8 Receptors considered comprise occupiers of residential properties, users of communal and recreational areas and facilities where the visual context to these areas is an essential contributor to the enjoyment and experience of users. Examples of such areas and facilities relevant to the proposed scheme include parks and public open space, public footpaths and bridleways.

10.1.9 Assessments have been undertaken at three points in the anticipated life of the proposed scheme; during construction, in the opening year and design year. Comparison of the impacts relative to specific receptors in the Opening Year and Design Year provides a good indication of the anticipated effectiveness of the landscape proposals and mitigation measures which form an integral part of the proposed scheme and which are described in Chapter 5.

10.2 Methods of assessment

10.2.1 The assessment has been informed by the guidance provided in the following documents:

- Highway Agency's Interim Advice Note 135/10; and
- Guidelines for Landscape and Visual Impact Assessment (Third Edition), published by the Landscape Institute and Institute of Environmental Management and Assessment (IEMA) (2013).

10.2.2 Both assessments have involved:

- recording and evaluation of the status and sensitivity of landscape character and the visual context of the study area (the baseline environment);
- identification of likely impacts and their potential significance on landscape character and views experienced by visual receptors;
- identification of appropriate landscape design and mitigation measures in light of the potential impacts identified; and

- description of the predicted effects on landscape character and views taking into account proposed mitigation.

10.2.3 Please refer to Appendix 10A for a full explanation of the Methods of Assessment.

Landscape character

10.2.4 Identification of the form and status of the existing landscape has involved a combination of desk-based and site-based study and survey. The following data sources have been referred to:

- The Cheshire Landscape Character Assessment (Appendix 10B);
- Appendix 12 of the Stockport Unitary development Plan 2008 – Landscape Character Areas (Appendix 10B);
- 1:25,000 and 1:1,250 Ordnance Survey (OS) maps covering the study area; and
- aerial photography.

10.2.5 The classifications, mapping and aerial photography have been used to inform an analysis of landform, vegetation, settlement patterns, infrastructure, land use and the drainage regime of the study area and wider landscape and the drafting of preliminary locally defined LLCAs.

10.2.6 The preliminary LLCAs have been reviewed on site by two landscape architects, the preliminary boundaries being modified as appropriate and preliminary descriptions supplemented in light of the site surveys. Photographs were taken to record and illustrate the principal components and character of each LLCA. The site surveys were undertaken during 2010 and updated in 2011 and 2013.

Evaluation of impacts

10.2.7 The evaluation of impacts on each of the LLCAs has involved:

- description and evaluation of their susceptibility / sensitivity to change associated with the potential introduction of a new dual carriageway and consequent modification of the composition of landscape components and features that constitute the LLCAs; and
- consideration of the nature of the impacts on the LLCAs informed by an evaluation of the magnitude of change relative to components, features and their composite character, the extent of the resultant effect and the duration of the identified effects.

10.2.8 Each of the LLCAs has been attributed a sensitivity rating based on the evaluation of its susceptibility / sensitivity to change and taking into account the value of the landscape. Conclusions relative to value have been informed by consideration of

factors such as the physical and scenic qualities of the landscape, historic / cultural associations, relative scarcity and accessibility / use by local communities and the wider population. A three-point scale of high – moderate – low has been adopted for sensitivity. Explanation of the scale is provided in Appendix 10A.

10.2.9 Evaluation of the nature of change has involved consideration of the magnitude of change, the geographic extent of the change and the predicted duration of the change has been identified through a process of quantification, such as an area of woodland or length of hedgerow that will be lost, and description, such as modification to existing landform or the relationship between components such as settlements and open countryside. A five-point scale of major – medium – low – negligible and no change has been adopted to represent change. Explanation of the scale is provided in Appendix 10A.

10.2.10 The geographic extent of change has been described in terms of the area over which the identified impacts will have an effect such as the immediate vicinity of a part of the proposed scheme, throughout part or the whole of a particular LLCA or across a number of LLCAs.

10.2.11 Duration has involved an explanation of the timescale during which impacts and effects will occur.

Impact ratings

10.2.12 Impact ratings have been attributed to each LLCA taking into account the findings relating to sensitivity to change and magnitude of change and adopting a nine-point scale ranging from very large - large - moderate - slight and adverse through neutral to slight - moderate – large – very large and beneficial.. Indicative descriptors for the ratings are provided in Appendix 10A.

Visual Effects

The baseline environment

10.2.13 Establishment of the baseline environment for the assessment of visual effects has involved:

- drafting of the ZTV for the proposed scheme;
- identification of visual receptors within the ZTV who will be likely to have views of the proposed scheme and its associated traffic; and
- site surveys to validate the ZTV and those receptors that will be likely to have views of the proposed scheme and its associated traffic and record the form and quality of their existing views.

Zone of theoretical visibility (ZTV)

10.2.14 The ZTV has been identified by a combination of desk based review of 1:25,000 OS mapping and site survey to verify the preliminary plotting. Preliminary plotting considered landform (with a focus on principal ridgelines), areas of settlement and built development, and substantial areas of established planting.

10.2.15 The ZTV indicates those areas of land from which the proposed scheme might appear as part of a view, (refer to Figures 10.10 to 10.18). It provides a means of identifying potential receptors (viewers) in order that impact assessments can be undertaken. The ZTV is not representative of visual effects in itself nor does the presence of a receptor within the boundary indicate that the development would necessarily appear in views currently experienced by that receptor.

Visual receptors

10.2.16 Each receptor or receptor grouping identified has been visited and surveyed during site visits during 2010 and subsequently updated and reviewed in 2011 and 2013 to address changes to the design and identify new or changes to receptors. Factors considered during the visual assessment include:

- receptor type (e.g. dwelling / footpath);
- receptor height;
- existing view;
- distance of view;
- viewing position, angle of view and the position of the scheme in the outlook; and
- percentage and elements of the proposed scheme likely to be visible.

Evaluation of impacts

10.2.17 The evaluation of impacts on visual receptors has involved consideration of their sensitivity to change and the predicted nature of the change in the view.

10.2.18 Sensitivity considers the nature, context and expectations of the receptor. Least sensitive receptors are considered, for example, to be people engaged in indoor work whose primary focus is not generally on the surrounding landscape. Greater sensitivity is attached to receptors such as residential locations and users of recreational and leisure related facilities where the appearance of the landscape and quality of view is an essential part of the environmental experience. A three point scale has been adopted to represent sensitivity: high – medium – low. Explanation of the scale is provided in Appendix 10A.

10.2.19 Evaluation of the nature of change has involved consideration of the magnitude of change taking into account the predicted extent of development that will be visible, the percentage of the existing view newly occupied by the proposals and the viewing distance from the receptor to the development. Magnitude has been ranked using a five-point scale: major – moderate – minor – negligible and no change. Explanation of the scale is provided in Appendix 10A.

Impact criteria

10.2.20 The prime criteria used to evaluate visual impact relate to the extent to which existing views for the identified receptors will change, taking into account landscape proposals and mitigation measures. Consideration has accordingly been given to the size, elevation and proportion of the development in respect of the receiving environment and the degree to which activity within the receiving environment will alter during and post-construction. Cumulative visual impacts on receptors have also been into account. These are discussed in Chapter 17.

10.2.21 Impacts can be detrimental where features or key characteristics such as established planting, old buildings or structures have to be removed, directly affecting the view or outlook of a given receptor. Conversely, impacts can prove beneficial where derelict buildings or poorly maintained landscape features are restored, replaced or maintained, or where there is the introduction of new tree planting and a landscape structure where none currently exists, constituting an improvement in the current view

Visual impact ratings

10.2.22 The findings are represented using a descriptive scale ranging from large - moderate - slight and adverse through neutral to an ascending scale of slight - moderate - large and beneficial. There is a further impact rating, very large adverse, which is used to indicate impact on a receptor of very high sensitivity, significantly affecting an existing view of very high value and quality. Explanation of the impact ratings is provided in Appendix 10A.

Change over time

10.2.23 Impacts have been identified and quantified at four stages in the life of the proposed scheme:

- during construction;
- during winter in the opening year;
- during winter in the design year; and
- during summer in the design year.

10.2.24 The latter two assessments provide an indication of the effect the proposed mitigation measure will be likely to have.

10.3 Landscape character

Landscape Character Baseline Environment

10.3.1 The proposed scheme is located within a landscape of open land framed by the southern fringes of the Greater Manchester conurbation to the north, the settlements of Disley, Poynton, Woodford and Handforth to the east and south and Manchester Airport to the west. It is a landscape within which six local character areas (LLCAs) have been identified. The location and relationship between the LLCAs is shown in Figure 10.1.

LLCA - A - Norbury Brook Valley (Figures 10.2)

10.3.2 This character area is formed around an area of open countryside between the urban fringes of Hazel Grove and Norbury Moor to the north-west, Poynton to the south west and High Lane to the east. The area represents an important green buffer between the settled landscape to the west and the nucleated settlement of High Lane, representative of the settlement pattern along the Pennine fringe.

10.3.3 The heavily wooded and steep sided Norbury Brook valley is a prominent feature, located to the north west fringes of the character area and representing the upper reaches of the Ladybrook Valley. It restricts visual awareness to the urban settlement of Norbury Brook to the north west. A significant proportion of the woodland within the valley is classed as ancient woodland and makes for an attractive recreational route along the valley floor.

10.3.4 The wider area extends to the north of the existing A6 and is defined by substantial tree belts associated with the railway line enclosing several medium to large fields. There are small paddocks on the southern edge of Norbury Moor.

10.3.5 To the south of the valley the ground is flatter before gently rising to the south-east to the high ground (160 Above Ordnance Datum (AOD)) just west of New House Farm. Much of this land is open arable fields with few hedgerows. To the west the ground continues on the level to meet with the A523 Macclesfield Road, here the land provides mixed grazing for beef cattle and sheep. A number of ponds exist in the area and these usually have a number of mature trees associated with them. This area has a rural feel with the vegetation along the Norbury Brook Valley screening the urban fringe of Norbury Brook to the north.

10.3.6 Norbury Brook is contained within a steeply sided clough, heavily wooded on both sides. The mature vegetation delineates the route and the brook is only encountered when using one of the streamside rights of way or crossing the bridge at the end of

Old Mill Lane. There is a sense of tranquillity throughout this corridor, arising from the enclosed nature of the woodland and limited appreciation of the wider context.

10.3.7 Vegetation comprises pockets of scattered tracts of woodland, the most extensive being associated with Norbury Brook whilst a further broad tract of woodland is found to the south (Prince's Wood) that frames the landscape. The east of the character area is elevated above the core of the area although the landscape becomes increasingly more enclosed with smaller fields and numerous hedgerow trees combining with increased occurrence of woodland resulting in limited views across the landscape as Macclesfield Canal and the edge of High Lane is approached.

10.3.8 Public rights of way are frequent throughout the character area forming an extensive network and linking with longer distance trails such as the Middlewood Way and Ladybrook Valley Interest Trail. A single communications tower exists to the north east and is a noticeable detraction to the generally rural views of the area.

10.3.9 The general feel of the area is that of a large open landscape, broad views particularly to the south and east are contained by landform and belts of tree planting in the distance. It is visually remote from the surrounding urban development and has a distinctly rural character accommodating a number of long distance footpaths, as such it represents a recreational resource at a local level. The area does have an ability to accommodate some change as a result of quite extensive tracts of woodland, particularly to the north and west. As a result the area's sensitivity to change of the type being proposed is 'moderate'.

LLCA - B - Ladybrook Valley (Figure 10.3)

10.3.10 Ladybrook Valley and surrounding farmland extends from the Macclesfield Road (A523(T)) in a westerly direction to form a broad green swathe to the east of the affluent suburbs of Bramhall. The eastern section of the Ladybrook Valley is broader and has small to medium sized fields with wooded sides, as the valley extends westwards it narrows to form a steeply sided wooded valley typical of the area and similar in form and character to the cloughs found to the east.

10.3.11 The character area is bound by the suburbs of Bramhall to the west, the sprawling suburbs of Bramhall Green and Norbury Brook along the A5143 to the north and the A523 (T) to the east along with the northern suburbs of Poynton and the railway line (Macclesfield to Cheadle Hulme) to the south. The influence of these urban areas is limited in part by the belts of woodland and hedgerow trees that combine with the valley landform to limit broader awareness across the character area.

10.3.12 Away from the wooded valley in the north of the area the broader landscape extending to the south is typical of the north Cheshire plain being made up of

medium sized fields with occasional field ponds bordered by hedgerows with mature trees and narrow belts of woodland along drains and streams.

10.3.13 In addition to the influences of the urban areas to the fringes of the area it is not without urban elements, mainly in the form of Bramhall Golf Club that occupies the south western corner of the area, although the course is visually discreet due to extensive perimeter planting. Elsewhere isolated development occurs away from the suburbs throughout the area and is particularly noticeable along Woodford Road.

10.3.14 Rights of way occur throughout the area and combine to form a network linking Poynton in the south with Bramhall and include the Ladybrook Valley Interest Trail following the Ladybrook Valley in an east west direction. Elsewhere in the area there are mainly public footpaths with a bridleway linking the north and west of Poynton.

10.3.15 The overall appearance of the area is one of a gently undulating landscape with numerous hedgerows and trees and woodland creating a sense of containment. The Ladybrook Valley itself has an attractive appearance as hedgerows extend up the valley slopes to form belts of woodland. The area has a limited ability to accommodate some change as a result of its open nature, particularly to the east of the area. As a result the area's sensitivity to change of the type being proposed is 'moderate'.

LLCA - C - Woodford and Poynton Fringes (Figure 10.4)

10.3.16 Lying in a broad area of open countryside to the south of the A555 and bounded to the east and west by Poynton and Woodford respectively; the character area is characterised by a combination of open countryside with frequent ribbon development along a series of primary and secondary road corridors.

10.3.17 The urban influences of the adjacent settlements are limited with the A555 corridor forming a buffer with the suburbs of Bramhall to the north and the strong vegetation framework limiting broader views across the area. The fringes of the area are dominated by a mixture of land uses typical of the urban fringe, including golf courses, industrial / commercial estates, and recreational activities such as horse riding set within an eroded agricultural framework.

10.3.18 The area is crossed by both primary and secondary roads, these have led to mixed development along these corridors including residential, commercial, light industrial as well as agricultural holdings. Residential properties form ribbon development along the main communication links, the majority of the properties are semi detached or detached and set within medium to large gardens. Small pockets of grazing occur throughout these areas and are predominantly occupied by stabling and paddocks for horses.

10.3.19 Woodland is sparse within the area as a whole with the exception of Wigwam wood to the east, despite this the gently undulating landform in combination with the frequent tall hedgerows that form the majority of field boundaries interspersed with mature trees mainly oak and ash results in a high degree of enclosure within the majority of the area. The exception to this is the area around former Woodford Aerodrome – the lack of significant vegetation results in a more open feel to the character to the south and east of the area.

10.3.20 One of the other key features typical of the urban fringe within the landscape are golf courses. Moorend Golf Course is found in the west of the area, immediately adjacent to Bramhall and Woodford Road. Vegetation within the course is generally young and as such contributes little to the wider landscape, although several large mature former hedgerow trees have been retained and provide some sense of maturity.

10.3.21 Footpaths and bridleways are found throughout the area with a particular concentration found to the east of Moorend Golf Course.

10.3.22 This relatively large character area which is geographically remote form the large suburbs to the north comprises areas of open countryside, despite this the influence of ribbon development along local road corridors results in frequent urban fringes land uses. The landscape's value as an area that represents a locally important green buffer between adjacent settlements and that accommodates numerous footpaths and a recreational resource. The area has a limited ability to accommodate some change as a result of its open nature and as a result the area's sensitivity to change is 'moderate'.

LLCA - D - A555 Corridor (Figure 10.5)

10.3.23 This character area contains a noticeable green wedge between Wilmslow's increasingly urban character in the west and Woodford in the east, whilst the extensive suburbs of Bramhall and the southern edge of Cheadle form the northerly boundary. To the south the extensive agricultural landscape of the Cheshire plain extends forming LLCA C, although the area is not representative of the more rural landscapes to the south being uncultivated or grazed and with hedgerows in generally poor condition. The landform is generally flat ranging from between 80-90m AOD.

10.3.24 The area's proximity to adjacent urban settlements is an important one in that the area represents a clear delineation with the area of countryside, despite this the area is under some pressure in the form of typically urban fringe characteristics including numerous paddocks, riding stables and garden centres / nurseries. Housing is typically detached or semi detached and forms linear development along the main roads that are single carriageway with medium width footpaths on both sides. The exception to this is the existing A555 corridor.

10.3.25 The A555 links Woodford Road in the east with Wilmslow Road in the west and has a junction with the A34 along its length. In the east the road is set within extensive cutting and is largely hidden from the wider character area with only the top of the road lights and roadside planting giving any clues to its existence. In the west the road rises to cross the existing A34 before continuing at a slightly elevated level to meet with Wilmslow Road. Where views of the road do occur the road appears as a noticeable visual detractor.

10.3.26 Vegetation within the area is predominantly limited to hedgerows with numerous hedgerow trees. Management of the hedgerows varies across the area with some heavily maintained through trimming whilst others have been left to grow out to form thin leggy boundaries supplemented by post and wire fencing. Woodland within the area is sparse and confined to a few locations mainly in the central and eastern portions.

10.3.27 To the west of the A34 the land use dramatically changes to a typically light industrial and commercial one, dominated by medium sized warehouse style buildings linked by access roads. Further west the suburbs of Handforth border the character area to the south west and the junction of the A555 and Wilmslow Road as the adjacent character area (LLCA-E) is abutted.

10.3.28 To the north and west of the A34 and A555 junction the landscape is typically an agricultural one with small to medium fields bounded by a network of hedgerows and numerous mature hedgerow trees typically Oak. Scattered residential properties are found within this area along with a row of large detached properties with large gardens to the south of Stanley Road. The extensive grounds of the Royal School for the Deaf are also found in this area along with a hotel to the very west of the area.

10.3.29 The landscape lacks a sense of cohesiveness as much of the landscape structure has been interrupted primarily by the development of roads (A555 and A34) and activities within the urban fringe. Its proximity to an extensive urban area gives it some importance as a recreational resource and as a green wedge in close proximity to heavily developed urban areas. The area has an ability to accommodate some change although this is primarily associated with existing transport corridors and established development within the area. As a result the area's sensitivity to change of the type being proposed is 'low'.

LLCA - E - Heald Green / Handforth Fringe (Figure 10.6)

10.3.30 This area is typical of how the encroachment of development on the agricultural landscape has occurred in the area. Development of Heald Green to the north, Handforth to the south and farm diversification has meant that the original field pattern has been gradually eroded.

10.3.31 The character area is bounded to the north by the urban area of Heald Green development. The golf course makes up the westerly half of the area extending up to the railway line and extensive planting that forms the western boundary. The easterly boundary is formed by development along Wilmslow Road and the suburbs of Heald Green (north) and Handforth (south east). The area's relationship with the adjacent urban areas is an important one in that it provides a clear buffer and break in the wider settlement pattern between Handforth and the broader urban areas to the north.

10.3.32 Remnants of field boundaries with a number of mature trees are dotted across the golf course gradually linking into the field boundaries to the east of the area where agricultural land use returns, mainly for grazing. Only an area around The Grange would appear to have retained its original field boundaries of hedgerows with mature trees. Substantial properties including The Grange, and the small cluster set around Park Farm are dotted through the landscape, these are typically surrounded by mature gardens, paddocks and large mature trees that screen the properties from wider views.

10.3.33 A number of large commercial green houses exist in the northern section of the area at Yew Tree Farm that further emphasises the diverse nature of the local land uses. These form a noticeable element in the local landscape particularly from local footpaths.

10.3.34 Field ponds are typical of the wider area and occur throughout the area typically associated with stands of mature trees that contribute towards the local landscape character.

10.3.35 To the north west of the character area the landscape opens up to large interlinked fields grazed by a large beef herd. Here the hedgerows remain with a number of mature trees and field ponds. Awareness of the setting within the urban fringe remains with the upper floors of office buildings associated with large developments around the airport visible to the north partially screened by belts of trees.

10.3.36 Overall the landscape is flat with a mixed land use. The mature trees in the area give a feeling of a contained landscape particularly in summer. Footpaths across the area are generally well sign posted and appear to be well used probably due to their close proximity to the large residential areas to the north, south and east.

10.3.37 The landscape retains much of its landscape structure, including numerous mature trees although a substantial part of the area is laid out as a golf course. Its proximity to an extensive urban area as well as footpath access to a wider network would suggest that it has value as an important green buffer between development to the north and south east. The area has an ability to accommodate some degree of change although this is primarily associated with existing development areas within

the area. As a result the area's sensitivity to change of the type being proposed is 'moderate'.

LLCA - F - Moss Nook (Figure 10.7)

10.3.38 A small character area bordered to the north by Simons Way, in the east by the existing railway line and extensive planting bordering LLCA-E, to the south by the northern edge of as marked by Moss Lane and to the west by the open expanse of Manchester Airport.

10.3.39 One of the key features of the area is the frequency and scale of the communication routes that converge in the area; road and rail links extend in a north south and east west direction linking to the airport and extensive suburbs of Wythenshawe. These transport corridors result in a fragmented landscape framework with remnants of field boundaries and hedgerow trees.

10.3.40 The remaining open areas are made up of a mosaic of glasshouses, nurseries and the remnants of agricultural land still used for grazing. Development has mainly occurred along the main road links in a series of residential ribbon developments extending from the junction of Styal Road with Ringway Road West to result in a limited appreciation of the agricultural landscape beyond the local development. Commercial development occurs in the north east of the area as part of the mosaic of mixed development typical of the wider area.

10.3.41 The area has a feeling of movement with the busy local roads, aircraft landing/taking off at the airport and areas of development all increasing the sensation of movement and change and sense of enclosure and pressure for further development.

10.3.42 The area's landscape structure has been eroded and interrupted primarily by the development of roads, rail corridors and the encroachment of airport related activity resulting in a lack of cohesion. Access via footpaths and bridleways is limited within the north of area however its proximity to an extensive urban area gives it some value at a very local level as a recreational resource. The area is already heavily urbanised and as such is capable of accommodating further change of the type proposed, as a result the area's sensitivity to change is 'low'.

Summary of Baseline Conditions

Landscape Character

10.3.43 Table 10-1 summarises the baseline conditions associated with each identified LLCA.

Table 10-1 Summary of landscape sensitivity

Landscape Character Area	Sensitivity to Change

Landscape Character Area	Sensitivity to Change
A – Norbury Brook Valley	Moderate
B - Ladybrook Valley	Moderate
C – Woodford and Poynton Fringes	Moderate
D – A555 Corridor	Low
E – Heald Green / Handforth Fringe	Low
F – Moss Nook	Low

10.3.44 Several areas have a coherent landscape pattern comprising a strong network of hedgerows and hedgerow trees that contribute to a landscape framework that would be sensitive to change, these primarily occur through the eastern section of the study area and to the south of the Heald Green suburbs.

10.3.45 Elsewhere the landscape comprises poorer quality landscape features that are frequently found forming an urban fringe landscape and are commonly associated with residential areas.

10.3.46 With the exception of the areas forming the Lady Brook Valley and Norbury Brook Valley to the east and which are considered to be of good quality and medium sensitivity, the landscape of the wider study area is best described as being of poor to ordinary quality with a low sensitivity to change.

Predicted impacts and mitigation

10.3.47 The predicted impacts taking into account the landscape proposals and mitigation measures described in Chapter 5 and shown in Figures 5.29 to 5.44 are described below.

LLCA - A - Norbury Brook Valley

10.3.48 The introduction of the proposed scheme and associated cuttings and screen mounding will result in a significant modification to the fringes of the character area. The loss of an area of farmland to the north of the A6 will extend the urban influences resulting in a perceptible change in the context of the landscape in this area.

10.3.49 The enclosed landscape to the north of Norbury Brook will accommodate the proposed route effectively, the existing woodland limiting the effect on the farmland to the south. North of the brook, there will be a significant change in the elements within the landscape and the proximity of the proposed scheme to the housing to the north. Screen mounding in combination with woodland to provide visual screening will alter the context of this corridor resulting in a more wooded appearance.

10.3.50 Modification to the existing profile of the Norbury Brook including loss of woodland and the diversion of the water course will result in a noticeable change to the character of the valley resulting in briefly exposed views out of the valley and the introduction of a new and highly disruptive feature.

10.3.51 Mitigation measures will reduce the effect on existing woodland to maintain where appropriate the existing framework, utilising woodland planting strategies to integrate the scheme into the context of the area.

10.3.52 Key mitigation measures here comprise:

- extensive use of false cutting and associated planting to limit broader appreciation of the proposed scheme within the area;
- restoration of hedgerow boundaries to reinstate the existing landscape framework; and
- reinstatement of the woodland associated with Norbury Brook, restoring the linear features within the landscape.

10.3.53 The area's overall ability to accommodate change is relatively low; however the fringes of the character area to the north of the Norbury Brook is visually contained and as such has a moderate / high ability to accommodate change. Overall, the magnitude of impact will be in the order of moderate as the changes will be largely contained to the northern section of the character area although where impacts do occur they are considered to be of major magnitude. The resulting effect at the year of opening will be moderate / large adverse reducing to moderate adverse in the Design Year.

LLCA - B - Ladybrook Valley

10.3.54 With the exception of the crossing of the Lady Brook Valley the proposed scheme is broadly at grade although extensive lengths of false cutting in combination with woodland planting is proposed between London Road and Mill Hill Hollow. This will result in a perceptible change in the adjoining landform and a broadening of the belt of woodland that currently exists along the length of the existing watercourse.

10.3.55 The proposed embankments proposed at the crossing of the Lady Brook Valley represent a major modification to the existing landform, truncating the valley and introducing a new and visually intrusive element. Woodland planting associated with the embankment slopes will reduce the impacts on landform and vegetation over time as the planting matures but the awareness of the road will remain.

10.3.56 South of Mill Hill Hollow the landform flattens, the scheme crosses this landscape set within a slight cutting and results in the severing of four hedgerows and the loss of a number of mature hedgerow trees. The reinstatement of the field boundaries where

they have been modified will over time reduce awareness of the proposed scheme within this landscape however awareness of the movement of traffic will remain in the longer term.

10.3.57 The approaches to the crossing of Woodford Road by the proposed scheme will result in a significant modification to the existing landscape framework of hedgerows and mature hedgerow trees. The introduction of two new overbridges to accommodate a footpath and Woodford Road itself will introduce new elevated features within the landscape which will be slightly at odds with the undulating landform. Mitigation in the form of hedgerows and pockets of shrubs and trees will soften the appearance of these elements and the road set within cutting will limit awareness of the road within the wider landscape.

10.3.58 Mitigation measures comprise:

- false cutting associated with woodland planting to integrate the road into the existing landform and vegetation framework between Macclesfield Road and Mill Hill Hollow;
- provision of woodland, species rich grassland and blocks of woodland to create a local recreational resource in association with Norbury Brook;
- extensive use of woodland planting to screen views from adjacent properties and integrate the proposed embankments at the crossing of the Ladybrook Valley;
- the reinstatement of hedgerows and intermittent trees will reflect local vegetation patterns to the elevated farmland south of Mill Hill Hollow;
- the extension to the toe of the embankment to the north of the main alignment will integrate the road into the existing landform and provide an opportunity for false cutting to screen views from properties to the north on Woodford Road;
- blocks of woodland will in association with the crossing of Woodford Road provide integration and screening to adjacent properties to the north and south; and
- extended embankments to be planted on the upper sections and handed back for agriculture on the lower slopes will be aimed at integrating significant change in the landform between Woodford Road and the railway line.

10.3.59 The area's ability to accommodate change is considered to be low due to the complex nature of the vegetation framework in the north of the area combined with the open characteristics of the southern half of the area. Overall the magnitude of impact will be in the order of moderate but at the upper end of the scale, the road representing a new element at odds with the local landscape character. Effects will

be large and adverse at the year of opening; this is anticipated to reduce to moderate in the Design Year.

LLCA - C - Woodford and Poynton Fringes

10.3.60 The varying landscape forming the fringes of Woodford and Poynton will be significantly impacted upon by the proposed alignment arising as a result of the introduction of an at grade junction with a link to the existing A5149 (Chester Road). The existing agricultural landscape will be significantly altered by the construction of the junction, the loss of significant lengths of hedgerows and a number of mature hedgerow trees.

10.3.61 The changes will comprise the introduction of the scheme corridor running in a broadly east – west direction traversing the core area of the character area that comprises an area of farmland and a golf course that forms a buffer between Bramhall to the north and the fringes of Woodford and Poynton to the south. The majority of the scheme will be set within cutting or screened by false cutting with some of the lower slopes to be handed back to agricultural use post construction, however the loss of views and sense of openness will be eroded.

10.3.62 Significant changes to the existing landform and vegetation framework require substantial mitigation measures to integrate the proposed junction into the landform and provide appropriate levels of screening to adjacent properties.

10.3.63 Key mitigation measures will comprise:

- extended embankments to be planted on the upper sections and handed back for agriculture on the lower slopes will be aimed at integrating significant change in the landform between the railway line and the oil terminal access road;
- extensive lengths of false cutting adjacent to the proposed junction with the link to Chester Road will provide appropriate screening to adjacent properties in the year of opening, additional screening in the form of shrubs with intermittent trees will in the medium to long term provide effective screening and integrate the earth mounding into the local landscape;
- formation of a new recreational resource to the north of the alignment in the form of footpaths, woodland and ecological compensation ponds will replicate features in the landscape; and
- extensive areas of agricultural handback following construction with the aim of maintaining existing elements in association with new mitigation infrastructure.

10.3.64 The area's ability to accommodate change is considered to be in the order of moderate, with major infrastructure elements such as the oil terminal and existing A-

road network, elements associated with the scheme will not appear incongruous in the wider landscape. Overall the magnitude of impact will be in the order of moderate as the road will represent a noticeable new element within the local landscape character. The effect at the year of opening will be moderate adverse reducing to slight adverse in the Design Year although at the upper end of the scale.

LLCA - D - A555 Corridor

10.3.65 The scheme will include the re-modelling of the existing junction of the A34 with the A555 and the B5094 (Stanley Road) as well as the formation of a new cycle way running parallel and to the north of the existing A555 corridor.

10.3.66 Localised changes to the existing road corridor will be limited to the widening of the existing road and small scale change arising through the introduction of the footpath, cycleway and the resulting loss of some roadside vegetation. The effect on the landscape character will not be significant and will through the introduction of replacement planting be effectively mitigated in the medium to long term.

10.3.67 Mitigation measures will be proposed to assist with the tie in of the new proposals from the roundabout link with the Poynton Bypass and improvements to the existing junction of the A555 and A34.

10.3.68 Mitigation measures will comprise:

- the widening of the footprint and junction with the A5102 will necessitate the formation of a new junction requiring the replacement of planting removed with new woodland planting to screen views of the junction and cutting from the north and south; and
- where removed replacement roadside planting in the form of shrubs and intermittent trees arising as a result of the removal of existing vegetation to facilitate improvements to the junction.

10.3.69 The area's ability to accommodate change is considered to be in the order of moderate / high; the existing major road network elements associated with the scheme will not appear as significant within the wider landscape. Overall the magnitude of impact will be in the order of low as the re-modelling of the existing highway and new cycle way will not be noticeable new elements within the local landscape character. The effect at the year of opening and further to the Design Year will be neutral.

LLCA - E - Heald Green / Handforth Fringe

10.3.70 The scheme transects the central core of this character area in a broadly east west direction, at grade to link with the junction of the existing A555 in the east to the railway line forming the western boundary. The proposed scheme will be set within a

combination of low false cutting and mitigation planting that will provide some screening to elements of traffic, planting to the mounding will also provide additional screening but will also serve to integrate the proposed scheme into the wider landscape setting, restoring field boundaries and overall landscape framework.

10.3.71 The generally flat landform through this character area will not be significantly affected. Local earth mounding to form false cutting will not be particularly high and will only have a very limited impact immediately adjacent to the road, impacts on the wider landscape setting will be negligible.

10.3.72 The proposed scheme will result in the severance of field boundaries to form a number of isolated pockets of land to be used for ecological mitigation measures. A number of mature trees will also require removal to accommodate the scheme within the current landscape framework. This will not have a significant impact on the local landscape character as the area has frequent mature trees that will be retained and as such the landscape framework will be largely retained.

10.3.73 Mitigation will seek to provide sufficient screening through the use of landscape mounding and planting to reduce the visual intrusion of the scheme into the local landscape whilst also aiming to integrate the scheme into the local landscape framework through the restoration of field boundaries.

10.3.74 Key mitigation measures will comprise:

- remnant fields parcels to be utilised for the provision of ecological compensation and enhancement ponds in association with blocks of woodland, shrubs and trees to integrate the proposed scheme into the existing landscape context;
- dense mitigation planting in association with the proposed footbridge to screen this elevated structure within the wider landscape; and
- extensive false cutting in locations where the proposed alignment is at grade to provide an immediate screen to wider views of the proposed scheme within the landscape, associated shrub and woodland planting will in the medium to long term provide additional screening and integrate the false cutting into the existing vegetation framework.

10.3.75 The area's ability to accommodate change is in the order of moderate, the generally flat landscape is frequently interrupted by mature hedgerows and trees. Overall the magnitude of impact will be in the order of moderate as the road will be a noticeable new element within the local landscape character. The effect at the year of opening will be moderate adverse reducing to slight / moderate adverse in the Design Year.

LLCA - F - Moss Nook

10.3.76 Changes to landscape character within the area will be restricted as a result of the proposed scheme being set within an already heavily modified landscape that comprises existing transport corridors. The proposed junction with Styal Road will result in a modification to the existing road layout although the magnitude of impact is not anticipated to be significant.

10.3.77 To the west the proposed scheme lies immediately adjacent to the existing rail corridor, several hedgerows will be severed although mitigation measures have been designed to reinstate local linkages where appropriate.

10.3.78 Mitigation measures will provide planting either side of the proposed scheme gradually providing screening to the proposed scheme and introducing extensive belts of low level planting. Mitigation measures are restricted within the vicinity of the airport to reduce high level planting that will provide cover for birds and thus increase the risk of bird strikes.

10.3.79 Key mitigation measures here will comprise:

- shrub planting between the alignment and railway line aimed at replacement existing planting removed by the construction of the new road; and
- inclusion of a screen fence and narrow belt of planting to the outer edge to provide a visual screen to dwellings on Ringway Road West.

10.3.80 The area's ability to accommodate change is in the order of high due to the existing network of communication links and fragmented landscape pattern. Overall the magnitude of impact will be in the order of low / moderate as the road will be a perceptible new element within the local landscape character. The impact at the year of opening will be slight / moderate adverse reducing to slight adverse in the Design Year.

10.4 Visual context

10.4.1 Most of the visual receptors are residential dwellings overlooking an urban fringe landscape that is generally of an ordinary quality. This is most noticeable to the north of the route corridor where the limit of the urban area is well defined and direct views of the open countryside frequently occur.

10.4.2 To the west of Poynton and south of the suburbs of Bramhall and Heald Green visual receptors are slightly less frequent and typically have views of open countryside with fewer visual detractors.

10.4.3 Around the airport existing views are frequently interrupted by transport corridors, traffic and aircraft abound and views are rarely still or harmonious. Receptors here are considered to have a lower sensitivity to change.

Visual Receptor Baseline Environment

10.4.4 The principal visual receptors contained within the previously identified ZTV, including residential/commercial property and defined rights of way and that have an appreciation of the proposed route have been outlined below.

The eastern and southern edges of Norbury Moor

10.4.5 Principal receptors comprise:

- a number of properties along Buxton Road.
- dwellings overlooking pasture and woodland along Mill Lane, Old Mill Lane and Millbrook Fold.
- mainly detached properties with rear facing views along Ashbourne Road, Darley Road.
- period Properties around Norbury Hall and residential properties along Macclesfield Road.
- detached properties with rear facing views overlooking fields and woodland along Sheldon Road, Longnor Road, Elton Drive, Wensley Drive and Malton Drive.
- public Right of Way (FP75, FP76, FP109, FP15C, FP62C, FP64C, FP 65, FP65C, FP66)

The northern and western edges of Poynton

10.4.6 Principal receptors comprise:

- modern development with views to the north west includes properties on Dundrennan Close, Abbotsbury Close, and Easby Close.
- properties overlooking the local pastoral landscape along Woodford Road include: Lower Park Crescent, Woodford Road and Lower Park Road.
- public Right of Way (FP3, FP37, FP31, FP27, FP75,)

The southern edge of Bramhall

10.4.7 Principal receptors comprise:

- semi detached properties with rear facing views along Meadway and Albany Road.

- Bramhall Queensgate Primary School.
- Woodford Road and Chester Road.
- properties with views of Woodford Recreation Ground along Regent Close and Highfield Parkway.
- residential properties along Patch Lane, Eskdale Avenue and Moss Lane.
- caravan Park on Spath Lane East.
- public Right of Way (FP14a, FP15, FP16, FP19, FP13)

Stanley Green

10.4.8 Principal receptors comprise:

- residential properties adjacent to the existing A34 along Longsight Lane, Stanley Road and St James Way.
- detached properties along Henbury Lane.
- public Right of Way (FP14a, FP15, FP16, FP19, FP13)

The southern edge of Woodhouse Park / Moss Nook

10.4.9 Principal receptors comprise:

- a mixture of properties along Ringway Road.
- terraced and semi detached properties to the edge of Woodhouse Park including; Shadowmoss Lane, Carsdale Road, Thornsgreen Road, Lincombe Road.
- office blocks forming Manchester Business Park.
- public Right of Way (FP50, FP128, FP129, FP140, FP141, FP80, FP81, FP42, FP35, FP97, FP101, FP100, FP99, FP33, FP143)

The southern edge of Heald Green

10.4.10 Principal receptors comprise:

- a mixture of properties along Bolshaw Road and Bolshaw Farm Lane.
- semi detached properties along Davies Avenue.
- recently converted farm at Bolshaw Farm to several homes
- isolated farms and Outwood Farm.
- public Right of Way (FP258, FP7, FP10, FP86)

The northern fringe of Handforth

10.4.11 Principal receptors comprise:

- flats and bungalows along Clay Lane.
- a small number of properties along Wallingford Road.
- a number of two storey properties overlooking bungalows on Clay Lane along Windermere Road.
- public Right of Way (FP119)

The southern edge of Woodhouse Park / Moss Nook

10.4.12 Principal receptors comprise:

- a mixture of properties along Ringway Road.
- terraced and semi detached properties to the edge of Woodhouse Park including; Shadowmoss Lane, Carsdale Road, Thornsgreen Road, Lincombe Road.
- office blocks forming Manchester Business Park.
- public Right of Way (FP253, FP261)

Predicted Visual Effects

10.4.13 The findings of the detailed visual effect assessment for identified receptors have been tabulated within Appendix 10C: Visual Impact Table, with each receptor and receptor grouping depicted in Figures 10.10 to 10.18. The following table summarises the anticipated level of impact for each stage of scheme development on identified receptors.

Table 10-2 Summary of impacts on visual receptors

Impact Rating	Number of Receptors			
	Construction	Year of Opening	Winter 15 Years	Summer 15 Years
Large Beneficial	-	-	-	-
Moderate / Large Beneficial	-	-	-	-
Moderate Beneficial	-	-	2	7
Slight / Moderate Beneficial	-	-	5	-
Slight Beneficial	-	15	10	10

Impact Rating	Number of Receptors			
	Construction	Year of Opening	Winter 15 Years	Summer 15 Years
Neutral / Slight Beneficial	-	-	11	11
Neutral	17	161	447	535
Neutral / Slight Adverse	41	41	160	98
Slight Adverse	234	338	197	183
Slight / Moderate Adverse	157	137	17	35
Moderate Adverse	244	146	159	138
Moderate / Large Adverse	67	79	13	6
Large Adverse	250	104	2	-
Very Large Adverse	13	2	-	-

10.4.14 A total number of 1021 properties have some visual appreciation of the alignment, effects vary between moderate beneficial to neutral and onto very large adverse as described in Section 10.3.

10.4.15 Construction effects vary between neutral and very large adverse, due in main to the scale of construction activities at a number of locations and their proximity to receptors. The majority of effects fall in the order of large adverse (250), whilst a similar proportion are considered to be in the order of moderate adverse (243) and slight adverse (233). A number of sensitive receptors (13) with very significant magnitude of impact are considered to result in a very large adverse effect, although it is important to note that construction activities are temporary in nature and occur within a defined timescale.

10.4.16 At the winter of the year of opening the most significant proportion (337) of receptors are considered to have a slight adverse effect, the number of receptors undergoing slight moderate adverse to large adverse effects has significantly reduced due mainly to the establishment of some mitigation measures (earth mounding, cuttings, false cuttings) integrating the alignment into the local landform. A small number of receptors (106) continue to suffer an effect of large adverse or greater, predominantly due to the loss of attractive views to be dominated by new road structures and traffic fundamentally changing views.

10.4.17 A smaller number of properties (15) are anticipated to be afforded a slight beneficial effect, this is predominantly due to a reduction in views of existing traffic through the diversion of traffic away from the existing A6 (Hazel Grove).

10.4.18 In the winter and summer of the Design Year identified mitigation measures will have a substantial influence on the level of effect. The number of receptors undergoing a moderate adverse visual effect is anticipated to remain in the region of 159. Thirteen (13) receptors will experience moderate to large adverse effects during the winter, reducing to six (6) receptors in the summer of the Design Year. Large adverse visual effects will substantially addressed with two (2) large adverse effects being mitigated with the most significant effects being no greater than moderate to large adverse indicating that the proposed mitigation measures will reduce the visual effect of the proposed alignment.

10.4.19 A small number of properties (28) will be afforded a beneficial change in views, ranging between neutral to slight beneficial through to moderate and beneficial, as proposed mitigation measures will provide screening to existing roads and junctions and improving existing poor quality views.

10.4.20 Overall the visual effect of the alignment is considered to be slight and adverse at the year of opening. Following the establishment of mitigation planting and in support of other mitigation measures visual effects will reduce to neutral for the most significant number of receptors during the winter and summer of the Design Year.

10.4.21 The following table summarises the anticipated level of impact for each stage of scheme development on identified rights of way.

Table 10-3 Summary of Impacts on Rights of Way

Impact Rating	Number of Receptors			
	Construction	Year of Opening	Winter 15 Years	Summer 15 Years
Large Beneficial	-	-	-	-
Moderate / Large Beneficial	-	-	-	-
Moderate Beneficial	-	-	-	-
Slight / Moderate Beneficial	-	-	-	-
Slight Beneficial	-	-	-	1
Neutral / Slight Beneficial	-	-	2	1
Neutral	-	13	15	19

Impact Rating	Number of Receptors			
	Construction	Year of Opening	Winter 15 Years	Summer 15 Years
Neutral / Slight Adverse	6	1	8	8
Slight Adverse	13	12	10	9
Slight / Moderate Adverse	4	4	5	4
Moderate Adverse	10	10	3	1
Moderate / Large Adverse	6	3	-	-
Large Adverse	5	1	1	1
Very Large Adverse	-	-	-	-

10.4.22 A total of 44 footpaths including bridleways and local footways have been deemed to experience a change in existing views as a result of the proposed scheme. During the construction phase a small number of footpaths (5) undergo large adverse effects, three of these (FP109, FP76, FP3) comprise the Ladybrook Valley Interest Trail – a locally designated footpath; with a slightly greater number experiencing a slight (13), moderate (10) and moderate / large (6) adverse effect.

10.4.23 Post construction in the year of opening impacts on footpaths broadly reduce in magnitude as a result of less activity and disturbance from associated plant and activity. The number of footpaths experiencing neutral effects increasing from 0 to 13 and the number experiencing large and adverse from 5 to 1.

10.4.24 Mitigation measures aimed at integrating the scheme into the local landform and landscape framework will result in a further reduction in footpaths experiencing effects between moderate to large adverse during winter in the Design Year. This results in a slight increase in the number of receptors undergoing a change in the order of neutral / slight beneficial through to slight / moderate adverse with the greatest number experiencing effects of slight adverse or less.

10.4.25 The summer of the Design Year results in a single receptor experiencing a slight beneficial effect with a further single receptor remaining as a neutral / slight beneficial effect. The majority of the remaining effects on footpaths are considered to vary between neutral and slight / moderate adverse with the greatest number of footpaths (19) experiencing a neutral impact. A relatively small number of footpaths (2) are anticipated to experience a significant effect with a one of these (FP76) that crosses Norbury Brook and forms a short length of the Ladybrook Valley Interest Trail anticipated to be subject to large and adverse effect as a result of a significant

change to the experience of the users, loss of woodland and substantial new bridge construction.

10.5 Conclusions and effects

10.5.1 The proposed scheme will generally integrate into the receiving landscape effectively, although there will be localised impacts to landscape character that will remain significant in the long term. These will occur:

- north of Norbury Brook in LLCA A;
- where the proposed scheme crosses the Ladybrook Valley in LLCA B;
- at the Bramhalll Oil Terminal in LLCA C; and
- at the crossing of the West Coast Mainline in LLCA C.

10.5.2 Moderate and adverse landscape effects will occur at the western end of the proposed scheme in LLCA E in the short term reducing to slight/moderate adverse in the design year.

10.5.3 The assessment has determined that the effect on landscape character will be significant in the short term and is likely to remain so into the medium to long term.

10.5.4 Large adverse and long term visual impacts will occur to two receptors at the southern end of Old Mill Lane in the winter of the Design Year. Moderate to large adverse effects will occur to a further 13 residential receptors in the long term during winter, reducing to six in the summer.

10.5.5 A single public right of way at FP76 will receive long term significant visual impacts during both winter and summer. An additional three public rights of way will receive moderate adverse impacts in the long term during winter reducing to a single public right of way receiving moderate adverse impacts during summer of the Design Year.

10.5.6 The assessment has concluded the effect on a small number of visual receptors will remain significant in the medium to long term.

11 Nature Conservation

11.1 Scope of the assessments

11.1.1 This chapter reports the findings of the assessments relating to:

- Norbury Brook SBI
- The following habitat types:
  - *semi-natural broad-leaved woodland,*
  - *semi-improved grassland,*
  - *open water (ponds);*
  - *running water;*
  - *hedgerows; and*
  - *Schedule 9 plants*
- The following fauna:
  - *badger;*
  - *bats;*
  - *otter;*
  - *hedgehog;*
  - *brown hare;*
  - *GCNs;*
  - *common toad;*
  - *common reptiles;*
  - *kingfisher; and*
  - *breeding birds*

Study areas

11.1.2 The study areas for the assessments have been:

- Norbury Brook SBI / the boundary of the designated site.
- habitats / the proposed permanent land take and temporary working areas and contiguous areas of habitat where they extend beyond the land take.
- GCNs / 500m either side of the proposed permanent land take.
- Badger / 50m either side of the proposed permanent land take.
- Otter / along Lady Brook and Norbury Brook where the two watercourses cross the land take and a further 100m along both watercourses either side of the land take.
- Bats / a corridor comprising the proposed land take and extending 100m either side of the land take.

- Bats (roost potential) / proposed land take and any temporary working areas beyond the permanent land take.

11.1.3 Consideration has also been given to the extent of the habitat types and habitat potential in the wider area and historic records relative to the presence of species to inform the evaluation of conservation status of the resources which have been subject to assessment.

Timescales

11.1.4 The assessments consider impacts which will be associated with the construction of the proposed scheme such as disturbance of species located close to areas of construction activity and impacts associated with future use of the proposed scheme such as potential bat collision with vehicles using the dual carriageway.

11.2 Directives, statutes and regulations

11.2.1 The following directives, statutes and regulations have been taken into account:

Conservation of Habitats and Species Regulations 2010

11.2.2 Species ("European Protected Species" or EPS) highlighted as requiring conservation by all EU member states are protected in the UK by The Conservation of Habitats and Species Regulations 2010. EPS are protected from deliberate capture, injury or death, disturbance, and destruction of their places of rest or shelter.

Wildlife and Countryside Act 1981 (WCA),

11.2.3 Protects EPS in a similar way to the Conservation of Habitats and Species Regulations 2010 and relates to all wild birds and their nests and all UK reptile species, The WCA also makes provisions for the control of invasive non-native species, such as Japanese knotweed *Fallopia japonica* and Himalayan balsam *Impatiens glandulifera*, and makes it illegal to cause such plants to grow in the wild.

Protection of Badgers Act 1992

11.2.4 Offences regarding Badgers (*Meles meles*) (e.g. killing, injury and cruel treatment, damage to or destruction of their setts) are covered by this act.

Natural Environment and Rural Communities Act 2006

11.2.5 Section 41 of the Act comprises schedules of habitats and species which have been identified as being of principal importance by the UK government.

11.3 Methods of assessment

11.3.1 The assessments have been informed by the Guidelines for Ecological Impact Assessment in the United Kingdom (2006), published by the Institute of Ecology and Environmental Management (IEEM).

11.3.2 The guidelines define an ecologically significant impact (and hence one that is likely to result in a significant effect) as follows – '*a significant impact, in ecological terms (whether negative or positive), is defined as an impact on the integrity of a defined site or ecosystem and/or the conservation status of habitats or species within a given geographical area.*'

11.3.3 For the purposes of these assessments, the definitions for integrity and conservation status recommended in the IEEM Guidelines have been adopted as indicated below:

- The integrity of a site is the coherence of its ecological structure and function, across its whole area that enables it to sustain the habitat, complex of habitats and/or the levels of populations of the species for which it has been classified.
- Conservation status relating to habitats has been determined by the sum of the influences acting on a habitat and its typical species that may affect its long-term distribution, structure and function as well as the long-term survival of its typical species within a given geographical area.
- Conservation status relating to species has been determined by the sum of influences acting on the species concerned that may affect the long-term distribution and abundance of its populations within a given geographical area.

11.3.4 The assessments have accordingly taken into account the composition and status of the sites, habitats and species under consideration, including their importance relative to geographical context (the baseline environment), and the nature of the predicted impact to enable an evaluation of significance based on the above definitions to be made. The findings relating to significance take into account proposed mitigation identified in light of the value of the receptor and the nature of the impact. An indication of certainty relative to the identified impacts has also been provided as recommended in the IEEM Guidelines.

Establishment of the baseline

11.3.5 Establishment of the baseline has involved a combination of desk-based studies, site surveys and consultations with statutory and non-statutory nature conservation organisations. The desk-based studies involved reference to the following data sources:

- Multi Agency Geographic Information Centre website (www.magic.defra.gov.uk);
- Natural England website (www.natureonthemap.org.uk);
- Ordnance Survey (OS) website (www.ordnancesurvey.co.uk);
- Environment Agency's environmental maps database 'What's in your backyard?' (www.environment-agency.gov.uk);
- Greater Manchester Ecology Unit Records (GMEU);
- Manchester Bird Group;
- Cheshire Wildlife Trust;
- Cheshire and Wirral Ornithological Society;
- Cheshire East Biological Records Centre (Non-statutory designated sites and biological records); and
- aerial photography from Google Earth (preliminary identification of habitat types);

11.3.6 The site surveys undertaken, their timing and the methods used are scheduled in Table 11-1. Detailed explanation of the methods used is provided in Appendices 11A – 11E.

Table 11-1 Site surveys

Survey	Date Undertaken	Methods used
Protected Species		
Badger Survey (Appendix 11A)	March 2013	Search for field signs of badgers and their setts.
Bat Survey (Appendix 11B)	May/June 2011 (activity surveys, March 2013 (tree surveys), September / October 2013 emergence / return surveys	Methods conformed to BCT[27] good practice guidelines.
Great Crested Newt Habitat Suitability Index (HSI) and Survey (Appendix 11C)	March – June 2013 (supported by previous work undertaken during February – June 2010)	Methods described in English Nature and Oldham et al[28]
Otter Survey (Appendix D)	March – May 2011 March – June 2012	Search for field signs and assessment of habitat suitability. Camera trapping survey of potential otter resting site
Habitats		
Phase 1 Habitat Survey (Appendix E)	March 2011	JNCC Standard Phase 1 habitat survey methods[29]. Incorporates a search of Japanese knotweed and other invasive non-native species. Also, a search for sites along watercourses supporting kingfisher was undertaken.

Biodiversity value

11.3.7 Each of the sites, habitat types and species considered has been attributed a value using the following geographic thresholds:

- international;
- national;
- regional (in the context of the north west);
- county (Greater Manchester/Cheshire);
- district (Stockport, East Cheshire);
- local; and
- within zone of influence only (i.e. the project site and its immediate surroundings).

11.3.8 Criteria used to determine value comprised:

- habitat size, shape, diversity (e.g. mosaics, mono-cultures) and connectivity;
- physical conditions (e.g. natural, semi-natural, buildings/hard standing);
- biodiversity, including species richness, range and populations of plant and animal communities;
- rarity and typicalness of plant and animal communities;
- stage/stability of ecological succession and habitat development trajectory;
- typicalness of the physical environment;
- position in an ecological or geographical unit; and
- ease of re-creation;

Evaluation of the nature of the impacts

11.3.9 The evaluation of the nature of the impacts has involved consideration of their extent, magnitude, duration, reversibility and timing/frequency. Aspects of ecosystems considered included effects on:

- resource availability (soil nutrients/minerals, territory, breeding/roost sites, etc);
- stochastic processes (flooding, drought, disease, eutrophication, etc);
- ecological processes (population dynamics, successional processes, etc);
- human influences (farming, drainage, pollution, disturbance, etc);
- historical context (natural range variations, vagrants);
- ecological relationships (food webs, insect-plant interactions, predator-prey dynamics, etc);
- ecological functions (organic matter transfer, production, etc); and
- ecosystem properties (connectivity, metapopulations, fragmentation, etc)

11.3.10 Impact assessment predictions have been assigned a confidence level to indicate how likely the predicted impact is to affect the ecological receptor. Confidence levels have been defined as:

- certain/near-certain: the impact will or is highly likely to affect the receptor;
- probable: it is likely the impact will affect the receptor;
- unlikely: there is some chance the receptor will be affected; and
- extremely unlikely: little chance the impact will affect the receptor.

11.3.11 The extremely unlikely category is included to cover impacts that may be highly unlikely, but could have very serious impacts on ecological receptors.

Mitigation

11.3.12 Where impacts of potentially high order have been identified or impacts will otherwise involve conflict with statutory obligations relative to the resources considered during the assessments, mitigation measures have been proposed to ensure legal compliance and reduce or compensate the potential impacts and their effects.

11.4 Baseline environment

Norbury Brook SBI

11.4.1 Norbury Brook SBI comprises some 19.86ha of mixed habitat (Figure 11.1). Lowland mixed deciduous woodland in the form of well developed oak-birch woodland is the dominant type, a type identified as being of principal importance in the NERC Act 2006. 2.3ha of the woodland at Carr Wood is ancient woodland; that being woodland where there has been a continuous cover since 1600 AD or earlier. In terms of biodiversity value, ancient woodland supports more species than any other habitat type in the UK. Other habitat types include some 1.4ha of semi-improved grassland and 0.16ha of running water in the form of the Norbury Brook.

11.4.2 Taking into account the status of the principal habitat type as one of principal importance under Schedule 41 of the NERC Act 2006, the status of some 12% of the site as ancient woodland and the non-statutory designation of the site, it has been concluded the SBI is of biodiversity value at a district level.

Habitats

Semi-natural broad-leaved woodland / plantation woodland

11.4.3 Semi natural broad-leaved woodland / plantation woodland associated with the proposed scheme corridor and surrounding area is concentrated along the Norbury Brook. Lady Brook and the confluence of the two watercourses with the Poynton Brook in the eastern half of the corridor and along the River Bollin and in the vicinity of Styal towards the western end and south of the corridor.

11.4.4 Areas of the type most immediately associated with the proposed scheme corridor comprise small blocks (1-2ha) or strips along field boundaries. Most blocks are highly fragmented, but some are linked by watercourses and hedgerows allowing animals to commute between them and other habitats. Some of the woodland such as that associated with the airport at the western end of the corridor is recently planted.

11.4.5 Canopy species comprise typical lowland broadleaf species and include:

- ash fraxinus excelsior;
- beech fagus sylvatica;
- silver birch betula pendula;
- pedunculate oak quercus robur; and
- sycamore acer pseudoplatanus,

11.4.6 Species within the understory include:

- bramble rubus fruticosus agg.;
- elder sambucus nigra;
- holly ilex aquifolium; and
- hawthorn crataegus monogyna with occasional hazel corylus avellana.

11.4.7 Areas of particular note in the context of their proximity to the proposed scheme include that on the northern margin of the Norbury SBI, including the ancient woodland at Carr Wood (Figure 11.2) and a block of beech / oak woodland at Mill Hill Hollow which contains mature trees of particular value because of their age and size (Figure 11.3).

11.4.8 This type of woodland is listed as a habitat of principal importance in Schedule 41 of the NERC Act 2006. Targets associated with this classification include maintaining the extent and condition of the resource.

11.4.9 Taking into account the distribution of the type, the status of parts of the resource as ancient woodland, the relationship to the watercourses and accessibility to the communities neighbouring and within the proposed scheme corridor and surrounding areas, it has been concluded that the semi natural broad-leaved woodland / plantation woodland is of biodiversity value at a district level.

Semi-improved grassland

11.4.10 There is one area of semi-improved grassland which is distinct from what are otherwise generally poor areas of the grassland type along and adjacent to the proposed scheme corridor. It comprises several fields which extend for some 4.8ha north of the Norbury Brook adjacent to the A523 London Road (Figure 11.3). The dominant grass species is false oat grass *Arrhenatherum elatius* with frequent patches of Yorkshire fog *Holcus lanatus*, cock's foot *Dactylis glomerata*, perennial ryegrass *Lolium perenne* and red fescue *Festuca rubra*. Herb species, which are typical of roadsides and neglected agricultural areas, include common ragwort *Senecio jacobaea*, smooth sow-thistle *Sonchus oleraceus*, great willowherb *Epilobium hirsutum*, rosebay willowherb *Chamaenerion angustifolium*, cow parsley *Anthriscus sylvestris*, common mallow *Malva sylvestris*, yarrow *Achillea millefolium*,

ribwort plantain *Plantago lanceolata*, buttercup species *Ranunculus spp*, teasel *Dipsacus Fullonum*, hogweed *Heracleum sphondylium* and hemlock *Conium maculatum*.

11.4.11 Taking into account the composition of the type and, more notably, the relative scarcity of higher quality areas of the type in the context of the predominantly agricultural, recreational and amenity based grassland types associated with the road corridor and neighbouring areas, it has been concluded that the area of semi improved grassland adjacent to the A523 is of biodiversity value at a district level.

Hedgerows

11.4.12 Hedgerows associated with the proposed scheme corridor are generally hawthorn dominated and species-poor. There are five sections of unmanaged species-rich hedgerow. One section extends 320m north from woodland associated with Norbury Brook to a small stand of open, maturing tree planting at the eastern end of Wensley Drive on the southern edge of Norbury Moor (Figure 11.3). A second section extends east to west for 500m between the site access to the Bramhall oil depot and the rear of Meadway on the southern edge of Bramhall (Figure 11.5). The three remaining sections are located south of Heald Green and east of Styal Golf Club and are associated with localised areas of dense scrub (Figure 11.8). The total length of these three sections is 620m. The species-rich hedgerows formed of old hedgerows which have been left unmanaged, and have developed significant standard trees and a diverse number of species forming the hedge itself.

11.4.13 Species include alder a*lnus glutinosa*, ash, silver birch, beech, blackthorn *prunus spinosa*, elder *sambucus nigra*, elm *ulmus species*, hawthorn, hazel, holly *ilex aquilfolium*, hornbeam *carpinus betulus*, small-leaved lime *tilia cordata*, field maple *acer campestre*, pedunculate oak and willow *salix species*.

11.4.14 All hedgerows considered as part of the assessment constitute habitats of principal importance in the context of Schedule 41 of the NERC Act 2006.

11.4.15 Taking into account the extent of the network of hedgerows, their connectivity with other habitat types and their predominant species–poor status, it has been concluded the network of the type is of biodiversity value at a local level. It has been further concluded that, notwithstanding the dispersed and limited extent of species-rich hedgerows as part of the network, the species diversity and habitat potential relative to fauna qualify these sections as being of biodiversity value at a district level.

Open water (ponds)

11.4.16 The studies identified a total of 192 ponds within a 1km area of search centred on the proposed scheme alignment. Reference to Figure 11.2 -11.9 demonstrates that whilst the ponds are dispersed throughout the length of the corridor, there are distinct

concentrations between Poynton and Bramhall and between Heald Green and Styal. The ponds are generally man-made. Some are thought to dry out in late summer.

11.4.17 The quality of the ponds is variable, some supporting diverse emergent / marginal plant communities. This is in large part as a result of their diverse functions which include drainage, as hazards on golf courses and as ornamental features.

11.4.18 Associated fauna include invertebrates (diving beetles, etc), fish, amphibians and waterfowl. As described below, ponds at Styal, and between Moorend and Hazel Grove Golf Courses are areas of particular importance to GCN populations.

11.4.19 The UK's stock of ponds is falling and efforts are being made to reverse this trend. Ponds are identified as habitats of principal importance in Schedule 41 of the NERC Act 2006 and have associated nationwide conservation objectives which aim to maintain the quality of the current UK stock of ponds.

11.4.20 Taking into account the relatively extensive nature of the network of ponds, the importance of the habitat type nationally and varied status relative to marginal and aquatic vegetation in the context of their differing functions, it has been concluded that the identified ponds have a biodiversity value at a district level.

Running water

11.4.21 Lady Brook, Norbury Brook and Poynton Brook (Figure 11.3) are classified under the Water Framework Directive. They occupy relatively natural meandering channels, with natural riffle/pool structures and a primarily bedrock substrate. They are substantially enclosed within areas of linear, mature woodland. Riparian vegetation is established on reaches where the canopy permits light to penetrate. All three support fish and invertebrates. The watercourses represent good examples of the type in the context of the Greater Manchester conurbation and its immediate hinterland.

11.4.22 Other watercourses include Spath Brook, Oxhey Brook and a number of drainage ditches. These have been heavily modified or entirely man made and support fewer flora and fauna species overall.

11.4.23 Lady Brook, Norbury Brook and Poynton Brook qualify as habitats of principal importance as identified in Schedule 41 of the NERC Act 2006 whereas Spath Brook, Oxhey Brook and the drainage ditches do not.

11.4.24 Both provide corridors and allow movement of animals (e.g. birds and bats) to connect to other habitats.

11.4.25 Taking into account the physical characteristics and habitat quality associated with Lady Brook, Norbury Brook and Poynton Brook, and the focus of these in conjunction with the enclosing woodland as corridors of importance to fauna, including mammals,

invertebrates and fish, it has been concluded they have a biodiversity value at a district level. The other watercourses have a biodiversity value at a local level

Schedule 9 plants

11.4.26 The studies identified two species of invasive non-native plants which are listed in Schedule 9 of the Wildlife and Countryside Act.

11.4.27 An area of Japanese knotweed was recorded at the site of the proposed crossing of the A523, and an area of Himalayan balsam at the proposed crossing of the Lady Brook (Figure 11.3). Both species were also observed along the banks of the Norbury Brook and Lady Brook but beyond areas which will be required for construction of the proposed scheme.

Mammals

Badger

11.4.28 Detailed information relating to the location of badger setts is provided in the confidential Appendix 11A. The appendix is not made openly available in light of the objectives relating to the protection of the species under the Protection of Badgers Act. It is however available to the planning authority as the competent authority for the application and to Natural England and the Environment Agency as statutory consultees.

11.4.29 The studies and surveys identified a number of setts as indicated below:

- 3 main setts;
- 2 annexe setts;
- 3 subsidiary setts; and
- 13 outlier setts.

11.4.30 Other evidence of badger activity is identified in Figure 11.2 – 11.9. This included snuffle holes (indicating foraging areas), latrines (marking edges of territories), runs and paw prints (commuting routes) and hairs on fences.

11.4.31 Badgers are generally common and widespread throughout the British Isles, with recent surveys estimating an overall population in the order of 250,000 adults. They are not considered to be threatened, and their overall ecological value within the study area is considered to be low.

11.4.32 Badgers have biodiversity value within the proposed scheme's zone of influence only.

Bats

11.4.33 The bat activity surveys undertaken in 2011 (Appendix B: Bat Survey) identified two species of bat, common pipistrelle *(pipistrellus pipistrellus)* and soprano pipistrelle *(pipistrellus pygmaeus)*, foraging and commuting throughout the length of the proposed scheme corridor, typically along railway lines and hedge/tree lines. Locations where bat activity is detected are considered valuable; particularly commuting routes and foraging sites which can be used by a significant portion of an area's bat population. A further species of Noctule was identified flying over the survey area near Woodford Road; it is assumed that this individual was likely to be commuting to a foraging site outside of the study area.

11.4.34 The pipistrelle species are not rare nationally or in the Greater Manchester area and are species of principal importance, with associated targets which aim to protect and enhance their populations.

11.4.35 Surveys, in 2013, for potential tree roosts identified 61 suitable trees (Figures 11.2 – 11.9). Emergence / return surveys undertaken in September / October 2013 did not identify roosting sites in these trees. However, bats use some roosting sites, particularly trees, dynamically, moving between sites on different nights depending on their needs. Taking this into account, the fact that no evidence of use was recorded, suggests that the tree resource along the proposed scheme is of limited value.

11.4.36 Soprano pipistrelle is a species identified as being of principal importance in Schedule 41 of the NERC Act 2006.

11.4.37 Bats have biodiversity value at the district/borough scale.

Otter

11.4.38 The desk based studies identified recorded presence of the species within the OS hectad SJ98, the most recent record being in 2009. The project specific site surveys found no evidence of the species in the form of sightings or the presence of spraints or paw prints along the Lady Brook or Norbury Brook corridors or the drainage ditches surveyed in 2011. A potential resting site was identified on the northern bank of the Lady Brook at the location of the proposed scheme crossing of the watercourse. This comprised a burrow set within and below the root system of a mature oak tree. There was evidence of use by an animal in the form of leaf litter but no definitive evidence that the use was by otter.

11.4.39 Subsequent camera trapping undertaken for three months between late March and late June in 2012 provided no evidence of otter activity at the potential resting site.

11.4.40 Taking into account the recorded presence of the species in the wider area, the absence of evidence of their presence along the sections of watercourses most directly associated with the proposed scheme, and the recognised increase in populations within the region allied to an indication that they are not locally abundant, it has been concluded otter are of biodiversity value at a district level.

Hedgehog

11.4.41 Camera trapping was undertaken to attempt to identify hedgehogs within the study area. Due to vandalism and unsuccessful surveys of this species camera trapping was discontinued. The type of habitat surrounding the proposed scheme indicate that the Hedgehog is potentially present throughout the study area.

11.4.42 Hedgehogs are in long term decline[30] and habitat for them (scrub, hedgerows and grasslands for example) in the urban fringe is likely to support locally important populations.

11.4.43 Hedgehogs have biodiversity value at the local scale.

Brown hare

11.4.44 There is one record of brown hare provided by GMEU and no individuals were observed during the species surveys in either 2011 or 2013. Therefore, the status of brown hare in the study area is uncertain.

11.4.45 Due to the paucity of the records and unsuitable habitat the brown hare is unlikely to be present in the study area but small fragmented populations could be present at the eastern end of the proposed scheme toward the more expansive habitats in Cheshire and Derbyshire.

11.4.46 The brown hare is in long term decline[30], is of conservation concern and is subject to targets aiming to maintain and enhance populations through measures such as protection of habitats. Therefore, it has a biodiversity value at the district/borough scale.

Herpetofauna

Great crested newts

11.4.47 GCN are present throughout the study area with particularly important areas at Styal Golf Course and land between Moorend and Hazel Grove Golf Courses (Figures 11.2 – 11.9 and Appendix 11C Great Crested Newt Survey Report). The size of GCN populations and numbers of ponds identified are indicated in Table 11-2. The population sizes are categorised to reflect Natural England's capture and exclude guidance for GCN mitigation works.

Table 11-2 Size of GCN Population and numbers of ponds identified within the study area

Population Size	Number of Ponds
1-10	23
11-100	6

11.4.48 The populations are separated by large areas of heavily managed grassland, and barriers in the form of roads and development but are fairly widespread and locally common. In recent decades the GCN has experienced a decline and the status of populations is of concern[31].

11.4.49 Despite being locally common the populations are important at a level higher than the local scale. The great crested newt is a species of Principal Importance, with associated conservation targets which aim to protect and enhance populations of this species within its range. Therefore, the GCNs have biodiversity value at the district/borough scale.

Common toad

11.4.50 Data from the GMEU indicated one record for common toad *Bufo bufo* within the Desk Study and the presence of this species was confirmed in the study area during GCN surveys.

11.4.51 Recent studies by Natural England[32] have indicated the loss of up to 50% of rural populations in eastern and southern England from habitat fragmentation and development. The level of threat to common toad populations therefore elevates their value above the local scale.

11.4.52 Common toads have biodiversity value at the district/borough scale.

Reptiles

11.4.53 There are no Biological Records of reptiles within the study area and none were observed during surveys for other species. However suitable habitat exists and it is likely that reptiles are found in long grass, scrub and ruderal habitats throughout the scheme. The following common species are potentially present:

- common lizard Zootoca vivipara;
- slow-worm Anguis fragilis;
- adder Vipera berus; and
- grass snake Natrix natrix.

11.4.54 Reptiles have biodiversity value at the local scale.

Birds

Overall breeding bird community

11.4.55 Biological records indicate that the breeding bird assemblage is typical of the semi-natural, urban fringe habitats associated with the study area.

11.4.56 Thus the overall breeding bird community has biodiversity value at the local scale.

Kingfisher

11.4.57 This species was identified in the desk study data and incidental sightings during field surveys showed that kingfishers are found on the Lady Brook and Norbury Brook. Individuals are likely to use these water courses for breeding. As a species listed on Schedule 1 of the Wildlife and Countryside Act, the nesting burrows in the banks of these water courses would be protected sites.

11.4.58 Kingfishers are widespread in the UK and not subject to any specific conservation concerns. However, they are sensitive to water pollution and modification of the water courses they live on.

11.4.59 Thus kingfisher has biodiversity value at the local scale.

Evaluation summary table

11.4.60 The following table (Table 11-3) provides a summary of the valuation for each receptor

Table 11-3 Evaluation summary table for the proposed scheme.

Ecological receptor	Biodiversity value
Norbury Brook SBI	District/borough
Ancient Woodland	District/borough
Broad-leaved semi-natural woodland	District/borough
Semi-improved grassland	District/borough
Open water (ponds)	District/borough
Running water – Lady Brook and Norbury Brook	District/Borough
Species-rich hedgerows	District/borough
Badger	Zone of Influence
Bats	District/borough
Great crested newt	District/borough

Ecological receptor	Biodiversity value
Common toad	District/borough
Reptiles	Local
Overall breeding bird community	Local
Kingfisher	Local
Japanese knotweed	N/A
Himalayan balsam	N/A

11.5 Predicted impacts and mitigation

11.5.1 The following impact assessments take into account mitigation as described in Chapter 5 and illustrated in Figures 5.29 – 5.44. Account has also been taken of mitigation measures described in Appendix 5A (Outline CEMP). These comprise protocols and management procedures related to pre-construction surveys, exclusion and safeguarding of protected species prior to construction and working practices in proximity to sensitive habitats and protected species during construction.

Norbury Brook SBI

11.5.2 Alignment of the proposed scheme to the south east of Old Mill Lane will involve the loss of some 0.4ha of lowland deciduous woodland within the SBI, 0.08ha of which is ancient woodland (Figure 11.1). It will also involve the diversion of a 70m section of the Norbury Brook with consequent potential impact on the physical form of the channel, aquatic and marginal vegetation and the passage of mammals, invertebrates and fish along the watercourse and its banks.

11.5.3 The loss of the woodland will be in part compensated for by the planting of mixed deciduous woodland on the new cutting slopes where the road crosses the northern margin of the locally designated site. It will not, however be possible to compensate the loss of the small area of ancient woodland with new planting.

11.5.4 The potential impact on the watercourse will be mitigated by the profiling of the diverted channel to reflect the existing profile, including instances of riffles and pools and the planting of marginal vegetation to maintain the continuity of existing habitat type on the immediate banks of the watercourse.

11.5.5 Taking into account:

- the initial loss of some 2.2% of the woodland within the SBI as a whole;
- the permanent loss of some 2.6% of that part of the total which is ancient woodland;

- the re-introduction of new woodland within the existing SBI boundary equivalent to 1% of the total woodland area; and
- the reinstatement of the diverted section of watercourse to reflect the existing profiles and associated vegetation along the watercourse.
- It has been concluded the proposed scheme will not have an impact on the integrity of the SBI and that it will consequently not have a significant effect on the locally designated site.

Habitats

Semi-natural broadleaved woodland

11.5.6 Semi-natural broadleaved woodland will be lost where the proposed scheme passes through woodland at the Norbury Brook (Figure 11.10), Barlowfold Farm (Figure 11.11), the Lady Brook (Figure 11.11) and at Manchester International Airport (Figure 11.17). The overall loss will be in the order of 3.5ha. As described in the context of the Norbury Brook SBI 0.08ha of the woodland that will be lost comprises ancient woodland at Carr Wood, a loss which cannot be mitigated.

11.5.7 The landscape and environmental proposals for the scheme include the introduction of 14.5ha of mixed native woodland which once it establishes and begins to mature will notably extend the network of the habitat type and establish a distinct east-west orientated corridor of woodland linking the small number of areas which will be severed and compensating the areas of loss.

11.5.8 Taking into account:

- the initial loss of some 3.5ha of fragmented areas of predominantly mature woodland;
- the permanent loss of some 0.08ha of ancient woodland within Carr Wood;
- the introduction of a distinct corridor of woodland comprising some 14.5ha of native species.

11.5.9 It has been concluded the proposed scheme will result in a medium to long-term beneficial impact on semi-natural broadleaved woodland at a local level and that this will constitute a beneficial significant effect at a local level. Considering the loss of ancient woodland as a distinct constituent within the wider woodland resource, it has been concluded the impact will be negative on a resource which is of county value but that the small scale of the loss relative to the resource as a whole will have an adverse significant effect at a local level. The level of certainty for both effects is certain.

Semi-improved grassland

11.5.10 The alignment of the proposed scheme west of the A523, Macclesfield Road will result in the permanent loss of 2.9ha of the 4.8ha of good quality semi-improved grassland associated with the proposed scheme corridor (Figure 11.11).

11.5.11 The landscape and environmental proposals for the scheme include the introduction of 15.6ha of species-rich grassland which once it establishes and begins to mature will notably increase the extent of the habitat type and floristic diversity in the context of the local area.

11.5.12 Taking into account:

- The severance of the area and initial loss of some 2.9ha (60%) of the habitat type; and
- the introduction of some 15.6ha of compensatory and new areas of the habitat type with greater floristic diversity;
- It has been concluded the proposed scheme will result in a short to medium term beneficial impact on good quality semi-improved grassland at a local level and that this will constitute a beneficial significant effect at a local level. The level of certainty for the effect is certain.

Hedgerows

11.5.13 The proposed alignment will involve the permanent loss of 6325m of species-poor hedgerow and of 578m of species-rich hedgerows (Figures 11.11, 11.13 and 11.16), the latter representing some 40% of the species-rich type. It will also involve severance of the network of hedgerows with consequent impacts on fauna which utilise the network as commuting routes and a place of refuge.

11.5.14 The landscape and environmental proposals for the scheme provide for the introduction of 5825m of species-rich hedgerow such that there will be some 15% more hedgerow lost than introduced. The extent of higher quality species-rich sections of the type within the local area will however increase four-fold.

11.5.15 Taking into account;

- the net loss in the extent of the habitat type; and
- the marked increase in higher value species-rich hedgerows.
- It has been concluded the proposed scheme will result in a beneficial impact relative to the value of the network of hedgerows at a local level and that this will not constitute a significant effect relative to the resource.

Open water (ponds)

11.5.16 Seventeen of the 192 ponds identified will be permanently lost (Figures 11.10 – 11.17). The impact will involve the loss of aquatic and marginal habitat types of variable quality, habitats which are currently utilised by a range of fauna as breeding grounds, refuges and sources of food. Species include GCN, common toad, other amphibians, fish, waterfowl and a diverse assemblage of invertebrates

11.5.17 These are impacts which will have a potentially significant adverse effect on a resource of biodiversity value at a district level. The proposed scheme, however, provides for the introduction of 34 ponds such that the loss will be compensated and the network of ponds as a resource will be extended.

11.5.18 New ponds will be designed in accordance with Natural England guidelines as described in Chapter 5. Particular attention will be paid to the establishment of a well-balanced relationship between marginal and aquatic habitats and open water and the establishment of marginal profiles which are conducive to use by GCN (Figures 5.29 – 5.44).

11.5.19 Taking into account:

- the proposed replacement to loss ratio of 2:1; and
- the commitment to the establishment of a well- balanced mosaic of marginal and aquatic types and open water;

11.5.20 It has been concluded the proposed scheme will result in a short to medium term beneficial impact on ponds as a resource of value at a district level but that this will not constitute a significant effect relative to the habitat type.

Running water

11.5.21 The proposed scheme requires the diversion of a 70m section of the Norbury Brook and the bridging on-line of a 60m section of the Lady Brook.

11.5.22 Impacts on the Norbury Brook are described in paragraphs 11.5.1 – 11.5.5.

11.5.23 The bridging of the Lady Brook will involve the construction of a 19.6m single span bridge to provide a clear crossing of the watercourse and accommodate a footpath to an access track and on the north bank and footpath on the south bank of the watercourse. The alignment and channel profile of the watercourse will not be disturbed. Marginal vegetation and existing mature tree planting on the banks of the watercourse will be cleared for a length of some 40m to allow for the bridge decking and clearance from the canopy of existing trees which enclose the watercourse.

11.5.24 Measures to prevent and reduce potential discharge of sediments, materials and fuels and oils where construction activity is required in the vicinity of watercourses and equipment/plant is operational are described in detail in Chapter 16.

Mammals

Badger

11.5.25 Potential and predicted impacts on badger comprise:

- potential loss or injury during construction by virtue of inadvertent encroachment of individuals into working areas;
- certain loss of one main sett and six outlier setts to accommodate the proposed alignment of the proposed scheme; and
- potential impact as a result of disturbance associated with construction activities such as excavation, piling and clearance of vegetation by virtue of the location of a main sett, two annexe setts and five outlier setts outside of but in close proximity to the working areas required for the proposed scheme.

11.5.26 These are impacts which will not have a potentially significant adverse effect on a resource of biodiversity value within the zone of influence of the proposed scheme only but which require consideration in the context of the statutory protection afforded to the species under the Protection of Badgers Act. A number of mitigation measures have accordingly been included as part of the scheme proposals.

11.5.27 Measures to avoid potential death, injury or disturbance during construction will be incorporated into the working methods for activities such as excavation, piling and vegetation clearance. These include:

- fencing to preclude inadvertent encroachment into working areas,
- provision of ramps into excavations undertaken in areas of potential badger presence,
- enforcement of exclusion zones for potentially disturbing construction activity where there is known presence of the species;
- monitoring of construction activity by an ecological clerk of works in areas of known proximity between construction and badger presence; and
- location of materials storage areas away from known areas of badger presence.

11.5.28 Measures to mitigate the loss of the main sett will involve the construction of an artificial sett. The closure of the existing sett and associated establishment of the replacement sett will be subject to a license to be sought from Natural England.

Bats

11.5.29 Potential and predicted impacts on bats comprise:

- certain loss of 35 of the 61 trees identified as having bat roost potential; (Figures 11.10-11.17);
- potential disturbance as a result of construction-related noise and vibration of a recorded roost site located 20m north of the proposed scheme at Woodford Road (Figure 11.12).
- potential disturbance of bats using known and potential roost sites which will remain in close proximity to the completed scheme may be disturbed due to construction noise and vibration and traffic related noise; and
- severance of commuting routes including hedgerows, tree lines, woodland edges and watercourses resulting in fragmentation of availability of foraging areas and roost sites and/or death or injury where bats continue activity along such routes once the proposed scheme is open to use.

11.5.30 These are impacts which will have a potentially significant effect on local pipistrelle populations by virtue of loss and fragmentation of established roosts and habitat and severance of established commuting corridors and access to roosts.

11.5.31 The following design and construction-related measures have been incorporated as part of the proposed scheme in light of the known and potential impacts. These are detailed in Table 11-4

Table 11-4 Mitigation and compensation proposals to offset impacts on bats.

Measure	Description
Replacement of lost bat tree roosts	Surveys did not locate any roosts within trees that will be felled as part of the scheme. However, it is recognised that bats use such roosts dynamically, and that prior to construction bats may well be roosting within trees to be felled. Emergence/return surveys will be repeated prior to construction. Should those trees identify trees with active roosts, bat boxes will be provided to compensate for the felled trees. Felling of trees will be undertaken using a scheme of "soft felling", whereby each limb of the tree is cut, lowered carefully to the ground and inspected by an ecological clerk of works for bats. This process allows any animals roosting within the tree to fly away unharmed, or if hibernating warm up and find another suitable place nearby, avoiding mortality (BCT, 2000). An additional 20 bat boxes will be put up in trees on land adjacent to the scheme and in mitigation areas to provide additional roosting habitat. The locations of these boxes will be informed by the tree surveys undertaken prior to construction alluded to above, and where landowner consent can be obtained. All the above works will be undertaken under a Natural England

Measure	Description
	development licence, and will reduce the effects of roost loss to neutral levels.
Restriction of disturbing construction activity near known roost	Night working and light spill will be restricted within 250m of the known roost to prevent disturbance as bats leave and re-enter it. A method statement will be prepared and followed by contractors with such actions outlined within, and the area monitored by the ecological clerk of works. The above actions will reduce the effects of roost disturbance to neutral levels.
Provision of screening planting for known roost	Trees and scrub will be planted to act as screening for the known roost and reduce disturbance from road traffic. Details of planting are provided in Chapter 5 and illustrated in Figures 5.29 – 5.44.. Screening will reduce the effects of roost disturbance to neutral levels.
Provision of bat "hop over" points	Trees and scrub will be planted on bat commuting lines to provide "hop overs", high points of vegetation close to the roadside which allow bats to fly to the other side of the road. Such "hop overs" have not been proposed where new woodland or scrub planting is proposed across a bat flight line, as the new planting will provide sufficient vegetation to form a hop over point itself. "Hop overs" will reduce the effect of fragmentation.

11.5.32 Implementation of the mitigation measures described in Table 11.4 will reduce negative impacts on bats such that they will not be significant.

Predicted impacts on hedgehog and brown hare

11.5.33 Impacts on hedgehogs during the construction phase will be avoided by using best practice measures described in Chapter 5: Proposed Scheme.

Great crested newt

11.5.34 Potential and predicted impacts relative to the species will involve:

- the permanent loss of 8 ponds which the site surveys identified as being occupied by GCN and a further 6 where the surveys did not establish presence but the habitat is suitable for breeding populations of the species;
- the loss of terrestrial habitat including grassland and species rich and poor hedgerows; and
- the fragmentation of habitat.

11.5.35 There is also a risk as GCN and common toads may be killed during clearance works as they use this habitat to forage or find refuge.

11.5.36 As a linear feature, the proposed scheme will split hedgerows and grasslands preventing breeding migration of GCN across the scheme. As construction is likely to occur in the breeding season, the temporary fragmentation occurring at this time is significant.

11.5.37 Impacts upon amphibians during will be negative and significant.

11.5.38 Several different measures are proposed to provide mitigation and compensation for impacts on GCN and common toad, and these are described in Table 11-5.

Table 11-5 Mitigation and compensation proposals to offset impacts on great crested newt and common toad

Measure	Description
Replacement of GCN/ common toad breeding ponds	8 ponds occupied and used for breeding by GCN will be lost under the proposed scheme footprint. These ponds and 9 others (17 in total) lost to the scheme may also be used by common toad. Before construction begins, these ponds will be replaced at a ratio of 2 ponds created for every 1 lost (Natural England, 2001), and their vegetation and water quality will be made suitable to support breeding newts. Creation of ponds will be complete before ponds within the proposed scheme footprint are destroyed. The 17 ponds required form part of the 34 ponds to be created by scheme landscaping. If works are to proceed during the GCN breeding migration (February-June), the breeding ponds will be ring fenced using herpetile barrier fencing and trapped until the end of the migration to capture newts migrating towards them. Habitats and refugia around the pond will then be destructively searched and the pond dug out, and land levelled. Such trapping will not be required if clearance work proceeded outside the breeding migration, but searching refugia for hibernating newts will still be required alongside trapping out of suitable habitat as described below. Common toads will also be caught and moved as part of this mitigation. Creation of new ponds and trapping out those within the proposed scheme will offset the effects of proposed scheme construction. However, the scheme will have a negative impact on great crested newts and common toads which are likely to have well established routes of migration. However, with the proposals above implemented, such negative impacts will be non-significant.
Capture and exclusion and of\ great crested newts/common toads	GCNs will be captured out of the proposed scheme working corridor in areas of suitable habitat (i.e. semi-improved grassland, hedgerows, woodland etc) within 250m of occupied ponds. This will involve fencing of the working width with herpetile barrier fencing,

Measure	Description
	placement of pitfall traps on the inside perimeter of the fence, and checking the traps for either 30 or 60 nights (depending on the size of the metapopulation identified). Pitfall traps will be augmented by refugia (e.g. carpet tiles) placed within the working width. Animals will be relocated to suitable habitat adjacent to the working corridor, or newly created compensatory habitats close to the capture area which will act as receptor sites. Common toads will also be caught and moved as part of this mitigation. Vegetation manipulation (i.e. strimming of long grass or cutting of scrub) will be undertaken to increase the likelihood of capture. Where hedgerows and other refugia are to be cleared within the trapping area, they will be hand searched of great crested newts before clearance even if the area has already be thought clear of animals. This precautionary measure will prevent animals in refugia being killed. Records of numbers of animals caught and moved will be kept, and all works will be undertaken under Natural England licence which will be obtained before any work is undertaken. These actions will reduce the impact of terrestrial habitat clearance and potential mortality of newts and toads to neutral levels.
GCN and common toad assisted migration	Where GCN and common toad habitat is fragmented by construction, an assisted migration will be undertaken to move animals from one side of the proposed scheme to (English Nature, 2001). Pitfall traps will be placed on the outside of the perimeter fence to capture animals migrating across the working width. These will be augmented by artificial refugia (e.g. carpet tiles) placed next to the fence. For the duration of the development (i.e. whilst the herpetile fencing is in place) traps/refugia will be checked for animals. These will be moved to the opposite side of the working width to simulate migration. Vegetation manipulation (i.e. strimming of long grass or cutting of scrub) will be undertaken to increase the likelihood of capture. Where hedgerows and other refugia are to be cleared within the trapping area, they will be hand searched of amphibians before clearance even if the area has already be thought clear of animals. This precautionary measure will prevent animals in refugia being killed. These actions will reduce the impact of habitat fragmentation to neutral levels.

11.5.39 Implementation of these measures will reduce impacts on amphibians to negative, non-significant status overall.

Common reptiles

11.5.40 Grassland habitat that could potentially support common reptiles will be permanently lost. This could result in the killing or injury of these animals. Therefore, impacts to common reptiles will be negative and significant.

11.5.41 Hand searches within the GCN trapping scheme (Table 11-5) and areas of habitat suitable to support common reptiles will be undertaken to prevent death or injury of these animals by moving them to a suitable habitat adjacent to the proposed scheme. Searching and removal will reduce the impact of the proposed scheme on reptiles to neutral levels.

Overall breeding bird community

11.5.42 Removal of scrub, hedges and other habitat will risk killing breeding birds or damaging their nests. Removal also represents an overall permanent loss of breeding bird habitat throughout all the proposed scheme. Impacts on breeding birds will negative and significant.

11.5.43 Trees, scrub, hedgerows and other nesting bird habitat will be cleared outside of the bird breeding season (March-July) to avoid killing or injuring breeding birds or their dependant young. In areas where restrictions due to GCN trapping and mitigation this may not be possible. In areas of GCN habitat scrub, hedgerows and trees will be cleared outside of the bird breeding season with hand tools (i.e. avoiding tracked vehicles or large equipment which could kill newts) to just above ground level, leaving stumps in place until the area is declared free of newts. Grassland and other habitats will not be cleared as they offer no nesting habitat to breeding birds known to inhabit the study area.

11.5.44 Clearance outside the breeding season will represent a neutral residual impact.

Kingfisher

11.5.45 A kingfisher breeding site was found on the Lady Brook 10m from the proposed scheme crossing (Figure 11.11). This breeding site will be disturbed by the construction works; the kingfisher is a shy species and may not fish or breed in area receiving high levels of disturbance. Noise, vibration and visual disturbance from movement of people and equipment will be significant sources of disturbance to this species.

11.5.46 Once the scheme is open to use continued movement along the watercourse will be available to the species by virtue of the planned open span structure. Disturbance due to movement of cars and people through and around this section of the Ladybrook is unlikely to deter continued use. The loss of the burrow however as a breeding site may result in less frequent or no use of this section of the water course

11.5.47 Therefore, the impact relative to kingfisher is likely to be negative and significant.

11.5.48 To mitigate the impacts to kingfisher a survey will be undertaken during the summer prior to construction of the proposed scheme to determine whether the burrow adjacent to the scheme, or others within the scheme, are used.

11.5.49 If the burrows are confirmed to be in use closure of the burrow will be undertaken in winter when it is not used by these birds; burrows cannot be closed during the kingfisher breeding season, which begins in April and lasts until the end of July.

11.5.50 Closure will involve covering the burrow's opening with strong wire mesh which kingfishers cannot burrow through. The mesh will remain in place for the duration of works and will be removed following Construction of this section of the proposed scheme.

11.5.51 Closure will lead to negative impacts on kingfisher due to loss of a breeding site. However further burrows and habitat are available throughout the adjacent habitat of the Lady Brook and overall impacts will be negative but non-significant.

Impact assessment summary table

11.5.52 The following table (Table 11-6) summarises the impacts associated with the relief road scheme. It indicates which receptors require mitigation measures to offset impacts, which is detailed in the following section.

Table 11-6 Summary of impacts

Ecological receptor	Predicted Impacts*	Residual Impacts*
Norbury Brook SBI	Negative and Significant	Negative but Non-Significant
Ancient Woodland: Norbury Brook	Negative and Significant	Negative but Non-Significant
Semi-natural broad-leaved woodland	Negative and Significant	Negative but Non-Significant
Semi-improved grassland	Negative and Significant	Positive but Non-Significant
Open water (ponds)	Negative and Significant	Positive but Non-Significant
Running water (Lady Brook and Norbury)	Impacts discussed in Chapter 17	Impacts discussed in Chapter 17
Species-rich Hedgerows	Negative and Significant	Neutral
Badger	Negative and Significant	None
Bats	Negative and Significant	Negative but Non-Significant

Ecological receptor	Predicted Impacts*	Residual Impacts*
Hedgehog	None	None
Brown hare	None	None
Great crested newt	Negative and Significant	Negative but Non-Significant
Common toad	Negative and Significant	Negative but Non-Significant
Common reptiles	Negative and Significant	None
Overall breeding bird community	Negative and Significant	None
Kingfisher	Negative and Significant	Negative but Non-Significant
Japanese knotweed	Negative and Significant	Positive
Himalayan balsam	Negative and Significant	Positive

11.6 Conclusions and effects

11.6.1 The assessments have demonstrated that the loss of a small area of ancient woodland, as a resource that cannot be compensated for, will constitute a significant effect at a local level. In the context of the Norbury Brook SBI it has been concluded that it will not constitute a significant effect relative to the overall composition of habitat types and status.

11.6.2 The assessments have demonstrated that there will be a net addition of habitat types of higher value as a result of the implementation of the planting proposals. Whilst this will be beneficial it has been concluded it will not constitute a significant effect.

11.6.3 The assessments relative to fauna and protected species have demonstrated that with the proposed mitigation measures in place, including those related to statutory obligation, there will be no significant effects.

12 Geology and Soils

12.1 Scope of the assessments

12.1.1 This chapter includes:

- a description of the solid and drift geology and soils associated with the proposed scheme corridor; and
- the findings of an assessment relating to potentially contaminated sites where construction could involve disturbance and potential release of contaminants and result in consequent impact on sensitive receptors.

Study Area

12.1.2 The study area for the assessment relating to contaminated sites has comprised lands within the proposed land take and high risk sites such as landfills within a 1km wide corridor centred on the alignment for the proposed scheme, it having been concluded there will be a negligible risk of a linkage between construction related disturbance and sources of potential contamination relative to sensitive receptors at distances greater than 500m from the centre line for the proposed scheme.

Receptors

12.1.3 Sensitive receptors considered include:

- construction staff;
- residents living in the vicinity of the proposed working areas;
- users of publicly available areas close to the proposed working areas; and
- soils as a resource within and in the vicinity of the proposed working areas

12.1.4 The risk that surface and groundwater could be affected by the disturbance and release of contaminants during construction is addressed in Chapter 16.

12.2 Statutory and planning context

12.2.1 Reference has been made to the following legislation:

Part IIa of the Environmental Protection Act 1990

12.2.2 Part IIa of the Environmental Protection Act sets out a regulatory framework for the identification and remediation of contaminated land and includes a statutory definition for contaminated land.

12.2.3 Contaminated land is defined as 'land which appears to the local authority in whose area it is situated to be in such a condition, by reason of substances in, on or under the land, that:

- significant harm is being caused or there is a significant possibility of such harm being caused; or
- pollution of controlled waters is being, or is likely to be, caused.

Contaminated Land Regulations 2006

12.2.4 The regulations consolidate the provisions of the Contaminated Land (England) Regulations 2000 (SI 2000/227) and the Contaminated Land (England) (Amendment) Regulations 2001 (SI 2001/663) with amendments. They also set out provisions relating to the identification and remediation of contaminated land under Part 2A of the Environmental Protection Act 1990.

12.3 Methods of assessment

12.3.1 Information relating to geology and soils and the assessment relating to contaminated land and sites has been sourced and undertaken with reference to the guidance provided in the DMRB - Volume 11, Section 3, Part 11 Geology and Soils.

Geology and Soils

12.3.2 Information has been obtained from the following sources:

- SEMMMS, A6 to Manchester Airport Relief Road, Ground Investigation Report – AECOM 2011 (Appendix 12A);
- British Geological Society (BGS) geological maps; and
- The National Soil Resources Institute online mapping: (http://www.landis.org.uk/soilscapes)

Assessment of Contamination Risk

12.3.3 The assessment has involved:

- reference to the following data sources to establish the presence of potentially contaminated land and sites within the defined study area:
  - *Envirocheck report reference 31480027;*
  - *SEMMMS, A6 to Manchester Airport Relief Road, Ground Investigation Report – (AECOM 2011);*
  - *Current and historic mapping: 1882 Cheshire, 1899 Cheshire, 1910-1911 Cheshire, 1911 Cheshire, 1938 Cheshire, 1954 Ordnance Survey Plan, 1967 Ordnance Survey Plan, 1975 Russian Manchester, 1976-1977 Ordnance Survey*

Plan, 1990 Ordnance Survey Plan, 1996 Ordnance Survey Plan, 1999 10K Raster Mapping, 2006 10K Raster Mapping, 2010 10K Raster Mapping;

- *Aerial photography from Google Earth; to verify site boundaries, existing use and previous disturbance to potentially contaminated sites;*

- a site walkover on 25th May 2011 to verify relevant desk based data;
- identification of likely contamination related impacts using a source-pathway-receptor model;
- identification of proposed mitigation measures in light of the identified impacts; and
- description of the predicted effects based on consideration of the likely impacts and proposed mitigation.
- Potentially contaminated sites have been identified based on the type and extent of contaminants which might typically be associated with the historical and / or present use.

12.3.4 Where contaminated / potentially contaminated sites will be disturbed during construction, the risk of contaminants (a source; e.g. a historic landfill) finding a linkage (pathway) to a receptor (e.g. construction workers) has been assessed.

12.3.5 Where the assessment has identified such a potential source – pathway – receptor linkage, mitigation measures have been identified with the objective of breaking or modifying the linkage and avoiding or reducing the potential impact.

12.4 Baseline environment

Solid Geology

12.4.1 Solid geology associated with the study area is shown on Figure 12.1 and comprises:

- mudstone, siltstone and sandstone of the Westphalian Coal Measures between the proposed realignment of the A6 and the confluence of Lady Brook and Norbury Brook;
- sandstones of the Sherwood Sandstone Group west of the Lady Brook to Styal Road; and
- mudstone of the Bollin Mudstone Member (Lower Keuper Marl), part of the Mercia Mudstone Group between Styal Road and the western end of the proposed scheme.

12.4.2 There are fault lines distributed throughout the corridor and a notable concentration of fossil lines and coal seams towards the eastern end of the corridor.

Drift Geology

12.4.3 Drift geology overlaying the solid geology is shown on Figure 12.2. It comprises glacial and fluvial deposits (typically sands and gravels) of varying densities and at thicknesses between 1 -18m.

12.4.4 The AECOM Ground Investigation Report identified:

- an area of peat north of the rail bridge where Woodford Road crosses the WCML; and
- up to 2m of granular made ground, recorded in the vicinity of the Shadowmoss Road junction.

Soils

12.4.5 A substantial part of the study area comprises topsoils classified as slowly permeable, seasonally wet and slightly acid but base-rich loamy and clayey soils. There is a small area of freely draining slightly acid loamy soil between the Hazel Grove to Buxton railway line and Norbury Brook.

12.4.6 Approximate topsoil depths along the proposed scheme alignment are indicated below:

- A6 and the Hazel Grove to Buxton railway line – 0m to 0.65m
- Hazel Grove to Buxton railway line to the West Coast Main Line – 0.9m
- WCML to Woodford Road – 1.5m
- Styal Road and the western end of the proposed scheme – 0.4m.

12.4.7 Topsoil depths between the western end of the A555 and Styal Road are not currently known.

Contaminated Sites

12.4.8 The review of historical mapping referred to in 12.3.3 and information provided in the Envirocheck report identified ten potentially contaminated sites within the 1km study area for the assessment. These generally comprise historic landfill sites, existing waste management facilities and petrol and oil storage facilities. The location of these sites is shown on Figure 12.3. Summary descriptions for each are provided in Table 12-1.

12.4.9 A review of information and in the ground investigation (GI) Report (Appendix 12A) indicated no contaminate encroachment could be linked to the sites identified in Table 12-1.

12.4.10 The chemical test results from the top 1m of selected exploratory holes indicate that, throughout the proposed scheme, the natural material beneath the topsoil is likely to classify as non hazardous waste and 'inert' for waste disposal and landfill purposes.

Table 12-1 Potentially Contaminated Sites within 500 m of the proposed scheme

Site Reference (Figure 12.3)	Site Type	Name	Location	Approximate Distance from the proposed scheme	Primary Source and Contaminants	Potential Pathway
PCS1	Historic landfill site	Mill Bank Farm	Chester Road, Hazel Grove	200m north	Deposited waste includes inert and industrial. Wide range of potential contaminants. Licensed from 1989 to 1992.	N
PCS2	Historic landfill site	Hill Green Farm	Woodford Road, Poynton	300m north	Deposited waste included inert, commercial and household waste. Range of potential contaminants though unlikely to be any leachate. Licensed between 1983 and 1984.	N
PCS3	Historic landfill site	Upper Swineseye Farm	Off Bridle Road West, Woodford	470m south	Deposited waste included inert waste. Range of potential contaminants but unlikely to be any leachate. Landfill licensed between 1983 and 1990.	N
PCS4	Oil Depot	Bramhall Oil Terminal	Off Woodford Road, Bramhall	160m north	Automotive petrol and other petroleum spirits in underground tanks. Possible contaminants include hydrocarbons, PAHs, organic and inorganic chemicals.	N
PCS5	Historic landfill site	Ashmere Farm	Off Woodford Road, Bramhall	50m north	Deposited waste included inert, industrial and commercial waste. Range of potential contaminants unlikely to be leachate. First and last inputs were in 1985.	N
PCS6	Historic		Land off Dairy	Adjacent to the Highway	Deposited waste includes non-	N

Site Reference (Figure 12.3)	Site Type	Name	Location	Approximate Distance from the proposed scheme	Primary Source and Contaminants	Potential Pathway
	landfill site		House Lane, Handforth (A)	Boundary of the existing A555	biodegradable waste (not construction). Possible infill area from A555 as AMEC are the licence holder. Wide range of potential contaminants. License issued in 1995.	
PCS7	Historic landfill site		Land off Dairy House Lane, Handforth (B)	130m south	Deposited waste includes non-biodegradable waste (not construction). Possible infill area from A555 as AMEC are the licence holder. Wide range of potential contaminants. License issued in 1994.	N
PCS8	Licensed Waste Management Facilities, and former petrol station	Former Star Grove Petrol Station	Wilmslow Road	220m south	Currently hand car wash site. Possible contaminants include hydrocarbons, PAHs, organic and inorganic chemicals.	N
PCS9	Petrol Station	Styal Road Service Station	Junction of Styal Road and Ringway Road West	180m north	Operational petrol station. Possible contaminants include hydrocarbons, PAHs, organic and inorganic chemicals.	N
PCS10	Historical landfill Site	Airport Woodhouse Park	Manchester Airport	0m (crosses proposed scheme) previously disturbed for the construction of Ringway	The AECOM Ground Investigation Report indicates both Cohesive and Granular Made Ground which indicates this site could comprise unspecified waste. As the age of	Y

Site Reference (Figure 12.3)	Site Type	Name	Location	Approximate Distance from the proposed scheme	Primary Source and Contaminants	Potential Pathway
				Road and the Rail Spur	the landfill is unknown there could be a wide range of potential contaminants.	

12.5 Predicted Impacts and mitigation

Contaminated Sites

12.5.1 The assessment has established that nine of the ten sites identified are outside of the land take for the proposed scheme such that they will not be disturbed as a result of construction whilst one, PCS10, will be subject to disturbance.

PCS10 Airport Woodhouse Park

12.5.2 Construction between Styal Road to the west of Shadowmoss Road as the proposed scheme merges with the existing Ringway Road will involve:

- installation of services including communications and power cabling;
- construction of the drainage networks and treatment;
- pavement construction;
- construction of the footpath, cycletrack and bridleway;
- landscape planting; and
- installation of safety barriers, signs and lighting.

12.5.3 Disturbance associated with these activities, and excavation in particular, could result in the exposure of sensitive receptors to potentially harmful contaminants. The source-pathway-receptor model for this potential risk is outlined below:

- source: undetermined
- pathway: ingestion, inhalation or touch of potentially contaminated material which will be most likely to occur during ground clearance, earthworks and excavations.
- receptors: construction workers, residents of the nearby houses on Carsdale Road less than 100m north of the site boundary and travellers along Ringway Road West.

Mitigation

12.5.4 Further targeted ground investigation will be undertaken at PCS10 during detailed design to ensure the presence of any potentially harmful contaminants is more fully understood and appropriate contaminant-specific measures are incorporated into the methods of construction for the potentially contaminated site.

12.5.5 The following measures have been proposed in light of the uncertainty associated with PCS10's status as a landfill lacking detailed records relative to content.

- the use of clearly specified personal protective equipment in line with best practice for working with the contaminants identified through the targeted ground investigation;
- clearly defined working areas and access routes;
- plans to carefully strip, handle and separately store soils prior to construction;
- the storage of all oil, chemical and hydrocarbon sources in accordance with legal requirements and best practice; and
- method statements for addressing the presence and unforeseen occurrences of hazardous substances.

12.5.6 The measures will be formalised as part of the detailed CEMP. The CEMP will include a specific soils and contaminants management plan. The plan will require method statements for work being undertaken where the risk of contamination has been established to identify a process of investigation focused on establishing specific contaminants, appropriate working methods and protective measures to be adopted.

12.6 Conclusions and effects

12.6.1 It has been concluded that with the appropriate investigations and identified mitigation measures in place it is unlikely the proposed scheme will have any significant effect on the geology and soils associated with the proposed scheme corridor or on at-risk receptors and construction workers.

13 Noise and Vibration

13.1 Scope of the assessments

13.1.1 The assessments related to noise and vibration have been focused on:

- a qualitative assessment of potential noise impacts in relation to sensitive receptors during construction of the proposed scheme;
- assessment of potential traffic-related noise impacts and nuisance relative to sensitive receptors following the opening of the proposed scheme during daytime and night time;
- assessment of potential impacts on sensitive receptors as a result of vibration associated with the construction of the proposed scheme; and
- assessment of potential impacts on sensitive receptors as a result of vibration associated with the future use of the proposed scheme.

13.1.2 Sensitive receptors relative to all four assessments include:

- residential dwellings;
- schools, colleges and children's nurseries;
- community facilities including sports centres and clubs;
- places of worship;
- hospitals, care/nursing homes, health centres and clinics;
- laboratories containing sensitive equipment; and
- heritage buildings

13.1.3 Consideration has also been given to outdoor areas commonly used by people where the ambient noise levels are currently believed to be below 50dB (A) for recreational purposes such as public rights of way.

Traffic-related noise during operation

13.1.4 The assessment has been focused on two aspects of traffic related noise;

- the predicted magnitude of increase or decrease in traffic-related noise levels which it is predicted will result from the implementation of the proposed scheme; and
- changes in the percentage of the population that will experience noise nuisance as a result of the proposed scheme.

13.1.5 The assessment of predicted changes in traffic-related noise levels has involved an evaluation of changes in traffic-related noise levels relative to sensitive receptors associated with parts of the road network (affected roads) which satisfy criteria for changes in traffic flows defined within the DMRB, Volume 11, Section 3, Part 7 Noise and Vibration HD 213/11. The study area for the assessment comprises sensitive receptors within 600m of affected routes within 1km of the proposed scheme boundary, and 50m of affected routes beyond 1km.

13.1.6 Affected routes comprise sections of road within the local network where traffic flows expressed in terms of annual average weekly traffic (AAWT) 18-Hour (06:00 to 24:00 hours) for the Do-Minimum and Do-Something scenarios for the opening year (2017) and design year (2032) are predicted to either increase by 25% or decrease by 20%.

13.1.7 The study area for the night-time assessment is defined as that which covers all dwellings in any of the assessment scenarios predicted to experience an $L_{night,outside}$ of above 55dB(A) and an increase of 3dB ($L_{night\ outside}$) is predicted in the long term.

13.1.8 In relation to timescales, the assessment has been focused on prediction and identification of changes in predicted traffic related noise levels for the Do-Minimum and Do-Something scenarios in the opening year (short-term)and design year (long-term) for daytime impacts and the design year for night-time impacts.

Noise nuisance

13.1.9 Nuisance is measured in terms of the percentage of the population as a whole that is bothered “very much” or "quite a lot" by virtue of a specific traffic-related noise level. The correlation between specific levels and the percentage population bothered for the purposes of the assessment has been developed from studies which have been focused on reported nuisance where traffic-related noise has changed over a relatively long period of time.

Construction-related vibration

13.1.10 Consideration of construction related ground-borne vibration has been limited to areas where operations such as piling, ground stabilisation, demolition or rock-blasting may be required. The timescale adopted has been the predicted three-year construction period.

Traffic-related vibration during operation

13.1.11 The assessment of the operational airborne vibration undertaken has been limited to a corridor 40m wide on either side of the dual carriageway in accordance with HD 213/11.

13.1.12 Please refer to Appendix 10A for an explanation of acoustical terms used in this chapter.

13.2 Directives, statutes and regulations

The Noise Insulation Regulations 1975 as Amended 1988

13.2.1 Under the conditions specified in The Noise Insulation Regulations (NIR), residential properties experiencing an increase in noise levels as a result of road traffic noise may qualify for an offer of noise insulation if all four of the following conditions are satisfied:

- The property must be within 300m of the nearest point of the new or altered carriageway;
- The Facade Noise Level due to road traffic on any highway (the "Relevant" noise level) for the design year, or for any intervening year if the noise level is higher, must equal or exceed 68 dB $L_{A10,18h}$, (the "specified" level), with levels of 67.5 dB $L_{A10,18h}$ rounded upwards;
- The "Relevant" noise level for the design year, or for any intervening year if noisier, must be at least 1 dB $L_{A10,18h}$ higher than the pre-construction year road traffic noise level (the Prevailing Noise Level); and
- Noise from the new or altered road must contribute at least 1 dB $L_{A10,18h}$ to the "Relevant" noise level.

13.2.2 The highway authority has a duty under these regulations to offer sound insulation for residential properties with respect to a new road, and discretionary powers in relation to altered roads. Various discretionary powers are also available in relation to façades or parts of façades contiguous with a qualifying façade.

13.2.3 Some residential buildings are not eligible under the regulations. These include houses first occupied after the opening date; this is the date a new road was first opened to public traffic or an altered road was opened following completion of the alteration.

Defra First Priority Locations (FPLs) and Important Areas (IAs)

13.2.4 As required under the Environmental Noise (England) Regulations 2006, three First Priority Locations (within the broader 'Important Areas') have been identified within the noise operational assessment study area.

13.2.5 According to Defra, IAs and FPLs give a very good indication of the places exposed to the highest levels of noise. The 'Noise Making Authorities' (as given in Table 13-1 below) are required to investigate IAs and FPLs and develop appropriate noise action plans.

Table 13-1 Defra First Priority Locations within the Study Area

IA Number	Location description	Noise Making Authority	Noise Receiving Authority
1523	London Road North, Poynton	Cheshire East	Cheshire East
1527	A6 between Hazel Grove and High Lane	Stockport	Stockport
1529	A6 through Hazel Grove	Stockport	Stockport

13.3 Methods of assessment

Construction-related noise

13.3.1 The construction noise assessment has been undertaken with reference to BS 5228, 2009 'Code of Practice for Noise and Vibration Control on Construction and Open Sites'. The standard contains guidance on the prediction of noise levels at sensitive receptors from the operation of fixed and mobile noise sources found on construction sites. It provides sound level data for various machinery and tasks associated with the construction phase of a site. It also contains information pertaining to mitigation of noise from a construction site.

13.3.2 The assessment has involved a preliminary evaluation of appropriate construction-related noise limits based on the sample significance criteria detailed within BS 5228 for the locations adopted for the baseline monitoring for the assessments as indicated on Figure 13.1 and identification of proposed mitigation measures. The monitoring locations represent locations where properties will be closest to the proposed scheme alignment and hence the principal working areas.

13.3.3 The evaluation of preliminary construction related noise limits has involved the application of the ABC method and +5dB(A) method described in BS 5228. Detailed explanation of the methods and their application is provided in Appendix 13B.

Traffic-related noise during operation

13.3.4 The assessment of traffic-related noise during operation has been informed by the guidance provided in Volume 11, Section 3, Part 7 Noise and Vibration of the DMRB and the Department for Transport's Calculation of Road Traffic Noise (CRTN) and has involved the following key stages:

- identification of the number and type of sensitive receptors within the study area;
- prediction of "Do-Minimum" and "Do-Something" traffic-related noise levels and nuisance for the identified sensitive receptors in the proposed Baseline

Year (2017) and Future Assessment Year (2032). The predictions for the Do-Something scenario in the two assessment years have taken into account the proposed noise mitigation measures detailed in Chapter 5;

- evaluation of the magnitude of changes in traffic-related noise for identified receptors;
- evaluation of the changes in the percentage of identified receptors that would be subject to noise-related nuisance;

Identification of sensitive receptors

13.3.5 Identification and classification of receptors within the study area involved reference to OS mapping and Address Layer II data.

Prediction of traffic-related noise levels

13.3.6 The prediction of traffic-related noise levels has been undertaken in accordance with the procedures detailed within the Calculation of Road Traffic Noise (CRTN) - Department of Transport and Welsh Office, 1988. The procedures described in CRTN set out requirements for traffic flow, monitoring of existing traffic conditions, the type of ground cover, heights and distances of receptors, propagation of noise and screening from barriers.

13.3.7 NoiseMap Server Edition noise mapping software has been used to predict noise levels at residential properties and other potentially sensitive receptor locations within the study area. Data inputs to the modelling process comprised

- 18hr annual average weekday traffic flows (AAWT) for affected roads, broken down into flows for the following categories: cars, and HGVs with an unladen weight of greater than 3.5 tonnes;
- average speed of vehicles using each link in kilometres per hour)km/h;
- building height - 6 m;
- receptor height at dwellings 4 metres above ground level and 1 metre from the façade;
- receptor height at other sensitive receptors 1.5 metres above ground level and 1 metre from the façade;
- intervening ground between any road and a receptor is acoustically ‘soft’.
- ground contour data from OS Open Data Landranger Digital Terrain Model (DTM) mapping at 10m contour intervals. Localised topography information at 0.5m contour intervals also supplied by SMBC to accurately position the proposed carriageways in vertical height, including any areas in cutting or elevation above the DTM ground level.

- building outline data from OS MasterMap mapping geodatabases supplied by SMBC.
- address point data used to identify and select residential and non-dwelling receptors from AL2 mapping geodatabases also supplied by SMBC.
- all other roads from the proposed scheme have been modelled as 7.0 m wide (one lane in each direction).
- road type;
- use of Low Noise Surfacing (LNS);
- use of noise barriers of length and height as scheduled in Table 5-8.

Establishing the baseline

13.3.8 Existing background (ambient) noise levels were determined by monitoring the existing environmental noise climate at 15 locations during the daytime and at the same 15 locations at night within the vicinity of the proposed scheme as shown on Figure 13.1. The monitoring represents the noise climate with the existing traffic network and ascertains the influence of other non-traffic noise sources in the area.

13.3.9 Daytime monitoring was undertaken between the 16th September and 1st November 2010. Attended noise measurements were taken for periods of 3 hours each between the hours of 10.00 and 17.00 in accordance with the CRTN shortened measurement procedure.

13.3.10 Night-time monitoring was undertaken between the 19th and 26th June 2013, Attended noise measurements were taken for 30 minute periods between the hours of midnight and 4am.

13.3.11 The baseline surveys were undertaken in accordance with the principles of BS 7445 and following the guidance given in CRTN and BS 4142 - Method for Rating Industrial Noise Affecting Mixed Residential and Industrial Areas. The meteorological conditions during the measurement periods were within the limits stated in BS 7445 - Description and measurement of environmental noise (Part 1-Part 3).

13.3.12 The sound level meters used to undertake the measurements were 01dB Metravib type Blue Solo Sound Type 1 Level Meters (serial numbers 61331 and 61332) fitted with 01dB Metravib type PRE21S pre-amplifiers and Graf type MCE212 microphones.

13.3.13 All the equipment used had been calibrated to the relevant traceable laboratory standards. Field calibration was carried out with Norsonic 1251 calibrators (serial numbers 31460 31462 and 32704). No significant calibration drift was recorded. Calibration certificates are available in Appendix 13C.

Impact ratings

13.3.14 Impact ratings for the predicted changes in traffic-related noise levels in the short-term and long-term have been based on the guidance in HD 213/11 as replicated in Table 13-2 and Table 13-3.

Table 13-2 Classification of magnitude of noise impacts in the short-term

Noise Change LA10,18h	Magnitude of Impact
0	No Change
0.1 – 0.9	Negligible
1 – 2.9	Minor
3 – 4.9	Moderate
5 +	Major

Table 13-3 Classification of magnitude of noise impacts in the long-term

Noise Change LA10,18h	Magnitude of Impact
0	No Change
0.1 – 2.9	Negligible
3 – 4.9	Minor
5 – 9.9	Moderate
10 +	Major

Changes in noise nuisance

13.3.15 Noise nuisance takes into account both the long-term and short term-impacts. The methodology requires the reporting of the worst case noise changes as a result of the comparisons undertaken within the first 15 years following opening of the proposed scheme.

13.3.16 The percentage of the identified receptors which will experience annoyance has been calculated by comparing the modelled changes in noise using the Figures A6.1 and A6.2 in DMRB HD213/11.

Night-time assessment

13.3.17 Method 2 of the Transport Research Laboratory report “Converting the UK traffic noise index LA10, 18h to EU noise indices for noise mapping” as recommended in the HD213/11 guidance, has been followed to calculate the night time noise levels for the long-term scenarios.

Traffic-related vibration

13.3.18 With regard to airborne vibration, HD213/11, Annex 6 notes a correlation between the percentage of people bothered by vibration nuisance and the $L_{A10,18hr}$ statistical noise parameter experienced due to traffic noise. The correlation indicates that for a given level of noise exposure the percentage of people bothered "very much" or "quite a lot" by vibration is 10% lower than the corresponding figure for noise nuisance. Where noise levels are below 58 dB $L_{A10,\ 18hr}$ it can be assumed that the percentage of people bothered by vibration tends towards zero.

13.4 The baseline environment

13.4.1 Receptors A total of 26,034 residential properties and 114 non-residential noise sensitive receptors were identified within the study area for the assessment of traffic-related noise during operation:

- Residential – 26,034
- Education - 28
- Community Facilities - 33
- Places of Worship - 19
- Medical Facilities - 29
- Nursing / residential Homes - 5

Existing noise climate

13.4.2 At most of the locations used for the monitoring survey, traffic noise on the local road network, was the predominant noise source, particularly on the M56, Ringway Rd, Styal Rd, the A555, Chester Rd, Woodford Rd, the A523 and A6. At locations closer to Manchester Airport, particularly in Styal, Woodhouse Park and Moss Nook, aircraft noise from landing, take-off and taxiing becomes more dominant.

13.4.3 As well as road traffic noise there were other sources of noise that contributed to the background noise levels which included:

- jet aircraft flyover on the approach path to Manchester airport;
- ground movements of aircraft taxiing at the airport;
- light aircraft flyover;
- trains; and
- other local domestic human activities, such as lawnmowers, pedestrians, children playing etc.

13.4.4 Other than aircraft movements and other associated service noise at Manchester Airport there were no significant industrial noise sources encountered at the monitoring locations throughout the length of the proposed scheme.

Ambient noise levels

13.4.5 A summary of the LA10, LA90, and LAeq,T values are shown in Table 13-4 and Table 13-5. Detailed noise monitoring data is provided in Appendix 13D.

Table 13-4 Summary of baseline environmental noise monitoring survey

Site	Date	Time (Hrs)	Measurement Duration (hrs)	Overall Level (dB)			
				L_{Aeq}	L_{A10}	L_{A90}	L_{AMAX}
MP01	17/09/2010	13:49 – 16:49	03:00	51.7	53.4	46.3	76.4
MP02	22/09/2010	14:02 – 17:02	03:00	45.9	47.5	38.7	68.5
MP03	12/10/2010	13:55 – 16:55	03:00	46.4	50.0	39.4	64.6
MP04	13/10/2010	10:31 – 13:31	03:00	54.5	50.3	35.6	86.9
MP05	01/11/2010	14:01 – 17:01	03:00	67.0	71.9	49.3	82.2
MP06	16/09/2010	14:00 – 17:00	03:00	74.6	77.5	65.8	90.0
MP07	06/10/2010	10:22 – 14:08	03:00	52.9	54.6	49.9	65.9
MP08	17/09/2010	10:28 – 13:28	03:00	70.2	73.0	63.5	81.0
MP09	16/09/2010	10:30 – 13:30	03:00	54.4	56.5	49.7	71.3
MP10	21/09/2010	14:05 – 17:05	03:00	53.2	56.5	41.5	79.2
MP11	05/10/2010	13:56 – 16:56	03:00	49.0	50.5	43.6	70.3
MP12	06/10/2010	09:52 – 12:52	03:00	67.1	70.9	55.9	79.3
MP13	06/10/2010	13:18 – 16:18	03:00	58.8	60.9	52.3	78.0
MP14	22/09/2010	10:16 – 13:16	03:00	63.2	62.7	54.6	85.0
MP15	21/09/2010	10:31 – 13:31	03:00	58.3	59.4	48.2	78.8

L_{A10} is the A-weighted sound level that is exceeded for 10% of the sample period; this parameter givens an indication of the upper limit of fluctuating noise such as that from road traffic.

L_{A90} is the A-weighted sound level that is exceeded for 90% of the sample period; generally used to quantify background noise.

$L_{Aeq,T}$ is the A-weighted equivalent continuous sound level during the sample period (T) and effectively represents an average value.

L_{AMAX} is the maximum A-weighted sound level during the sample period; the highest level of environmental noise during the measurement.

Table 13-5 Summary of baseline environmental night time noise monitoring survey

Site	Date	Time (Hrs)	Measurement Duration (hrs)	Overall Level (dB)			
				L_{Aeq}	L_{A10}	L_{A90}	L_{AMAX}
MP01	19/06/2013	02:41 – 03:11	00:30	37.4	38.7	22.8	56.5
MP02	19/06/2013	01:59 – 02:29	00:30	28.6	28.6	19.4	56.0
MP03	19/06/2013	01:21 – 01:51	00:30	32.0	35.9	22.9	43.8
MP04	26/06/2013	03:04 - 03:34	00:30	30.6	33.0	25.7	49.6
MP05	19/06/2013	00:40 – 01:10	00:30	54.2	41.4	30.4	78.2
MP06	19/06/2013	00:01 – 00:31	00:30	61.4	64.9	34.7	77.8
MP07	26/06/2013	01:24 – 01:54	00:30	33.3	36.3	25.8	53.0
MP08	26/06/2013	00:43 – 01:13	00:30	56.9	59.5	37.3	76.9
MP09	26/06/2013	00:02 – 00:32	00:30	41.6	44.5	27.8	61.4
MP10	19/06/2013	03:08 – 03:38	00:30	34.0	36.2	29.8	47.6
MP11	19/06/2013	02:29 – 02:59	00:30	40.6	38.0	29.2	59.6
MP12	19/06/2013	01:46 – 02:16	00:30	59.4	63.8	40.2	75.0
MP13	19/06/2013	00:25 – 00:55	00:30	66.5	57.9	39.7	85.8
MP14	19/06/2013	01:06 – 01:36	00:30	56.9	58.7	42.1	73.2
MP15	26/06/2013	02:14 – 02:44	00:30	42.6	43.6	37.3	65.7

Vibration

13.4.6 Subjective observations were undertaken during the noise monitoring survey which indicated there ware no major sources of vibration in the vicinity of the proposed construction works. In light of the observations, baseline vibration monitoring was not undertaken.

13.5 Predicted impacts and mitigation

Construction noise

13.5.1 The exact types of plant which will be used have not been determined at this time. However, the typical plant and equipment that may be used during construction are mechanical excavators, scrapers, graders and dump trucks, generators, ready-mixed concrete vehicles, road rollers and compaction plant, pumps, hand tools and site staff vehicles.

13.5.2 It is also anticipated that sheet piling and bored piling will be required which may have vibration impacts depending on the type of piling plant used by the contractor.

Vibration levels shall be monitored by the contractor as part of the CEMP, and mitigation utilised where necessary.

13.5.3 Following the criteria methodology contained within BS 5228, thresholds of significant noise impacts have been derived from the baseline noise survey results. These are detailed in Table 13-6.

Table 13-6 Thresholds of significant noise impacts Location

	LAeq, dB calculated using the BS 5228 ABC Methodology		
	Weekday Daytime		
	Ambient level	Rounded to nearest 5dB	Threshold
MP01	51.7	50	65
MP02	45.9	45	65
MP03	46.4	45	65
MP04	54.5	55	65
MP05	67.0	65	70
MP06	74.6	75	75
MP07	52.9	55	65
MP08	70.2	70	75
MP09	54.4	55	65
MP10	53.2	55	65
MP11	49.0	50	65
MP12	67.1	65	70
MP13	58.8	60	65
MP14	63.2	65	70
MP15	58.3	60	65

13.5.4 Where construction noise levels are deemed to have a significant effect as outlined in BS 5228 - 'A significant effect has been deemed to occur if the total LAeq noise level, including construction, exceeds the threshold level for the Category appropriate to the ambient noise level', then where possible the construction delivery partner should adopt measures to reduce noise levels at source or through appropriate mitigation.

13.5.5 Table 13-6 provides recommended noise limits for construction activities based on the guidance given in BS5228 at each of the monitored locations.

Traffic-related noise during operation

13.5.6 The results of the modelling for traffic related noise are summarised Tables 13.7 - 13.11. The tables identify the numbers of receptors against the impact ratings

described in Table 13-2 and Table 13-3. The predicted changes in the short term and long term are illustrated in Figures 13.2 to 13.6 and 13.7 to 13.11 respectively.

Table 13-7 Summary of short term noise impacts

Scenario: Short term Traffic Noise Impacts			
Comparison: DS scenario in 2017 relative to the DM scenario in 2017			
Change in noise level		Number of Dwellings	Number of other sensitive receptors
Increase in noise level $L_{A10, 18h}$	0.1- 0.9 (Negligible)	8983	44
	1 - 2.9 (Minor)	6755	26
	3 - 4.9 (Moderate)	2332	9
	5+ (Major)	488	4
No Change	0	992	2
Decrease in noise level, $L_{A10, 18h}$	0.1 - 0.9 (Negligible)	4624	24
	1 - 2.9 (Minor)	1691	14
	3 - 4.9 (Moderate)	137	0
	5+ (Major)	37	0

13.5.7 In the short-term (Table 13-7), the opening of the proposed scheme is predicted to have a negligible/minor traffic noise impact at 85% of the dwellings, with 11% anticipated to experience moderate/major increases in traffic noise as a result of introduction of the scheme.

13.5.8 Dwellings which are predicted to experience a major adverse traffic noise impact are located in close proximity to the proposed scheme. The principal areas subject to an moderate/major noise impact are; southern Wythenshawe (north of Ringway Road West), southern extents of Heald Green, north western areas of Handforth including Styal Golf Club, southern areas of Cheadle Hulme and Bramhall, north western extents of Poynton and properties to the south of Norbury Moor.

13.5.9 The dwellings predicted to experience decreases in traffic noise are located in the southern Heald Green area (along Outwood Rd, Cross Rd and Bolshaw Rd), Moss Nook (Ringway Rd), Woodford Rd and Chester Rd at Woodford; and on the A6 between Hazel Grove and High Lane where the scheme tie-in bypasses the A6.

13.5.10 Table 13-8 indicates the predicted changes in noise levels comparing the two Do Minimum scenarios in 2017 and 2032 using the ratings identified in the DMRB. This comparison is undertaken in order to quantify the affect of inherent traffic growth between the year of opening and design.

Table 13-8 Changes in noise levels without the proposed scheme

Scenario: Long Term Traffic Noise Impacts			
Comparison: DM Scenario in 2032 relative to the DM scenario in 2017			
Change in noise level		Number of Dwellings	Number of other sensitive receptors
Increase in noise level LA10, 18h	0.1- 2.9 (Negligible)	25127	121
	3- 4.9 (Minor)	5	0
	5- 9.9 (Moderate)	6	0
	10+ (Major)	2	0
No Change	0	321	1
Decrease in noise level LA10, 18h	0.1- 2.9 (Negligible)	575	1
	3- 4.9 (Minor)	1	0
	5- 9.9 (Moderate)	2	0
	10+ (Major)	0	0

13.5.11 Without the proposed scheme the majority of the receptors are predicted to experience a negligible increase in noise level due to traffic growth over the 15 year period. The more significant increases are predicted to occur at Hilary Rd, Wythenshawe and are due to the increase in traffic flows in this area predicted to result from the committed developments at Airport City.

13.5.12 The results of the nigh time assessment are given in Table 13-9. It should be noted that the guidance given in DMRB requires that only those dwellings experiencing noise levels above 55dB ($L_{night,\ outside}$) in any scenario are assessed. Therefore the total number of dwellings assessed is considerably less than those in Table 13-8 above.

Table 13-9 Changes in noise levels without scheme – night time assessment

Scenario: Long Term Traffic Noise Impacts		
Comparison: DM scenario in 2032 relative to the DM scenario in 2017		
Change in noise level		Number of Dwellings
Increase in noise level $L_{night,\ outside}$	0.1- 2.9 (Negligible)	2920
	3- 4.9 (Minor)	81
	5- 9.9 (Moderate)	2
	10+ (Major)	0

Scenario: Long Term Traffic Noise Impacts		
Comparison: DM scenario in 2032 relative to the DM scenario in 2017		
Change in noise level		Number of Dwellings
No Change	0	163
Decrease in noise level $L_{night, outside}$	0.1- 2.9 (Negligible)	423
	3- 4.9 (Minor)	32
	5- 9.9 (Moderate)	0
	10+ (Major)	0

13.5.13 The areas predicted to experience night time noise impacts due to traffic growth are in the same geographical area as those during the daytime as indicated in paragraph 13.5.12.

13.5.14 Table 13-10 indicates the long term noise impacts comparing DM 2017 to DS 2032. Most receptors (81%) are expected to experience negligible to minor increases in noise as a consequence of the implementation of the proposed scheme and resulting traffic growth over a 15 year period.

13.5.15 Moderate and major adverse traffic noise impacts are predicted to occur in the long term at the following locations; clusters of residential areas north of Ringway Road West, south Heald Green, west and north western areas of Handforth, south and south east Bramhall, north Woodford, Poynton and Norbury Moor.

Table 13-10 Summary of long term noise impacts

Scenario: Long Term Traffic Noise Impacts			
Comparison: DS scenario in 2032 relative to the DM scenario in 2017			
Change in noise level		Number of Dwellings	Number of other sensitive receptors
Increase in noise level LA10, 18h	0.1- 2.9 (Negligible)	17158	77
	3- 4.9 (Minor)	4038	14
	5- 9.9 (Moderate)	850	8
	10+ (Major)	34	0
No Change	0	408	3
Decrease in noise	0.1- 2.9 (Negligible)	3453	21

Scenario: Long Term Traffic Noise Impacts			
Comparison: DS scenario in 2032 relative to the DM scenario in 2017			
Change in noise level		Number of Dwellings	Number of other sensitive receptors
level LA10, 18h	3- 4.9 (Minor)	70	0
	5- 9.9 (Moderate)	28	0
	10+ (Major)	0	0

13.5.16 The results of the long term night time assessment are shown in Table 13-11. Note that the noise levels given are for $L_{night,outside}$ at only those dwellings predicted to experience noise levels of above 55dB in any scenario.

Table 13-11 Long term night time noise impacts

Scenario: Long Term Traffic Noise Impacts		
Comparison: DS scenario in 2032 relative to the DM scenario in 2017		
Change in noise level		Number of Dwellings
Increase in noise level $L_{night, outside}$	0.1- 2.9 (Negligible)	2047
	3- 4.9 (Minor)	208
	5- 9.9 (Moderate)	245
	10+ (Major)	64
No Change	0	63
Decrease in noise level $L_{night, outside}$	0.1- 2.9 (Negligible)	537
	3- 4.9 (Minor)	207
	5- 9.9 (Moderate)	162
	10+ (Major)	88

13.5.17 Of the 3621 dwellings with the above 55dB $L_{night, outside}$ criteria, most (83%) are anticipated to experience a negligible to minor adverse increase in noise level, 29% show no change or a reduction in noise level as a consequence of the implementation of the proposed scheme and resulting traffic growth over a 15 year period.

13.5.18 The areas of greatest increase, showing moderate and major impacts (9%) are in broadly the same areas as those predicted to experience long term increases in the day time as indicated in 13.5.16.

13.5.19 Basic Noise Level (BNL) calculations were undertaken for affected routes beyond 1km of the proposed scheme. Property counts were undertaken to determine the number of dwellings within 50m of these routes. The assessment concluded that for all receptors none would experience more that a negligible increase in traffic related noise according the DMRB. Appendix 13E summarises the BNL calculations and property counts.

Noise nuisance

13.5.20 Table 13-12 indicates the predicted noise nuisance impacts for the day time period and shows that without the proposed scheme, the DM nuisance impacts are predicted to be less than 10% across the majority of residential receptors within the study area,. With the proposed scheme, the distribution of changes in nuisance is wider. There are more significant increases in annoyance as a result of the Proposed Scheme.

Table 13-12 Traffic noise nuisance impacts

Scenario : Traffic Noise Nuisance Impacts			
Comparison with Low Noise Surfacing on Do Something scenarios			
Change in noise level		Do Minimum	Do Something
		Number of Dwellings	Number of Dwellings
Increase in nuisance level	< 10%	23689	4545
	10 < 20%	1	7147
	20 < 30%	0	7407
	30 < 40%	0	2661
	> 40%	0	159
No Change	0 %	1209	1069
Decrease in nuisance level	< 10%	1135	3047
	10 < 20%	4	4
	20 < 30%	1	0
	30 < 40%	0	0
	> 40%	0	0

Noise Insulation Regulations

13.5.21 There are 55 residential properties which may potentially qualify for noise insulation under the Noise Insulation Regulations 1975 (Amended 1988) based on the results of the modelling for predicted traffic-related noise levels.

First Priority noise Locations

13.5.22 Changes to traffic related noise within the three FPLs indicated in Table 13-1 will comprise the following.

13.5.23 Traffic within FPL IA 1523, located on the A523 London Road North, Poynton, between Mayfair Close and Vicarage Lane, is predicted to increase as a result of the proposed scheme.. This is likely to represent a small increase in traffic related noise at this FPL.

13.5.24 Within FPL IA 1527, located at the junction of Mill Lane and the A6, and FPL IA 1529, located on the A6 between the junction of the A523 and Woodsmoor Road, traffic flows and traffic related noise levels will decrease as a result of the proposed scheme.

Construction vibration

13.5.25 Without information relating to the specifics of piling operations which may be required (including piling rig size, pile diameters, depth energy per blow etc), an assessment of vibration during construction has not been possible. Vibration from plant, and control measures to mitigate the effects of such, shall be considered by the construction delivery partner within the scope of the CEMP.

Traffic vibration

13.5.26 648 dwellings have been identified within 40m of affected roads in the study area. Table 13-13 shows the number of dwellings within 40m that are expected to experience a change in nuisance level as a result of traffic related airborne vibration. Only those dwellings predicted to experience noise levels of 58dB(A) and above have been included in the table, this being the recommended lower limit given in DMRB for noise exposure levels causing nuisance from air-borne vibration.

Table 13-13 Changes in vibration nuisance level

Scenario : Traffic Noise Nuisance Impacts			
Comparison with Low Noise Surfacing on Do Something scenarios			
Change in nuisance level		Do minimum	Do Something
		Number of Dwelling	Number of Dwelling
Increase in nuisance	<10%	493	4864

Scenario : Traffic Noise Nuisance Impacts			
Comparison with Low Noise Surfacing on Do Something scenarios			
Change in nuisance level		Do minimum	Do Something
		Number of Dwelling	Number of Dwelling
level	10 < 20%	0	26
	20 < 30%	0	0
	30 < 40%	0	0
	>40%	0	0
No Change	0%	150	136
Decrease in nuisance level	<10%	5	0
	10 < 20%	0	0
	20 < 30%	0	0
	30 < 40%	0	0
	>40%	0	0

13.5.27 Table 13-13 indicates the majority of properties will not experience any change in vibration nuisance in either scenario. There is a minor shift of 4% of the assessed dwellings moving from less than 10% change in nuisance into bands of above 10%, there are no dwellings in the greater than 20% category.

Mitigation

13.5.28 The contractor will be required to complete a detailed assessment in accordance with BS5228 as part of the finalisation of working methods and informed by the specific plant and machinery which will be used. The contractor will be required to agree appropriate thresholds based on the data derived from the monitoring surveys undertaken at the time with the local authorities. Construction noise exceptions will be agreed for locations where activities such as piling or extensive breakout will be likely to involve noise levels that unavoidably exceed general thresholds.

13.5.29 Proposed mitigation which the contractor will be required to incorporate in to the detailed CEMP include:

- notification to residents and other sensitive receptors in advance of implementation relative to construction activities involving potentially intrusive noise, with information relating to the nature of the noise levels and the timing and duration of the activities.
- publication of a complaints telephone line in agreed locations;

- use of well maintained and appropriately silenced plant at all times;
- equipment, including road vehicles will be shut down when not in use;
- engine compartments will be closed when equipment is in use and the resonance of body panels and cover plates will be reduced by the addition of suitable dampening materials.
- semi-static equipment will be sited and orientated as far as is reasonably practicable away from noise-sensitive receptors and will have localised screening where necessary;
- generators and water pumps required for 24-hour operation will be super-silenced and/or screened as appropriate;
- crane spindles, pulley wheels, telescopic sections and moving parts of working platforms will be adequately lubricated in order to prevent undue screeching and squealing;
- where possible, mains electricity will used rather than generators; and
- where practicable, pile caps will be cut and then broken with hydraulic rams to minimise the use of heavy air-powered breakers.

13.5.30 Mitigation once the proposed scheme is open to use will comprise the measures described in Chapter 5 – Noise Mitigation and will include a combination of mounding, low noise surfacing and environmental barriers.

13.6 Conclusions and effects

13.6.1 The assessments have identified appropriate protocols and measures for the management of construction related noise. With these measure in place construction related noise will not constitute a significant effect.

13.6.2 The assessments have demonstrated that a substantial number of receptors will be subject to a reduction in traffic related noise once the scheme is open for use. The assessments have further demonstrated that there will be locations where changes in noise level, taking into account mitigation, will be of an order which constitutes a significant effect.

14 Effects on All Travellers

14.1 Scope of the assessments

14.1.1 This chapter includes an assessment of anticipated impacts on:

- non-motorised users (NMUs) of the existing footpath, PRoW and road network relative to impacts on accessibility and the amenity value of the parts of the network affected; and
- motorists using the existing road network and the proposed scheme relative to driver stress.

14.1.2 NMUs include pedestrians, cyclists and equestrians. Motorists considered include users of the proposed dual and single carriageway and of the existing road network where it crosses the proposed scheme or in the proposed traffic mitigation areas.

14.1.3 The assessment for accessibility and amenity value has involved consideration of new severance associated with the alignment of the proposed dual carriageway and relief of severance associated with reductions in traffic flows on existing roads. The assessment for both has been focused on impacts in the opening year.

14.1.4 Details of NMU route closure / diversion during construction are currently not available and have not been subject to detailed assessment. The impacts will be temporary and short-term. The contractor will be required to develop and agree a Traffic Management Plan with the appropriate local authorities for the duration of the contract. The plan will identify proposals for the principal phases of the works and individual construction activities to address disruption to existing vehicular and NMU movements in specific locations along the construction corridor.

14.1.5 The study area for the assessment of accessibility and amenity value has been the network of NMU routes in the vicinity of and along the proposed scheme. These include:

- PRoW;
- cycletracks;
- footways;
- minor roads
- local roads and cycle routes; and

14.1.6 The study area for the assessment of driver stress has included:

- the proposed scheme corridor;

- the main through routes directly connecting to the proposed scheme; and;
- the following areas where traffic mitigation measures are proposed:
  - *A6 Disley to Hazel Grove*
  - *Torkington Road & Threaphurst Lane, Hazel Grove*
  - *Poynton: Clifton Road;*
  - *Cheadle: Gillbent Lane;*
  - *Handforth; and*
  - *Wythenshawe;*

14.2 Methods of assessment

14.2.1 The assessments have been informed by the following guidance:

- DMRB - Volume 11, Section 3, Part 8, Pedestrians, Cyclists, Equestrians and Community Effects (HMSO, 1993 - 2006); and
- DMRB - Volume 11, Section 3, Part 9, Vehicle Travellers (HMSO 1993 - 2006).

Assessment of impacts on accessibility and amenity value

14.2.2 The assessment has involved:

- identification of the existing network of PRoW and local roads, likely to be affected by the implementation of the proposed scheme;
- evaluation of the levels of current use of the identified network with particular emphasis on those sections which will be crossed by the proposed scheme or in close proximity to the proposed scheme (the baseline environment);
- estimation of changes in distance travelled for users of the existing network, where the proposed scheme provides for the stopping up, partial stopping up and diversion of existing PRoW and the provision of new footpaths cycletracks and bridleways;
- evaluation of the order of increased or reduced severance for users of the existing network; and
- description of the impacts and the predicted effects on NMUs and motorists using PRoW and local roads taking into account severance, increased accessibility and changes in amenity value.

Establishing the baseline

14.2.3 PRoW and local roads which have been included in the assessment were identified from the following sources:

- OS mapping;

- the Definitive Maps held by SMBC. MCC and CEC;
- 2009 base year traffic data;
- non statutory consultees (Chapter 6);
  - *Cheshire East local Access Forum;*
  - *North West Transport Activists Round Table;*
  - *The Ramblers; and*
  - *SUSTRANS*

14.2.4 NMU routes have been included in the assessment if they will be physically altered and levels of use associated with them could be likely to change as a result of the implementation of the proposed scheme.

14.2.5 A survey of NMU on the identified routes was undertaken by Greater Manchester Transportation Unit to establish indicative levels of use for each route. Each route was surveyed on a single Friday, Saturday and Sunday from 07:00 to 21:00 in June and July 2010 (Appendix 14A and Figure 14.1 for the location of NMU surveys).

Impact Assessment

14.2.6 Accessibility severance impact ratings adopted for the assessment have been those defined in Volume 11, Section 3, Part 8 of the DMRB as replicated in Table 14-1[33].

Table 14-1 Severance Impact Ratings

Magnitude of Severance	Criteria
Slight	• Pedestrian at-grade crossing of a new road carrying below 8,000 vehicles per day (AADT); • Or a new bridge would need to be climbed or a subway traversed; and • Or journeys would be increased by 250m.
Moderate	• Two or more of the hindrances set out under 'slight' applying to single trips; • Or pedestrian at-grade crossing of a new road carrying 8,000-16,000 vehicles per day (AADT) in the opening year; and • Or journeys would be increased by 250-500m.
Substantial	• Three or more of the hindrances set out under 'slight' or two or more set out under 'moderate'; • Or pedestrian at grade crossing of a new road carrying over 16,000 vehicles per day (AADT) in the opening year; and • Or journeys would be increased by over 500m.

14.2.7 Consideration has also been given to the number of journeys undertaken, the reason for the journey and increased accessibility associated with the additional provision proposed as an integral part of the proposed scheme objectives.

14.2.8 Amenity has been defined as the relative pleasantness of a journey. This has been determined by the views afforded to travellers along an NMU route and any exposure to traffic which will potentially affect travellers in respect of fear / safety, noise pollution and air quality.

14.2.9 The assessment of relief of severance for NMUs has been based on the predicted reduction in traffic flows on existing roads which it is predicted will result from implementation of the proposed scheme, using the criteria detailed in Volume 11, Section 3, Part 8 of the DMRB as replicated in Table 14-2.

Table 14-2 Relief from existing severance impact ratings

	Level of Relief From Severance % Reduction in Existing Traffic Levels		
	Slight	Moderate	Substantial
Built-up Area	30%	30-60%	60% +
Rural Area	60-75%	75-90%	90% +

Driver stress

14.2.10 The assessment of driver stress has involved consideration of:

- traffic flows;
- journey speed;
- frustration - the inability to drive at a speed consistent with the driver's wishes in relation to the general standard of the road;
- fear - the potential for accidents due to the presence of other vehicles, poor road standards and the possibility of pedestrians stepping into the road; and
- uncertainty - primarily due to signing that is inadequate for the driver's purpose.

14.2.11 In relation to traffic flows and journey speed, the DMRB provides guidance relating to levels of driver stress to the average hourly flow per lane, average journey speed, the urban or rural location of the road, and the type of road (motorway, dual carriageway or single carriageway) being assessed.

14.2.12 The assessment of predicted levels of driver stress has been informed by evaluation of the identified routes and areas against the criteria in Table 14-3 and Table 14-4.

Table 14-3 DMRB Stress ratings for single carriageway roads

Average Hourly Flow Per Lane Flow Units / 1 Hour	Average Journey Speed – km/hr		
	Under 50	50-70	Over 70
Under 600	High*	Moderate	Low
600-800	High	Moderate	Moderate
Over 800	High	High	High

Table 14-4 DMRB Stress ratings for dual carriageway roads

Average Hourly Flow Per Lane Flow Units / 1 Hour	Average Journey Speed – km/hr		
	Under 60	60-80	Over 80
Under 600	High*	Moderate	Low
600-800	High	Moderate	Moderate
Over 800	High	High	High

* Moderate in urban areas

14.3 Baseline environment

PRoW and Cycle Routes

14.3.1 There is an extensive network of NMU routes (including on road and traffic-free routes), and roads within the study area for the assessments as shown on Figure 14.1.

14.3.2 NMU routes associated with the eastern section of the proposed scheme between the A6 and the A555 include footpaths, and on-road and traffic segregated cycletracks connecting the communities of Hazel Grove, Bramhall, and Poynton. The user surveys identified the principal purpose for some 69% of users recorded as being recreational or dog walking.

14.3.3 East of the A6, Footpaths (FP) No. 65 and 66 Hazel Grove and Bramhall (HGB) link the pedestrian footway adjacent to the A6 across the Hazel Grove Golf Club to the residential area in Torkington and into the wider footpath network to the north and east (Figure 14.2). The A6 footway is used predominately for recreation or to access destinations including Hazel Grove golf course, the petrol station on the A6 and residential areas in Norbury Moor, Hazel Grove, and Stockport. FP 65 HGB is primarily used for recreation and dog walking.

14.3.4 FP109 HGB (Figure 14.2) is set in the wooded valley along the banks of Norbury Brook running west to east and between Park Gate Farm and the Manchester to Buxton Railway Line. It forms part of the Ladybrook Valley Interest Trail long distance walking route and links to FP 75 HGB, Poynton with Worth (PW) FP16 and PW FP62. The amenity value of the footpath in its wooded surroundings is high, as reflected by the relatively large number of recreational and dog walkers that use it. It is readily accessible to residents in Norbury Moor on the southern edge of Hazel Grove and properties along the A6.

14.3.5 The footway along the eastern side of the A523 Macclesfield Road (Figure 14.3) is heavily used. Some 57% of all NMU use recorded in the eastern section of the proposed scheme during the user surveys was identified with the footway. A relatively high number of wheelchair / buggy users were recorded compared to other NMU routes. The footway connects residential properties in Hazel Grove and Poynton to the Brookfield Garden Centre, Tower Road and the Lady Brook Valley Interest Trail, Poynton Park and Lake. 35% of the recorded journeys were to or from the Brookfield Garden Centre, for work, shopping or recreation. The amenity value of the footway, which comprises a 2m-wide pavement adjacent to the busy highway with traffic flows of 25,100 AADT, is low.

14.3.6 The A523 Macclesfield Road has also been identified as an important cycle route; some 45% of recorded NMUs were cyclists. There is a designated cycle lane along sections of the road, but it is not segregated from the high traffic flows.

14.3.7 PW FP3 links the small number of residential properties on Mill Hill Hollow to Chester Road to the north and the A523 Macclesfield Road to the south (Figures 14.2 and 14.3). The footpath also forms part of the Ladybrook Valley Interest Trail. Relatively low levels of use were recorded during the user surveys, that which was recorded being for recreation or dog walking. The amenity value of the footpath is high as it runs along the top of the wooded valley of the Ladybrook, crosses the Poynton Brook and passes Barlow Fold Farm surrounded by wooded field margins.

14.3.8 PW FP27, FP31 and FP21 form part of the network of NMU routes linking Poynton to Woodford Road and with PW Restricted Byway 39, PW FP46 and FP43 (Figure 14.4). Amenity is generally good along these routes which cross fields and farmyards. At Woodford Road PW FP31 and 27 terminate and any journeys beyond this to other parts of the footpath network involve the use of Woodford Road, either north or south. FP21 links to Bramhall via FP27. The footpaths surveyed in this area were poorly used over the survey period, in comparison to other routes. All recorded use was for recreation or dog walking.

14.3.9 The user surveys identified Woodford Road as a frequently used cycle route connecting Hazel Grove to Woodford, the western edge of Poynton, and indirectly to Bramhall via Chester Road.

14.3.10 FP14a HGB, FP15 HGB, FP16 HGB and FP19 HGB form a network crossing open hedge-lined fields, linking the westernmost residential area of Poynton, at Chester Road, to the Bramhall Oil Terminal and the southern edge of Bramhall. Queensgate Primary School is situated close to where FP14a HGB links into Albany Road and Bramhall (Figure 14.4 and 14.5). Footpath surveys indicated this part of the network is relatively poorly used and that the little use recorded was for recreation and dog walking.

14.3.11 NMU Routes associated with the existing A555 (Figures 14.5, 14.6, 14.7 and 14.8) comprise a network of footpaths linking Bramhall, Cheadle, Woodford and Handforth via the residential areas along Hall Moss Lane and the agricultural fields and holdings to the south with Woodford Recreation Ground, grazing fields and Grove Lane to the north. From east to west the FPs comprise the following:

- FP13 HGB,
- FP16 Cheadle and Gatley (CG),
- FP10 CG,
- FP26 CG,
- FP28 CG
- FP133 CG,
- Wilmslow (W) FP128,
- W FP129,
- FP50 CG,
- W FP140,
- FP38 CG,
- W FP140,
- W FP141, and
- CG FP42A

14.3.12 At the A555 and A34 junction FP42 CG and FP38A CG cross the A34 affording access to the Stanley Green retail park, Manchester Rugby Club and Cheadle Hulme Cricket Club. Surveys were not conducted for this link but it is assumed it will be used for recreation and dog walking particularly between the Manchester Rugby Ground and the A34 due to its proximity to the residential properties associated with Stanley Road, Grove Lane and Spath Lane (Figure 14.7).

14.3.13 W FP119 and W FP7 connecting to W FP87, W FP10, W FP107 and 108 form a small local network that link the southernmost residential area of Heald Green to

Handforth and Styal (Figure 14.8). This small dense area of footpaths crosses hedge-lined fields and Styal Golf Course. The amenity value is generally good; recreational users and dog walkers can experience a rural / agricultural aspect close to the residential areas of Handforth and Heald Green. W FP7 crosses the Styal Rail Line south of the proposed scheme. The user surveys indicated W FP119 and W FP7 experience moderate and low levels of use respectively and that use is for recreation or dog walking.

14.3.14 Crossing Styal Road to the north of the proposed scheme is the Manchester City Council FP253. The footpath links into a footway and cycle path to the west of Styal Road that connects Styal and Heald Green and is heavily used by cyclists and pedestrians. The majority of NMU surveyed were using the route to get to work or to access destinations, which included Wythenshawe, Styal Country Park, Manchester Airport, Heald Green, Styal, Moss Nook, Wilmslow, Styal train station and a petrol station on Hollin Lane.

14.3.15 Table 14-5 summarises the levels of use identified during the user surveys.

Table 14-5 User surveys – levels of use

Footpath	Recorded Level of Use Over 3 Days			
	Pedestrian	Cyclist	Equestrian	Wheelchair / Buggy
Toucan crossing on the A6 opposite Yew Tree Avenue (Site 1)	111	16	0	13
Footpath 65 (Site 2)	61	20	0	0
Footpath 109 (Site 3)	193	75	0	6
Footway on the eastern side of the A523 Macclesfield Road (Site 4)	379	342	0	34
Footpath 3 (Site 5)	53	1	0	0
Footpath 37 (Site 6)	4	1	0	0
Footpath 31 (Site 7)	5	0	0	0
Footpath 21 (Site 8)	48	145	2	0
Footpath 19 (Site 9)	0	0	0	0
Footpaths 14a, 15, 16 (Site 10)	35	0	0	0
Footpath 119 (Site 11)	62	1	1	0
Footpath 7 (Site 12)	10	0	0	0
Footpath from Styal Road to Bolshaw Road through the electricity	7	1	0	0

Footpath	Recorded Level of Use Over 3 Days			
	Pedestrian	Cyclist	Equestrian	Wheelchair / Buggy
Toucan crossing on the A6 opposite Yew Tree Avenue (Site 1)	111	16	0	13
Footpath 65 (Site 2)	61	20	0	0
sub-station (Site 13A)				
Footway and cycletrack running alongside the B1566 Styal Road (Site 13B)	119	265	4	2
Woodhouse Lane (Site 14)	197	57	0	5
Woodhouse Lane footbridge over railway (Site 15)	87	24	0	3
Thorley Lane (Site 16)	203	122	0	8

Community Areas Identified for Traffic Measures

14.3.16 There are a number of local communities which will experience increases in traffic levels or 'inappropriate routeing of local traffic'[34].

14.3.17 The A6 forms part of Stockport's strategic route network and performs an important role for the Greater Manchester City Region carrying traffic from the Peak District and beyond into Greater Manchester. It is also provides a direct link to / from Manchester that is utilised by a high volume of freight traffic. Traffic flows between Disley and Hazel Grove average 20,600 AADT. Along this section there are a number of community facilities including schools, places of worship, bus stops, shops, hotels, restaurants, pubs, the Disley train station and numerous side roads leading to residential properties. There are Toucan crossings in places. However, due to the dispersed nature of the community facilities some key areas are not adequately served with pedestrian crossings and traffic levels associated with the proposed scheme are set to increase from Disley to Hazel Grove.

14.3.18 A6 High Lane is linked to the A6 Hazel Grove via Threaphurst Road (500 AADT) and Torkington Road (1500 AADT). The link follows a northerly direction adjacent to Hazel Grove Golf Course and agricultural fields. Torkington Road then heads west toward Torkington through agricultural fields either side of the road before heading south-west past Torkington Primary School and residential properties and toward the link back onto the A6.

14.3.19 In Poynton, the A523 London Road (22100 AADT) and the B5149 (16000) intersect at the village centre via two shared space roundabouts. The area is within walking distance of a large number of residential dwellings in Poynton and has a number of community facilities including shops, cafes, offices, banks and places of worship along these roads which have also been included in the development of a shared space high street. Clifford Road (4300 AADT) links the A523 and the B5149 via a residential street and has been identified as an area that may be used as an alternative route with an increase in traffic levels.

14.3.20 Cheadle Hulme, Smithy Green and Stanley Green are linked by Gillbent Road (11700 AADT) to the A34. The route is adjacent to residential properties and close to Thorn Grove Primary School, Cheadle Hulme High School and Cheadle Hulme School.

14.3.21 The B5358 Wilmslow Road (13400 AADT) passes through Handforth centre and has shops, takeaways, places of worship, and medical practices lining the street within easy pedestrian access to the surrounding residential properties. The A34 / Stanley Road roundabout (53600 AADT) is congested at peak periods resulting in some A555 traffic using the junction on Wilmslow Road and travelling through Handforth.

14.3.22 In Wythenshawe, the residential area between Simonsway (14900 AADT) and Ringway Road West (24300 AADT) has a number of community facilities including schools, places of worship and recreation areas, within easy walking distance of residential dwellings. Simonsway is a local distributor road which provides an important east-west route within Wythenshawe both for vehicular traffic and pedestrians and cyclists. The route provides access to residential areas, Wythenshawe town centre, and the Ringway Trading Estate, as well as providing a strategic link to the motorway network via a north facing slip on to the M56 at Junction 4. Portway and Cornishway (6600 AADT) provide single carriageway access routes to residential properties, occasional retail units, schools, recreation areas, places of worship and other uses. Traffic is free-flowing throughout the day and both routes are lightly traffic calmed in the form of coloured carriageway surfacing and shallow speed cushions.

Driver stress

14.3.23 Existing levels of driver stress on roads in A6 Disley, High Lane and Hazel Grove Poynton, Cheadle, Handforth and Wythenshawe are all high, due to the high peak hourly traffic flows and / or low speeds which can increase journey times.

14.3.24 Table 14-6 shows the average peak hourly traffic flows and average speeds for the roads where traffic mitigation measures are proposed without the measures or the proposed scheme in place.

Table 14-6 Predicted average peak hourly 2 way traffic flows and average peak hourly speeds for the traffic mitigation measure areas without the proposed scheme in the opening year

Area	Average Peak Hourly Flow	Average Peak Hourly Speeds km/hr
A6 hazel Grove to Disley	1496	35
Poynton	225	12
Cheadle / Stanley Green	1395	36
Handforth	1005	34
Wythenshawe	448	31

14.4 Predicted impacts and mitigation

Accessibility and amenity value

14.4.1 Proposals for the part stopping up and / or diversion of existing NMU routes and for the introduction of new footpaths, cycle tracks and a section of bridleway are shown in Figure 14.1 and described in Chapter 5. The following paragraphs describe the impacts to NMU routes due to severance relative to accessibility and changes in amenity value.

14.4.2 The proposals for diversion of FP109 HGB will increase the journey length from Old Mill Lane to FP109 HGB and Norbury Brook by 268m. It is unlikely that users will be deterred from continuing to use this route due as it is mostly used for local recreation and as part of the long distance walking route the Lady Brook Valley Interest Trail. The presence of the proposed scheme and associated traffic will have an impact on the amenity value of the footpath immediately south of the lane. It is an impact which will reduce once the proposed bridge is crossed and users travel south-west or south east and the immediate influence of the road and its traffic recedes. Taking severance and the change in amenity value into account the impact will be moderate adverse.

14.4.3 The proposals for pedestrian crossing of the proposed dedicated filter lane at the A523 Macclesfield Road (Figure 14.3) will result in increased journey times for users of the footway on the eastern side of the road when they are required to wait until the crossing sequence gives them priority over the traffic accessing and existing the slip roads. There will be no marked change in amenity value for users of the footway. The increased journey time will have a slight adverse impact on the many people who currently use the footway.

14.4.4 The proposals for diversion of PW FP3 and the Ladybrook Valley Interest Trail will increase the journey length for the predominantly recreational users of the path by

approximately 110m. It is unlikely, however, the increased length will deter local use or longer distance walkers. The presence of the new road and its associated traffic will diminish the amenity value of the path in the immediate vicinity of the dual carriageway but not influence enjoyment of the path more widely. Taking into account the small extent of the diversion, the nature of the use and the localised loss in amenity value, the impact will be slight and adverse.

14.4.5 PW FP37 (Figure 14.3), PW FP31 and PW FP21 (Figure 14.4) will all be partly stopped up at the point where they cross the proposed scheme. Continued access for users of this network between Poynton and the Woodford Road will be provided by a footbridge following the approximate alignment of the partly stopped up PW FP31 and the proposed cycleway / footpath on the Woodford Road.

14.4.6 The diversion lengths for each footpath are:

- PW FP37 – 900m
- PW FP31 – 267 m
- PW FP21 – 150m

14.4.7 There will be a slight reduction in amenity value on all three footpaths due to increased traffic noise and the visual prominence of the road embankments.

14.4.8 The users surveys have indicated PW FP37 and PW FP31 are poorly used and all three footpaths are solely used for recreation by pedestrians and cyclists (Table 14.5). In addition, the proposed footpath and cycle way will connect the severed footpaths and provide opportunities for traffic free circular walks. Therefore, the impact on this network of footpaths is considered slight adverse.

14.4.9 The partial stopping up and diversion of FP19 HGB (Figure 14.4) will increase the journey length for users of the path by some 395m. The presence of the dual carriageway on high embankment and noise associated with traffic using the road will affect the amenity value of the path. The user surveys, however, recorded no evidence of use suggesting the path is not currently recognised for its amenity value. It has accordingly been concluded the impact will be slight adverse.

14.4.10 FP14a HGB, FP15 HGB and FP16 HGB will be partly stopped up at varying points along their length (Figures 14.4 and 14.5). Access from Poynton to Bramhall will be maintained via the proposed bridleway running alongside the new spur connecting Chester Road to the main alignment. A toucan crossing will provide for NMU who wish to cross the new junction and rejoin the stopped up footpaths on the Bramhall side of the proposed scheme. The largest potential increase to journey length will be approximately 1km. All users will be required to cross the main carriageway at grade, and to negotiate five crossings to travel from north to south. It is likely that many users could be dissuaded from continued use. For those that do, the amenity value

will be markedly diminished, It has accordingly been concluded the impact will be moderate and adverse.

14.4.11 Footpaths associated with the existing A555 will not be directly affected and will not be subject to a discernible loss of amenity value. The local network will be enhanced by virtue of the introduction of the proposed shared use cycle track and footpath, with a section of bridleway, running adjacent to the dual carriageway. The improved accessibility east to west through the area and additional connectivity with the existing network will have a moderate and beneficial impact.

14.4.12 WFP38A and WFP81 will be partly stopped (Figure 14.7). The footpaths are adjacent to the existing A555 and A34 and localised diversions will provide for safer crossing facilities. There will be no discernible loss in amenity value and no material impact.

14.4.13 WFP119 will be partly stopped up. The new footbridge crossing the proposed scheme (Figure 14.8) will result in an increased journey length for users of the path of 135m. Footpath 7 which also forms part of this local network will be partly stopped up and diverted, increasing the journey length for users by 111m. NMUs will pass under the proposed scheme via a pedestrian subway adjacent to Styal railway line, within the road over rail bridge. The presence of the proposed scheme across the middle of this local network will reduce the amenity value for users as a result of traffic noise and visual intrusion. The majority of users do so for recreation or dog walking. It is unlikely the small increase in journey lengths and reduction in amenity value will deter continued use. This is, however an area where traffic and its associated noise do not notably influence the user experience. It has, therefore, been concluded the impact will be moderate and adverse for a part of the network which appears to be well-established use.

14.4.14 MCC FP253 will be partly stopped up and diverted over a distance of 137m. There is no survey data for the footpath. However, it is assumed it is used for dog walking and recreation in order to access the wider network of footpaths to the east as shown on Figure 14.8 and 14.9. There will be a slight loss in amenity due to the busy nature of the proposed scheme. It has been concluded the small extent of the diversion and slight loss of amenity value will have a negligible impact.

14.4.15 The footway and cycletrack running alongside the B1566 Styal Road will be severed by the new road carrying in excess of 48,000 AADT. Access for pedestrians and cyclists will be maintained via a new toucan crossing on the slip roads and main carriageway of the proposed scheme. There will be a small increase in journey times as pedestrians and cyclists wait at the crossing. There will be some reduction in amenity as NMU crossed the proposed scheme due to the predicted high traffic flows. It has been concluded there will be a moderate adverse impact for the users of this footway and cycle track.

Complimentary measures

14.4.16 The proposed scheme includes provision of a shared pedestrian and cycle route, with sections that could be upgraded for use by equestrians, adjacent to the new road and existing length of the A555 and providing a new orbital link for the strategic cycle / pedestrian network. It is essential that this new orbital link is fully integrated with the existing local cycle and pedestrian network to maximise access to the new route and therefore maximise the benefits associated with the A6MARR scheme.

14.4.17 Further to consultation with landowners, Table 14-7 indicates the proposed footpath upgrades to be promoted as being complementary to the proposed scheme having taken account of public benefits and the in-principle support from landowners.

Table 14-7 Proposed PRoW upgrades

Footpath No.	Extents	Current Status	Proposed Status
Poynton-with-Worth FP3/1 SE	Scheme to London Road North	Footpath	Bridleway
Hazel Grove & Bramhall 19HGB	From Woodford Road to Scheme	Footpath	Bridleway
Hazel Grove & Bramhall 17HGB	16HGB to Adelaide Road including the link to corner of Meadway.	Footpath	Bridleway
Cheadle and Gatley 16CG	From Moor Lane to Highfield Parkway	Footpath	Bridleway
Poynton-with-Worth FP80	From 42(a)CG to Marthall Way	Footpath	Bridleway
Cheadle and Gatley 33CG	From FP143 to Stanley Road	Footpath	Bridleway
Hazel Grove & Bramhall 16HGB	From proposed scheme to 17HGB	Footpath	Bridleway
Cheadle and Gatley 42(a)CG	From FP140/1 to 42CG	Footpath - Access Road	Bridleway
Cheadle and Gatley 42CG	From 42(a)CG to 38CG	Footpath - Access Road	Bridleway
Longsite Lane	Stanley Road to FP38CG	Private Road	Bridleway
Wilmslow FP119	From Clay Lane RB87 to CEBC/SMBC boundary and in to SMBC	Footpath	Bridleway
Cheadle and Gatley 38CG	From 42CG to Longsight Lane	Footpath	Bridleway
Poynton-with-Worth FP37/1 S	Scheme to Woodford RoadLower Park Road	Footpath	Bridleway
Poynton-with-Worth FP31 N	Scheme to Woodford Road	Footpath	Bridleway
Wilmslow FP143	From Tatton Road to 33CG	Footpath	Bridleway
Hazel Grove & Bramhall 77HGB	From Sandown Road to 65HGB	Footpath	Bridleway
Hazel Grove & Bramhall 65HGB	Hazel Grove Golf Course to A6	Footpath - Access Road	Bridleway
Poynton-with-Worth FP3/1 SE	Scheme to London Road North	Footpath	Bridleway
Hazel Grove & Bramhall 19HGB	From Woodford Road to Scheme	Footpath	Bridleway

14.4.18 Other proposals to improve the linkages for NMUs include:

- An on-highway (A6) link to the Middlewood Way to complete a cycle route from the Manchester Airport on the new cycle route to Marple and other urban areas accessed by the Middlewood Way. An off-carriageway connection to Towers Road from the Macclesfield Road Junction to complete the link from Hazel Grove to Poynton for Cyclist.
- Wider Ladybrook Valley improvements to further support the usefulness of the network improvements in the area.
- Improved off carriageway linkage on Chester Road to give connection for residential areas to proposed bridleway 'spur' on Chester Road Junction. Most likely option to be an uncontrolled crossing island suitable for cyclists and pedestrians.
- Improved off or on road cycle linkages between Woodford Road Junction and Jenny Lane which is a quieter route for less experienced cyclists.
- Improved highway connection is required for St James' Secondary between Longsight Lane and A34 pedestrian and cyclist improvements.
- Possible link from Disley through Lyme Park to High Lane and potentially the Middlewood Way, Macclesfield canal and Poynton.
- A new link from path in to Albany Road Bramhall towards Queensgate School.

14.4.19 The TA identified areas that, as a result of the proposed scheme, will experience a reduction in traffic flows and will present opportunities for further complimentary measures which will benefit NMUs, these comprise the following:

- A6 through Hazel Grove
- Bramhall
- Finney Lane, Heald Green
- Styal Road, Styal

Cycle Routes

14.4.20 All existing cycle routes will be maintained during construction and operation. Where Regional Cycle Route 85 crosses the alignment of the proposed scheme on Styal Road, provision for cyclists will be provided at the toucan crossing. Traffic free cycle provision will be greatly improved by the introduction of the shared use path along the length of the proposed scheme. This will introduce a new east-west route improving the connectivity of the cycle network and be a significant benefit to cyclists.

Severance on existing roads

14.4.21 The A6 from Disley to Hazel Grove Golf Club will experience an increase in traffic flows as a result of the proposed scheme from an average 20,220 AADT, to 27,860 AADT. Residents of both High Lane and Disley that will access community facilities such as schools, churches, bus stops, post office, shops, hotels, restaurants, pubs and Disley train station will be required to cross the A6. This section of the A6 will be considered to result in substantial and adverse severance for residents in High Lane and Newtown without the proposed scheme. With the proposed scheme in place, the predicted increase in traffic flows will worsen the severance.

14.4.22 The nature of the A6 through High Lane and Disley means that it is neither possible nor desirable to significantly increase network capacity along this corridor. For this reason a package of measures on the A6 corridor through High Lane and Disley will focus on improving non-motorised user facilities and will potentially comprise, but not be limited to:

- cycle lanes on sections of the A6 between Hazel Grove and New Mills Newtown where practicable;
- a new pedestrian refuge on the A6 Buxton Road at Wellington Road;
- a new Puffin crossing on the A6 Buxton Road outside the Church/ War memorial in High Lane;
- new uncontrolled pedestrian crossings with refuge islands on Windlehurst Road;
- a new pedestrian refuge on the A6 Buxton Road West outside Lyme Park to link bus stops and the park entrance; and
- a new cycle link between Disley and High Lane/ Poynton through Lyme Park.

14.4.23 In addition, the promoting authorities have resolved to implement a package of enhanced mitigation measures to seek a balanced approach to managing traffic levels. The impact of these traffic mitigation measures are further explained in the TA.

14.4.24 The predicted increases in traffic levels on Threaphurst Lane and Torkington Road, to avoid the new junction of the A6 with the proposed scheme, will be mitigated by designating both roads as 'Quiet Lanes'. As predicted traffic levels are higher without than with the proposed scheme the implementation of this designation on existing severance will result in a slight beneficial impact for NMUs using this route.

14.4.25 In Poynton the traffic levels on Clifford Road are predicted to increase and that it will be used as a 'rat run'[34], with or without the proposed scheme. Monitoring has been committed to along Clifford Road in order to inform potential mitigation measures.

The predicted impact of the proposed scheme on existing severance is considered slight adverse.

14.4.26 The predicted increase in traffic levels on Gillbent Road due to the improvements or more specifically the proposed junction improvements to the A34/ B5094 Stanley Road junction will be mitigated by proposed speed restriction and / or local access improvements. As predicted traffic levels are higher without than with the proposed scheme the predicted impact on existing severance is considered negligible but beneficial.

14.4.27 In Handforth predicted increases in traffic using the town centre to avoid congestion at the A34 / Stanley Road roundabout will be deterred from travelling along the B5358 Wilmslow Road by the introduction of local traffic management measures[34]. As predicted traffic levels are higher without than with the proposed scheme a negligible but beneficial impact on existing severance is predicted for pedestrians accessing Handforth town centre.

14.4.28 In the Wythenshawe area traffic levels are predicted to increase along Portway[34] and residential streets south of Simonsway. To manage this increase local traffic management measures will be introduced on select residential routes and will discourage, as far as practicable, strategic traffic routeing through the Wythenshawe area but at the same time retaining local accessibility to Manchester Airport for Wythenshawe residents.

14.4.29 The mitigation measures will result in a reduction of severance on Portway and a moderate beneficial impact. On Simonsway a reduction of traffic from existing levels is predicted but the incorporation of the mitigation measures described above will divert traffic from the centre of Wythenshawe and increase traffic levels and predicted severance resulting in a slight adverse impact. Given that Simonsway is a distributor road and the priority of the mitigation measures is to divert traffic away from the Wythenshawe community facilities associated with the town centre the overall impact on this mitigation area is considered neutral.

14.4.30 Traffic management measures will be subject to sensitivity testing in consultation with the relevant Planning Authority to determine the most appropriate solution for each mitigation area.

Relief from Existing Severance

14.4.31 As a result of the proposed scheme, twelve roads will benefit from a relief in severance. Six roads will experience a moderate relief from severance and three will experience substantial relief from severance. Table 14-8 details the existing roads that will benefit from a relief from severance.

Table 14-8 Level of relief from severance to existing roads predicted as a result of the proposed scheme

Road Name	Predicted Reduction in Traffic Flows %	Rural / Built up Area	Level of Relief From Severance
A6 Buxton Road (east of A523 Macclesfield Road)	54	Built up Area	Moderate
High Lane - Torkington Road (east of Threaphurst Lane)	32	Built up Area	Moderate
High Lane - Threaphurst Lane (A6 Buxton Road to Torkington Road)	33	Built up Area	Moderate
Poynton - Woodford Road (between A5143 Dean Lane and Meadway)	44	Built up Area	Moderate
A5102 Aldington Road (between Dean Row Road and Wilmslow Park North)	39	Built up Area	Moderate
A5149 Chester Road (between Woodford Road and Oil Terminal Spur)	66	Built up Area	Substantial
A5102 Woodford Road (between A555 and Jenny Lane)	54	Built up Area	Moderate
Heald Green - Bolshaw Road (west of B5358 Wilmslow Road)	60	Built up Area	Substantial
Wythenshawe - Portway (between Cornishway and Oatlands Road)	56	Built up Area	Moderate
Wythenshawe - Ringway Road (between B5166 Styal Road and Shadowmoss Road)	93	Built up Area	Substantial
Wythenshawe - Shadowmoss Road (between Cornishway and Ringway Road)	60	Built up Area	Substantial
Wilmslow - Stanneylands Road	62	Built up Area	Substantial

Driver Stress

14.4.32 Most of the proposed scheme will be constructed offline reducing potential disruption to existing roads and stress for drivers. Locations where construction will be more disrupted to users of the existing network will be at the tie ins and proposed junctions as indicated below:

- A6 Hazel Grove / High Lane
- Macclesfield Road;
- Woodford Road Poynton;
- Chester Road;
- existing A555;
- Woodford Road Junction;
- A34 Junction / Stanley Green;
- Wilmslow Road Junction;
- Styal Road; and
- Ringway Road West

14.4.33 Measures to address disruption and associated stress are described in Chapter 5.

The proposed dual carriageway

14.4.34 The proposed scheme will be designed and constructed in accordance with the latest DMRB and European design standards which will minimise driver's fear through the potential for accidents, and uncertainty due to unclear signage. Average peak hourly traffic flows along the main alignment will be 1549 and the average peak hourly speeds will be 64.82kph. Vehicle travellers will therefore experience moderate stress However, the range of vehicles and speeds along the main alignment indicates that stress levels will range from low to high.

Side Roads

14.4.35 Where roads link or cross the proposed scheme, new junction alignments and signage will be in accordance with the latest design standards and should therefore reduce driver fear and uncertainty. Impacts to driver stress along side roads will therefore be caused by changes in traffic flows and speeds.

14.4.36 There are sections of roads where driver stress will change either beneficially or adversely. This is in general on the approach to junctions where speeds drop and the number of vehicles increase. Increases or decreases that don't fall into the DMRB criteria were still considered as this gives the context for making a journey on other

section of the road that did fall into the DMRB Criteria. Table 14-9 provides an indication of roads on which drivers may experience an increase or decrease in driver stress whilst making a journey for both the AM or PM peak hours.

Table 14-9 Driver Stress

Road Number	Do Minimum	Do Something	
	Stress Level	Stress Level	Impact
A523 Macclesfield Road (north of the proposed scheme) AM / PM	Moderate	High	Adverse
A5102 Woodford Road AM / PM	High	Moderate	Beneficial
A34 Wilmslow Handforth Bypass PM	Moderate	High	Adverse
A538 Altringham Road PM	High	Moderate	Beneficial
B5358 Wilmslow Road PM	High	Moderate	Beneficial
B5166 AM	High	Moderate	Beneficial
B5166 PM	Moderate	High	Adverse

14.5 Conclusions and effects

14.5.1 In light of the findings of the assessment it has been concluded there will be a significant beneficial effect relative to the local network available to NMUs as a result of the proposals for new / diverted footpaths and cycleways and a overall reduction of severance in existing communities.

14.5.2 The assessment has demonstrated that there will be a overall reduction in driver stress for users of the local road network but that this will not constitute a significant effect.

15 Community and Private Assets

15.1 Scope of the assessment

15.1.1 This chapter includes an assessment of:

- private land take and demolition of private property;
- loss of land used by the community;
- effects of land take on agricultural resources; and
- effects on development land.

Study Area

15.1.2 This assessment has considered all land and buildings which will be impacted by:

- demolition of property;
- loss of land; and
- severance;

15.1.3 Development land is defined, for the purposes of this assessment, as area of land for which planning permission has been granted but not yet enacted.

15.2 Methods of assessment

15.2.1 The assessments have been undertaken in accordance with Interim Advice Note (IAN) 125/09 – Supplementary Guidance for Users of DMRB Volume 11 'Environmental Assessment', the Community and Private Assets chapter comprises the Part 6 Land Use assessment, and the Community Effects aspects of Part 8 of the DMRB Volume 11, Section 3.

Establishing the Baseline

15.2.2 The baseline environment has been established through a desk-based assessment, site survey and consultation with landowners. As part of the desk-based review the following resources have been consulted:

- Local Plans and proposal maps for SMBC, CEC and MCC;
- Department for Environment, Food and Rural Affairs' (Defra) interactive mapping website; and the Multi Agency Geographic Information for the Countryside (MAGIC);
- Information gleaned from consultation with the public;

- OS mapping;
- Land ownership details obtained from consultation between SMBC, private land owners and land agent;
- GIS mapping quantification of land -take.

15.2.3 Land use has been defined as:

- Private
- Recreation
- Residential; and
- Agricultural

15.2.4 The assessment of land use has involved:

- identification of land take for the following uses:
  - *Temporary under licence,*
  - *land take for access (easement),*
  - *permanent; and*
  - *demolition of buildings;*
- evaluation of the potential impact of the Proposed Scheme land use with reference to the significance criteria in Table 15-1.

Table 15-1 Significance Criteria for the Assessment of Impacts on Private Property

Impact Rating	Criteria
Negligible Impact	• A barely discernible impact on use or amenity value.
Slight Adverse Impact	• landtake peripheral to existing or intended use; • activity that temporarily compromises or precludes use; and • loss of amenity that does not compromise use.
Moderate Adverse Impact	• landtake that compromises but does not preclude existing or intended use; • activity that compromises or precludes use for a protracted period; and • loss of amenity that compromises but does not preclude use.
Substantial Adverse Impact	• landtake that precludes existing or intended use; • activity that permanently compromises or precludes use; and • loss of amenity that precludes use.

Agricultural Land

15.2.5 The assessment of impacts on agricultural land has involved:

- identification of agricultural holdings based on land ownership information;

- consultation with land owners and land agents;
- site visits to the proposed scheme corridor;
- evaluation of the proposed scheme to establish the potential impact on agricultural holdings;
- assessment of the significance of residual impacts on landowners' agricultural holdings.

Development Land

15.2.6 The assessment of development land has involved:

- a review of the development plans and planning registers from SMBC, CEC, and MCC to identify development land and its intended future use within or adjacent to the proposed scheme.

15.3 Baseline environment

Land use

15.3.1 The proposed scheme is located on the urban and rural fringe and it frequently passes clearly defined settlement areas close to individual properties, farmsteads and commercial businesses / industrial trading estates. Figures 15.1 to 15.4 indicate land use within the land take for the proposed scheme.

Private Land

15.3.2 Private Land includes areas where a business or commercial undertaking has been identified. This includes areas of agricultural land that are tenanted but are not considered to form the whole or part of an agricultural holding ownership. These are indicated in Table 15-2.

Table 15-2 Private land

Ref	Contact ID	Present Use
P1	109	Golf Course practice holes
P2	89	Covered Reservoir tenanted for grazing
P3	2094	Riding Stable Business
P4	745	Car park for business centre
P5	69, 136 and 2096	Garden Centre and Field to north tenanted for Agriculture
P6	109	Land at Mill Hill Hollow
P7	93	Tenanted for Agriculture

Ref	Contact ID	Present Use
P8	923	Tenanted for Agriculture
P9	21	Tenanted for grazing
P10	107	Oil Terminal
P11	293	Tenanted for Grazing
P12	251	Moorend Golf Course
P13	68	Kitchen Showroom
P14	154	Outdoor play area for nursery school
P15	30	Car park business
P16	2101	Tenanted for Agriculture
P17	115 and 532	Golf Course / Wedding and Events Venue
P18	122	Electricity Substation
P19	85	Railway
P20	77	Plant Nursery
P21	77, 122	Manchester Airport

Undeveloped Land

15.3.3 There are plots of undeveloped land in private or public ownership that have been identified as being within the land take for the proposed scheme. The use of the term undeveloped has been adopted to mean that the identified land appears to have no present use and is not the subject of a planning application; these are indicated in Table 15-3.

Table 15-3 Undeveloped land

Ref	Contact ID	Present Use
U1-9	499, 1023, 951, 216, 607,193,874 and 309.	Moor End Golf Course
U10	125	Open space typified by pond and scrub
U11	1021	Privately owned pavement
U12	22	Open land adjacent to Stanley Green Trading Estate
U13	510	Undeveloped greenbelt

Recreation

15.3.4 Woodford Recreation Ground is 54,694m^2 and is used primarily as a sports facility for cricket and football. In addition it is used for dog walking and other informal recreation. There is a small changing room / clubhouse facility and access to the recreation ground is via the A5102 Woodford Road.

Residential

15.3.5 There are 16 locations which have been identified as Residential. These are indicated in Table 15-4.

Table 15-4 Residential land

Ref	Owner	Landuse
RS1	109	Garden
RS2		
RS3	109	Garden
RS4	5761	Land at dwelling
RS5	481	Garden
RS6	109	Land at dwelling
RS7	109	Land at dwelling
RS8	805	Garden
RS9 / 10	41, 303	Garden
RS11	122	Land at dwelling
RS12	77	Land at dwelling
RS13 / 14	122, 77	Residential Garden
RS15	109	Land at dwelling
RS16	122	Garden

Development Land

15.3.6 To the south east of the A34 / A555 junction an area of land has been identified as potential development land in the proposed Cheshire East Core Strategy document. The land parcels identified as being within the proposed scheme boundary are considered agricultural. There are no planning applications or permissions on this land.

Agricultural Holdings

15.3.7 Agricultural holdings and land uses throughout the proposed scheme corridor are varied in nature. The predominant use is for grazing sheep, horses, beef cattle and hay / silage production. There are a small number of agricultural holdings with dairy enterprises, producing arable crops and one poultry farm. The size of holdings range from approximately 45 ha to 2ha and the majority of agricultural land has an Agricultural Land Classification of grade 3 and 4 with occasional areas of grade 2[35].

15.3.8 23 agricultural holdings were identified and these are indicated in Table 15-5, on Figures 15.5 to 15.8 and in Appendix 15A: Agricultural Data Sheets.

Table 15-5 Agricultural holdings and land

Holding ID	Landuse
12	Grazing, hay production and tenanted for horse liveries
22	14ha hay production and 15ha grazing land for sheep and horses.
6	Grazing for beef cattle and hay production
1	Grazing for sheep, beef cattle and hay production
16	2ha for riding horses and 1.2ha hay production
27	Land for grazing and hay production
38	Grazing for horses
17	3ha grazing for horses and 9.1 ha for hay production
18	Area is split between land used for grazing, arable land and hay production for 13 ewes.
24	Land used for grazing and hay production
42	2.3ha for grazing
21	Grazing for sheep and cattle
32	Dairy farm, hay production with parcels of land tenanted for grazing
23	Grazing horses and hay production
8	Grazing
2	The holding is grazed by 250 beef cows and 250 lambs with 4ha for silage production
20	46.54 ha leased for grazing and hay / silage production
34	Land is used for grazing horses
9	1.7 ha grazing for horses and 0.5ha for hay

Holding ID	Landuse
30	Fallow
35	Land used for grazing sheep
11	1.8ha for silage production
43	Poultry Farm

15.4 Predicted impacts and mitigation

15.4.1 The following assessments address loss of land, amenity and potential impacts to businesses. Private and Community Assets where landtake has been identified are included. Private and Community Assets that do not experience a loss of land due to the proposed scheme have been considered in Chapters 8 Air Quality, 13 Noise and Vibration and 14 Effect on All Travellers.

Land Use during Construction

15.4.2 During construction temporary land take will be required for contractor compounds haul routes, materials storage, bridge construction and contingency areas (Chapter 5 and Figures 5.30 – 5.44). These areas will be returned to their original use on completion of the works. For the majority of receptors the construction impacts on use and amenity will be barely discernible. However, there are a number of areas where construction impacts will result in a marked change in use and amenity and these are indicated Table 15-6, Table 15-7 and Table 15-8.

Private

15.4.3 Impacts to private land as a result of the proposed scheme are explained in Table 15-6 and summarised as follows:

- 6 neutral / no impact
- 4 negligible
- 2 slight adverse
- 5 moderate adverse
- 4 substantial adverse

Undeveloped

15.4.4 Impacts to undeveloped land as a result of the proposed scheme are explained in Table 15-7 and summarised as follows:

- 1 negligible
- 1 slight adverse
- 11 substantial adverse

Residential

15.4.5 Impacts to residential land as a result of the proposed scheme are explained in Table 15-8 and summarised as follows:

- 1 neutral
- 2 negligible
- 7 slight adverse
- 3 moderate adverse

Development Land

15.4.6 Despite there being no planning application or permissions on the land south east of the A34 / A555 junction it was considered that an assessment on the potential future use of this land was appropriate. As indicated on Figure 15.3 and in reference to the criteria in Table 15.1 the landtake required for the proposed scheme would be peripheral to future use. In the context of the total land identified in the Cheshire East Core Strategy Consultation documents as potential development land the landtake is not considered significant and therefore the impact of the proposed scheme will be negligible.

Private Land

Table 15-6 Private land impact assessment

Ref	Landuse	Owner	Impact
P1	Golf Course	109	This land is owned by the Secretary of State for Transport and has been protected for road development. The present use of this land is practice holes for Hazel Grove Golf Course. Approximately 8.3 hectares of land will be permanently required for construction of the proposed scheme. Despite the land being reduced in size it is not expected that this will have a material impact on the Golf Course as the main playing holes will remain unaffected. The intended use for this land is for road development and the impact is considered **neutral**.
P2	Covered Reservoir	89	Access will be maintained to the reservoir during construction and it will retain its function during operation of the road therefore there will be **no impact** to the covered reservoir.
P3	Stables Business	2094	This land is tenanted to Mill Hill Riding School. The road will require 12ha of the land which is predominately used for both grazing and riding instruction. Access will be maintained during construction and internal field boundaries will be repositioned to maintain the functionality of the school. The proposed scheme results in landtake and a loss of amenity that compromises but does not preclude use. As a result the impact will be **moderate adverse**.
P4	Business	745	The eastern end of the car park for the showrooms and business centre, formally Simpsons Sausage Factory, on the A6 will be severed from the main building by the proposed scheme. During construction approximately 2.5ha of land will be required under licence and during operation 1.25ha of the plot will be permanently lost. During construction the majority of this car parking area will be required as a temporary compound area and this will preclude its use for a protracted period. During operation customers using this area will be required to walk over the bus bridge to reach the business. To reduce the impact of the proposed an area close to the business is proposed for new parking spaces. As a result the proposed scheme will compromise but not preclude existing or intended use during operation resulting in a **moderate adverse** impact.
P5	Business	69, 136 and 2096	20% of the Brookside Garden Centre car park will be required for construction of the proposed scheme. During construction access to the car park will be maintained through a single entrance and egress point which on completion will become the permanent access point for customer and delivery vehicles. To mitigate the loss of

Ref	Landuse	Owner	Impact
			parking space the car park will be remodelled to maximise the number of cars that can safely use the remaining area. The construction of the proposed scheme will compromise but not preclude use of the car park for a protracted period and operation will compromise but not preclude existing use and therefore the impact is considered **moderate adverse**.
P6		109	This land is owned by the Secretary of State for Transport and its intended use is for Highway purposes and as such the impact of the proposed scheme is considered **neutral**
P7		93	The land is here is presently tenanted for agriculture and a new access will be created off Woodford Road. The proposed scheme will result in a loss of 8% of land but this is considered peripheral to its intended use and the impact on its future use will be barely discernable and as such the impact is considered **negligible.**
P8		923	The land is here is presently tenanted for agriculture and left fallow; a new access will be created. The proposed scheme will result in a loss of 40% of land will sever 4 plots to the north of the land extent and will compromise but not preclude the future use and as such the impact is considered **moderate.**
P9	Golf Course	21	The field to the south of the Golf Course is tenanted for grazing. No golfing activities are undertaken on this land. The land has potential for further development of the golf club. During construction 6% of the total Golf Course land will be taken under licence for construction activities. During operation 5% of the land will be permanently required with a small section (0.003%) taken for easement. Construction and operation of the proposed scheme will temporarily compromise or preclude use of this land, but it is considered peripheral to golf course activities but will result in a loss of amenity that does not compromise use. Access will be maintained throughout both construction and operation and the proposed scheme will have a barely discernible impact on the Golf Club activities and as such the impact will be **negligible.**
P10	Oil Terminal	107	The proposed scheme will require the Oil Terminal to realign its feeder and distribution pipe. Despite the disruption of construction activities access will be maintained and as such there will be a barely discernible impact on the activities undertaken at the Oil Terminal and the impact will be **negligible.**
P11	Tenanted	293	This land is tenanted for agriculture but is not part of an agricultural holding. The proposed scheme will compromise

Ref	Landuse	Owner	Impact
	Land		and preclude its intended use and as such the landtake is considered a **substantial adverse** impact.
P12	Golf Course	251	The land at Moor End Golf Club is largely in the ownership of one party. However, a number of plots within the boundary of the playing area are owned by different parties. No planning permission or application exists on this land for the smaller plots and the planning consent for the Golf Course has lapsed. It is therefore unclear how the land will be used in the future. Moorend continues to function as a Golf Course and the proposed scheme will preclude and compromise these activities permanently which will result in a **substantial impact.**
P13	Business	68	96% of the land in this plot will be permanently taken by the proposed scheme resulting in a **substantial impact** which will preclude the intended use of this land.
P14	Day Nursery Business	154	14% of this land is required for construction and operation of the proposed scheme. The landtake will compromise but not preclude existing or intended use and therefore the impact is considered **moderate adverse**.
P15	Car Park Business	30	This land is tenanted by CEC but on agreement that the present Car Park can trade until such a time that the plot is required for development of the proposed scheme and the impact is considered **neutral.**
P16	Tenanted Land	2101	This land is tenanted for agriculture but not part of an agricultural holding. The proposed scheme will compromise and preclude its intended use and as such the landtake is considered a **substantial adverse** impact.
P17	Golf Course	115 and 532	The golf course will be re-modelled as part of a package of accommodation works which involves purchasing land north of Clay Lane and west of The Grange. Impacts have been considered for both the business and the amenity loss for the golfers. Construction will compromise but not preclude existing activity which is predominantly weddings and other events. Re-modelling the golf course will not preclude existing use and will be peripheral to the construction of the proposed scheme; the accommodation works will be timed in order that eighteen playing holes remain open throughout construction. During operation the proposed scheme will be in close proximity to the north of the golf course and will result in loss of amenity that does not compromise use and will be peripheral to the existing use and the overall impact on the golf course business and playing area is considered **slight adverse.**

Ref	Landuse	Owner	Impact
P18	Electricity Substation	122	There will be no discernible change as this land will continue to be used as access to the electricity substation and the impact is **neutral**.
P19	Railway	85	A section of this land will be require for permanent access but will not result in a discernible change in use or amenity and the impact is considered **neutral**.
P20	Business	77	28% of this plot will be required for construction of the proposed scheme and will result in the demolition of polytunnels associated with the nursery. The polytunnels will be re-sited and replaced as proposed mitigation. Construction activities will temporarily compromise use, landtake will, with the replacement polytunnels, be peripheral to existing use and result in a loss of amenity that does not compromise use and result in a **slight adverse impact**.
P21	Airport	77, 122	The impact to the land is considered **negligible** as the existing use will not be discernibly altered.

Undeveloped

Table 15-7 Undeveloped land

Ref	Landuse	Owner	Present Use
U1-9	Undeveloped	499, 1023, 951, 216, 607,193, 874 and	These plots are located within the boundary of Moor End Golf Course and on the playing area. The intended use for these plots is unknown but the proposed scheme will compromise and preclude future use and the impact is considered **substantial adverse**.

Ref	Landuse	Owner	Present Use
		309	
U10	Undeveloped	125	This land is owned by SMBC and at present has no activities being undertaken on it and as such the impact will be **negligible.**
U11	Undeveloped	1021	79% of the owned land will be required for construction of the proposed scheme. At present it is part of the footway associated with the Stanley Green Roundabout. The land will be used to site a bund associated with the remodelled roundabout and footway and therefore will preclude existing and intended use and is considered a **substantial adverse impact**.
U12	Undeveloped	22	Located to the east of the Stanley Green Business Park and at present is scrub and isolated trees. It is assumed that this is being held for future development but at present there are no planning applications relating to this area and no information is available regarding its intended use. During construction 15% of this land will be required under licence which will not preclude nor compromise present use. During operation 25% of the land will be permanently required but this will be peripheral to existing use and the impact of the proposed scheme will be **slight adverse.**
U13	Undeveloped	510	This land is split into various plots of land and is at present unused. It is presumed that the intended use will be to develop the plots but there are no planning permissions for this land.. The road will compromise and preclude future use and the impact is considered **substantial adverse.**

Residential

Table 15-8 Residential land

Ref	Landuse	Owner	Impact
RS1 / RS2	Garden	109	These properties will be purchased and potentially used as site offices and then resold on completion of the proposed scheme. The intended use of these properties will be temporarily altered but the operation of the proposed scheme will not preclude future use but will have a **slight adverse** impact on the amenity.
RS3	Garden	109	This property will experience a loss of approximately 50% of garden space and the use of this land will be

Ref	Landuse	Owner	Impact
			compromised but it will not preclude existing or intended use. The loss of amenity will be of a high order of magnitude due to the presence of the proposed scheme and the impact will be **moderate adverse.**
RS4	Garden	5761	This property will experience a loss of approximately 5% of land and will experience a s**light adverse impact** due to the proximity of the proposed scheme and the loss of amenity. The land take is considered peripheral to the existing use of the land.
RS5	Land at dwelling	481	This property will experience a loss of land of approximately 5% of the plot area. The landtake is peripheral and will not compromise use of the garden. However the loss in amenity due to the proposed scheme will result in a **slight adverse impact.**
RS6	Garden	109	This land here is in owned by the Secretary of State for Transport. The desk study indicated that this land may be informally managed by the house to the north for recreation. However, as its intended use is considered to be for highway purposes the proposed scheme would not preclude nor compromise this and therefore the impact is considered **neutral.**
RS7	Land at dwelling	109	This property will experience a loss of approximately 5% of land and will experience a barely discernible impact on use or amenity value due to the proximity of the dwelling to the Chester Road link and as such there will be a **negligible impact**.
RS8	Land at dwelling	805	This property will experience a loss of approximately 5% of land and will experience a barely discernible impact on use or amenity value due to the proximity of the existing A555 and as such there will be a **negligible impact**.
RS9 / 10	Garden	41, 303	This property will experience a loss of approximately 6% of land. The landtake is peripheral and will not compromise use of the garden. However the loss in amenity value due to the proposed scheme will result in a **slight adverse impact.**
RS11	Garden	122	This property will experience a loss of approximately 25% of land and will experience a s**light adverse impact** due to the proximity of the proposed scheme and the loss of amenity. The land take is considered peripheral to the existing use of the land.

Ref	Landuse	Owner	Impact
RS12	Land at dwelling	77	This property will experience a loss of approximately 9% of land. The landtake is peripheral and will not compromise use of the garden or land. However the loss in amenity value due to the proposed scheme will result in a **slight adverse impact.**
RS13 / 14	Land at dwelling	122, 77	This property will experience a loss of approximately 13% of land at the dwelling. The landtake is peripheral and will not compromise use. However the loss in amenity value due to the proposed scheme will result in a **slight adverse impact.**
RS15	Residential Garden	109	This property will experience a loss of approximately 30% of garden space and the use of this land will be compromised but it will not preclude existing or intended use. The loss of amenity will be of a high order of magnitude due to the presence of the proposed scheme and the impact will be **moderate adverse.**
RS16	Land at dwelling	122	This property will experience a loss of approximately 40% of land and its use will be compromised but it will not preclude existing or intended use. The loss of amenity will be of a high order of magnitude due to the presence of the proposed scheme and the impact will be **moderate adverse.**

Community Land

15.4.7 Land take at Woodford Recreation Ground will be approximately 12.5% of the total area. The majority of this is scrub with intermittent trees and adjacent to the existing boundary with the A555.

15.4.8 The impact to the recreation ground is considered negligible as the existing use and playing area will be unaffected. Amenity value will not discernibly alter due to the proximity of the recreation ground to the existing A555.

Agricultural Land

15.4.9 23 agricultural holdings were identified as potentially impacted by the proposed scheme. Each of these has been assessed individually based on the potential impact on agricultural land and the farm holding. Impact assessments for farm holdings and agricultural land are provided in Appendix 15A: Agricultural Data Sheets and summarised in Table 15-9.

Table 15-9 Summary of Agricultural Impact Assessment

Impact	During Construction	Permanently Post Construction
Major	6	6
Moderate	4	3
Minor	8	8
Negligible	2	2
No Change	3	4

Consultation

15.4.10 SMBC will, where possible, reduce the impacts of the proposed scheme through consultation with land and property owners to further develop appropriate mitigation and compensation measures.

15.5 Conclusions and effects

15.5.1 The assessments have demonstrated that land, business and property owners will be subject to landtake which will often compromise but not preclude existing use. The assessments have further demonstrated that in several locations the proposed scheme will preclude future use of the land there.

15.5.2 However, in the wider context of the surrounding land uses the loss of the types of land identified will not constitute a significant effect on Community and Private Assets.

16 Road Drainage and the Water Environment

16.1 Scope of the assessment

16.1.1 The assessments in relation to potential impacts on the water environment have focussed on surface waters, groundwater and floodplains. Potentially significant impacts that are considered include:

- pollution due to increased generation and release of sediments and suspended solids and increased risk of accidental spillage of pollutants such as oil, fuel and concrete during construction activities;
- pollution due to operational routine road runoff. A broad range of potential pollutants, such as hydrocarbons i.e. fuel and lubricants, fuel additives, metal from corrosion of vehicles, de-icer and gritting material, can accumulate on road surfaces. These can subsequently be washed off the road during rainfall events, polluting the receiving waterbodies;
- pollution due to operational accidental spillage. On all roads there is a risk that accidents or vehicle fires may lead to an acute pollution incident. Where commercial vehicles are involved potential pollutants that may be spilled could range from hazardous chemicals to milk, alcoholic beverages, organic sludges and detergents;
- increased flood risk due to development within the floodplain, increased runoff rates and volumes from hardstanding areas and proposed channel modifications such as culverting and watercourse realignment;
- changes in the geomorphological regime, such as erosion, deposition and channel migration as a result of proposed channel modification such as culverting and watercourse realignment. A reduction in morphological diversity can subsequently impact on water quality and biodiversity;
- loss of standing waters where the proposed scheme will be constructed through existing ponds;
- changes in groundwater flows and levels as a result of groundwater drawdown effects from the dewatering of deep cuttings.

16.1.2 The findings of the Flood Risk Assessment (FRA) undertaken by Aecom are summarised within this chapter. Full details of the assessment undertaken can be found in the separate FRA Report which accompanies the scheme planning application (Document Ref: 1007/6.7/061).

16.1.3 Indirect impacts on the aquatic ecology of the affected waterbodies are reported in Chapter 11 – Ecology and Nature Conservation.

16.2 Methods of assessment

16.2.1 The road drainage and the water environment assessment has involved the following key tasks:

- consultation with the relevant statutory and non-statutory bodies to establish the principal water environment issues associated with the study area;
- detailed desk studies and field surveys to ascertain the current baseline conditions on site;
- assessment of the potential impacts related to the construction and operation of the proposed scheme; and
- identification of measures to avoid, minimise or mitigate predicted impacts.

16.2.2 Further details on the baseline data collection and assessment methods used are provided below.

Baseline Data Collection

16.2.3 The desk study involved:

- review of the road drainage and the water environment chapter of the 2007 Interim Environmental Assessment Report, prepared by Penny Anderson Associates ltd;
- review of the Aecom Flood Risk Assessment Report and Ground Investigation Report (Appendix 12A);
- identification of all catchments, surface and groundwater bodies including watercourses, drains, ponds, wetlands and springs;
- estimation of watercourse low, mean and peak flows using the software LowFlows 2000 and the Institute of Hydrology Flood Studies Report and Flood Estimation Handbook;
- collation of EA data on water quality and WFD status of waterbodies;
- collation of data on existing abstractions and discharges;
- review of data on the existing road drainage systems on the A555, provided by CEC; and
- review of data on the proposed road drainage systems on the Ringway Road Highway Improvement Works, provided by Jacobs.

16.2.4 A site visit carried out on the 9th and 10th of June 2010 concentrated on gaining a good overall understanding of the water environment of the study area. Visual inspections and geomorphological assessments of the main watercourses were also undertaken.

Construction Assessment

16.2.5 A qualitative assessment of construction impacts was carried out, which involved a review of areas where construction is proposed in close proximity to waterbodies and the proposed mitigation measures targeted at avoiding or minimising the risk of construction pollution.

Routine Runoff Assessment

16.2.6 DMRB Volume 11, Section 3, Part 10, HD 45/09 – Road Drainage and the Water Environment specifies mandatory procedures for the assessment of pollution impacts from routine runoff on surface waters and groundwaters, known as Method A and Method C respectively.

16.2.7 In this instance only Method A has been used as all proposed road drainage outfalls have been designed to discharge to surface waters, and therefore there will be no pollution impact on groundwaters from routine runoff.

16.2.8 The Method A assessment comprises two separate elements:

- HAWRAT Assessment: the Highways Agency Water Risk Assessment Tool (HAWRAT) is a Microsoft Excel application designed to assess the short-term risks related to the intermittent nature of road runoff. It assesses the acute and chronic pollution impacts on aquatic ecology associated with soluble and sediment bound pollutants respectively; and
- EQS Assessment: Environmental Quality Standards (EQS) are the maximum permissible annual average concentrations of potentially hazardous chemicals, as defined under the Water Framework Directive (WFD). The long-term risks over the period of one year are assessed through comparison of the annual average concentration of pollutants discharged with the published EQS for those pollutants.

16.2.9 These assessments are carried out for each proposed road drainage outfall. Cumulative assessments have also been carried out where multiple road drainage outfalls discharge to a single reach of a watercourse.

16.2.10 Detailed explanations of both the HAWRAT and EQS assessment methods are provided in Appendix 16A.

Accidental Spillage Assessment

16.2.11 The DMRB document HA 45/09 specifies mandatory procedures for the assessment of pollution impacts from accidental spillage, known as Method D. The assessment takes the form of a risk assessment, where the risk is expressed as the annual probability of a serious pollution incident occurring. This risk is the product of two probabilities:

- the probability that an accident will occur, resulting in a serious spillage of a polluting substance on the carriageway; and
- the probability that, if such a spillage did occur, the polluting substance would reach the receiving watercourse and cause a serious pollution incident

16.2.12 The probability of a serious spillage occurring is dependent on a variety of factors: traffic volumes, percentage of HGVs in the traffic volumes, whether the road is motorway, rural or urban trunk road, the road type categories within the road drainage catchment under assessment i.e. 'no junction', 'slip road', 'cross road' or 'roundabout', and the length of each road type within the catchment

16.2.13 The probability of a serious spillage causing a serious pollution incident is dependent on the receiving waterbody type, i.e. surface water or groundwater, and the response time of the emergency services, i.e. less than 20 minutes, less than one hour or greater than one hour.

16.2.14 Typically an annual probability of 1% (i.e. a 1 in 100 chance of a serious pollution incident occurring in any one year) is considered an acceptable risk. However where a road drainage outfall discharges within 1km of a sensitive receptor, such as a protected conservation site, a higher level of protection is required such that the risk has an annual probability of 0.5% (i.e. a 1 in 200 chance of occurring in any one year).

16.2.15 A detailed explanation of the accidental spillage assessment method is provided in Appendix 16A.

Geomorphological Assessment

16.2.16 A qualitative geomorphological assessment was carried out using data collated through desk studies and field surveys. Aerial photography and historic mapping were studied for evidence of historic channel instability in the relevant river reaches. The field investigations took a river reconnaissance or fluvial audit approach, which identified channel morphology, bed and bank material, degree of vegetation, areas of erosion and deposition, historic channel change and land use.

16.2.17 From this baseline assessment a qualitative estimation can be made of both how 'active' the river is and the likely effect the proposed scheme proposals (such as

culverts, bridges and watercourse realignments) may have on the existing status of the water environment.

Groundwater Assessment

16.2.18 To determine the likely impact of dewatering of cuttings on groundwater flows and levels the drawdown distance/area of influence has been calculated for each cutting.

16.2.19 There is no published formula for the distance of influence from linear features such as cuttings, therefore the empirical formula of Sichardt[36] for calculating the radius of influence of groundwater abstractions has been used:

- $L = C(H-h)\sqrt{K}$

16.2.20 Where L = distance/radius of influence, K = permeability, H-h = groundwater table drawdown i.e. penetration of the cutting beneath the water table and C = 2000, where C is a constant.

16.2.21 The permeability of the aquifer has been estimated from ground investigations carried out by the highway designers.

16.2.22 A qualitative assessment was then made of the impact on the groundwater aquifer and nearby groundwater dependent receptors, such as public water supply boreholes and wetlands.

Flood Risk Assessment

16.2.23 The Flood Risk Assessment has been carried out by Aecom following guidance within the National Planning Policy Framework, and the supporting document Technical Guidance to the National Planning Policy Framework.

16.2.24 The objectives of the FRA were to:

- assess the risk to the proposed scheme from all potential sources of flooding;
- assess the risk of increasing flooding elsewhere as a consequence of the proposed scheme; and
- determine appropriate mitigation measures to limit the impact of flooding on the proposed scheme and offsite flooding due to increased runoff.

16.2.25 The flood risk baseline has been established through desk study, field survey and consultation. A drainage assessment has been carried out for the whole scheme, with hydraulic modelling of the Norbury Brook and case-by-case assessments of culverting and realignment requirements on small watercourses and field drains. Using the findings of these investigations a risk assessment of flooding from all

sources have been undertaken and practical mitigation measures identified where necessary.

16.2.26 Further details of the FRA methodology can be found in Appendix 16A and in the Aecom SEMMMS Flood Risk Assessment Report (Document Ref: 1007/6.7/061).

Impact Assessment Criteria

16.2.27 The predicted significance of impacts on surface waters and groundwaters has been based on the importance or sensitivity of the relevant waterbody and the magnitude of the impact from the proposed scheme, as recommended in DMRB document HD 45/09.

16.2.28 The importance or sensitivity of the waterbodies has been evaluated taking into account their quality, rarity, scale and substitutability. The criteria used in determining the importance of each waterbody are detailed in Appendix 16A, and are in keeping with the guidance and examples given in HD 45/09.

16.2.29 The magnitude of the various impacts is evaluated taking into account the extent of loss and effects on integrity of the relevant waterbody attributes. The criteria used in determining the magnitude of impact are detailed in Appendix 16A, and are in keeping with the guidance and examples given in HD 45/09.

Impact Significance

16.2.30 The estimation of the impact significance has been arrived at by combining the estimated importance of the affected waterbodies and the magnitude of the impacts as indicated in Table 16-1 below, taking into account mitigation and the guidance provided in HD 45/09. Where the significance is shown as being one of two alternatives a single description is provided based upon reasoned judgement of the specific case.

Table 16-1 Impact significance matrix

Importance of Waterbody	Magnitude of Impact			
	Major	Moderate	Minor	Negligible
Very High	Very Large	Large / Very Large	Moderate / Large	Neutral
High	Large / Very Large	Moderate / Large	Slight / Moderate	Neutral
Medium	Large	Moderate	Slight	Neutral
Low	Slight / Moderate	Slight	Neutral	Neutral

16.3 Baseline environment

Corridor overview

16.3.1 The water environment study area lies within an area of predominantly agricultural land on the urban fringe of Greater Manchester. The topography of the corridor is generally flat and occasionally gently undulating with elevations ranging between 120mAOD in the east to 70mAOD in the west.

16.3.2 The principal watercourses comprise the Oxhey Brook, Threaphurst Brook, Norbury Brook, Lady Brook and Poynton Brook at the eastern end of the corridor, the Spath Brook in the central part of the corridor and the Gatley Brook and Baguley Brook at the western end of the corridor. Most of these watercourses drain generally northwards towards the Upper River Mersey upstream of the Manchester Ship Canal, with the exception of the Spath Brook which drains southwards to the River Dean.

16.3.3 In addition to the principal watercourses there is a network of small streams, drains and ditches throughout the corridor, including the Hill Green Brook and Bramhall Brook which are minor tributaries of the Lady Brook. Due to historic land use and urbanisation many of the surface waters of the study area are heavily modified due to realignment, straightening and culverting. This, in addition to the generally flat topography, has resulted in poorly defined catchment boundaries.

16.3.4 There are two areas of notable floodplain and flood risk. The first is associated with the confluence of the Norbury Brook, Poynton Brook and Lady Brook. The second is related to the Spath Brook in the vicinity of Stanley Green Trading Estate.

16.3.5 There are numerous small ponds scattered throughout the rural areas of the corridor predominantly kettleholes formed during the last period of glaciation.

16.3.6 The superficial geology of the corridor largely consists of glacial till, which generally has a low permeability and is considered a secondary B aquifer, yielding limited amounts of groundwater from thin permeable horizons. Occasional, isolated deposits of glaciofluvial sands and gravels are located in the vicinity of Hazel Grove and Heald Green. These deposits have a high permeability and are considered a secondary A aquifer. The Heald Green deposit is an outlier which forms part of the Dane and Weaver (D&W) Quaternary Sand and Gravel Aquifers.

16.3.7 At the far eastern end of the corridor, around Hazel Grove, the bedrock geology consists of Carboniferous Pennine Coal Measures which are made up of alternating layers of sandstone, coal seams, mudstone and shales. This formation forms part of the Manchester and East Cheshire (M&EC) Carboniferous Aquifers. The sandstone layers act as individual secondary A aquifer units capable of supporting small to medium sized water supplies.

16.3.8 The eastern and central parts of the corridor, between Hazel Grove and Styal, are underlain by the Triassic Sherwood Sandstone which forms part of a principal aquifer unit, M&EC Permo-Triassic Aquifers. In the wider area this aquifer is heavily utilised for public water supply, with groundwater flow generally from north to south. However, in places the aquifer is divided into poorly connected blocks due to the geological structure and the presence of low permeability faults. In the vicinity of Woodford there is a public water supply borehole, the SPZ3 for which lies within the proposed scheme corridor.

16.3.9 West of Styal the corridor is underlain by Triassic Mercia Mudstone. Due to its relative impermeability the Mercia Mudstone is considered a secondary B aquifer, capable of supporting only very small private water supply abstractions.

16.3.10 The key surface water and groundwater features of the study area are shown in Figures 16.1 to 16.8. Table 16.2 below summarises the importance of each feature of the water environment identified above. Full details of the baseline data which has informed this assessment are provided in Appendix 16B.

Table 16-2 Importance of water features along proposed scheme

Feature	Attribute	Comment	Importance
Oxhey Brook	Geomorphology	Small heavily modified field drain	Low
	Hydrology & Flood Risk	Flows through agricultural land, no associated flood risk	Low
	Water Quality & Biodiversity	'Bad' WFD status downstream, no Freshwater Fisheries Directive (FFD) designation, low invertebrate diversity, no fish data, zone of influence biodiversity value	Low
Threaphurst Brook	Geomorphology	Assumed moderately diverse, some modification, moderately active	Medium
	Hydrology & Flood Risk	Flood risk to residential properties 1km downstream	Medium
	Water Quality & Biodiversity	'Bad' WFD status, FFD Cyprinid fishery with imperative pass but guideline failure, aquatic species indicative of good water quality, district biodiversity value	Medium
Norbury Brook	Geomorphology	Highly active & diverse geomorphology, some modification	High
	Hydrology & Flood Risk	Minor flood risk to agricultural land	Medium
	Water Quality & Biodiversity	'Good' WFD potential, FFD Cyprinid fishery with imperative pass but guideline failure, aquatic species indicative of good water quality, district biodiversity value	High
Poynton Brook	Geomorphology	Moderately diverse, some modification, moderately active	Medium
	Hydrology & Flood Risk	Minor flood risk to agricultural land	Medium
	Water Quality & Biodiversity	'Moderate' WFD status, FFD Cyprinid fishery with imperative pass but guideline failure, aquatic species indicative of good water quality, district biodiversity value	Medium
Lady Brook	Geomorphology	Highly active & diverse geomorphology, some modification	High
	Hydrology & Flood Risk	Minor flood risk to agricultural land	Medium
	Water Quality &	'Moderate' WFD status, FFD Cyprinid fishery with imperative pass but guideline failure, aquatic	Medium

Feature	Attribute	Comment	Importance
	Biodiversity	species indicative of good water quality, district biodiversity value	
Spath Brook	Geomorphology	Heavily modified channel, no geomorphological diversity	Low
	Hydrology & Flood Risk	Flood risk to commercial properties downstream, proposed scheme impinges on 1 in 1000 year return period floodplain	High
	Water Quality & Biodiversity	'Moderate' WFD status, no FFD designation, no aquatic species surveys undertaken, heavily modified channel, local biodiversity value	Medium
Gatley Brook	Geomorphology	Heavily modified channel, no geomorphological diversity	Low
	Hydrology & Flood Risk	No identified flood risk	Low
	Water Quality & Biodiversity	'Moderate' WFD status, FFD Cyprinid fishery with imperative pass but guideline failure, no aquatic species surveys undertaken, heavily modified channel, local biodiversity value	Medium
Baguley Brook	Geomorphology	Heavily modified channel, no geomorphological diversity	Low
	Hydrology & Flood Risk	No identified flood risk	Low
	Water Quality & Biodiversity	'Moderate' WFD status, FFD Cyprinid fishery with imperative pass but guideline failure, no aquatic species surveys undertaken, heavily modified channel, local biodiversity value	Medium
Standing Waters	Water Quality & Biodiversity	Numerous kettle hole ponds, common within county, do not support abstractions or discharges, no water quality data, some support great crested newt breeding, district biodiversity value	Medium
Glacial Till	Water Supply, Water Quality, Groundwater Flow, Biodiversity	Secondary B aquifer, low vulnerability WFD – not classified No abstractions within the study area	Low
Glaciofluvial Sands &	Water Supply, Water Quality, Groundwater	Secondary A aquifer, high vulnerability WFD – quantitative status 'Good', chemical status 'Poor'	Medium

Feature	Attribute	Comment	Importance
Gravels	Flow, Biodiversity	No groundwater abstractions within study area	
Carboniferous Pennine Coal Measures	Water Supply, Water Quality, Groundwater Flow, Biodiversity	Secondary A aquifer, low vulnerability WFD – quantitative status 'Good', chemical status 'Poor' and deteriorating No abstractions within the study area	Medium
Triassic Sherwood Sandstone (Woodford Area SPZ3)	Water Supply, Water Quality, Groundwater Flow, Biodiversity	Primary aquifer, low vulnerability WFD – quantitative status 'Poor', chemical status 'Poor' and deteriorating Three private non-potable abstractions within study area, all more than 750m from proposed alignment SPZ3 for public water abstraction within study area, abstraction borehole within 1.5km of the proposed scheme	High
Triassic Sherwood Sandstone (Other Areas)	Water Supply, Water Quality, Groundwater Flow, Biodiversity	Primary aquifer, low vulnerability WFD – quantitative status 'Poor', chemical status 'Poor' and deteriorating No abstractions within study area	Medium
Triassic Mercia Mudstone	Water Supply, Water Quality, Groundwater Flow, Biodiversity	Secondary B aquifer, low vulnerability WFD – not classified No abstractions within the study area	Low

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16.4 Predicted impacts and mitigation

Scheme – Water Environment Interactions

16.4.1 Table 16-3 details the proposed scheme elements which interact with the water environment. It should be noted that the proposed scheme chainage starts at the A6 junction and increases from east to west to the eastern end of the A555, then restarts from the western end of the A555, increasing from east to west to the junction with Shadowmoss Road.

Table 16-3 Proposed scheme - water environment interactions

Water Feature	Chainage (m) / NGR	Scheme Elements
Oxhey Brook	480-725	Realignment of 305m of Oxhey Brook, resulting in 40m shortening of the reach
	690	Relocation of existing United Utilities (UU) Combined Sewer Overflow (CSO) into realigned channel
	700	Extension of land drain into realigned channel, or alternatively diversion of land drain into earthworks drainage
Threaphurst Brook	1200	Network A road drainage outfall into Threaphurst Brook, draining 2Ha of road
Norbury Brook	8800-8900	Realignment of 125m of Norbury Brook, resulting in 20m shortening of the reach
	8955	Clear span pedestrian bridge over Norbury Brook
	8980	Diversion of land drain into earthworks drainage
	9800-10150	Proposed scheme footprint within 50m of 330m reach of Norbury Brook, 10m separation at closest point
	9980	Diversion of land drain into earthworks drainage
Poynton Brook	11100	Diversion of land drain into earthworks drainage
Lady Brook	10300	Clear span road bridge over Lady Brook
	10300	Network B and Network C road drainage outfalls into Lady Brook, draining a total of 11Ha of road
	12150	Preservation and/or extension of piped land drain to beyond the proposed scheme footprint or alternatively divert into earthworks drainage
	12550	Extension of piped land drains to beyond the proposed scheme footprint

Water Feature	Chainage (m) / NGR	Scheme Elements
Spath Brook	NGR 388215 383840	Network D&E and existing Network A555/PS4 road drainage outfall (single outfall structure) into Spath Brook near Hall Moss Lane, draining 15Ha of road in total. 48% of total discharge from existing road, 52% from proposed new road.
	NGR 386725 384325	Modification of A555/A34 junction will impinge edge of extreme flooding (1 in 1000 year return period) floodplain
	NGR 386160 384015	Network L and existing Network A555/PS3 road drainage outfall (single outfall structure) into the Spath Brook near Handforth Dean Industrial Estate, draining 13Ha. 53% of discharge from existing road, 47% from proposed new road
Gatley Brook	2420	Network M road drainage outfall into the Gatley Brook at Cunningham Drive, draining 3Ha of road.
Baguley Brook	4240	Network F and proposed RRHIW and Airport City networks road drainage outfall (single outfall structure) into the Baguley Brook 33% of discharge from Network F, assumed 67% from RRHIW and Airport City
Standing Waters	680	Golf course pond within 50m of the proposed scheme footprint
	850	Pond under the footprint of proposed scheme
	9600-9800	3 ponds within 50m of the proposed scheme footprint
	10970	Pond within 50m of the proposed scheme footprint
	11130	Pond under the footprint of proposed scheme
	11760	Pond under the footprint of proposed scheme
	12360	Pond partially under the footprint of proposed scheme
	12390	2 ponds within 50m of the proposed scheme
	12640	Pond within 50m of the proposed scheme
	12680	Pond under the footprint of proposed scheme
	1200	Pond within 50m of the proposed scheme
	1300	Pond under the footprint of proposed scheme
	1370	Pond under the footprint of proposed scheme
	1520	Pond within 50m of the proposed scheme
	1550	Pond under the footprint of proposed scheme

Water Feature	Chainage (m) / NGR	Scheme Elements
	2040	2 Ponds under the footprint of the proposed scheme
	2650	Pond under the footprint of proposed scheme
Glaciofluvial Sands & Gravels	800-1100	Cutting 1, length 300m, maximum depth 3mbgl
Glacial Till	9610-9940	Cutting 4, length 330m, maximum depth 2.3mbgl
	10080-10175	Cutting 5, length 95m, maximum depth 3.2mbgl
	10380-10850	Cutting 6, length 470m, maximum depth 2.9mbgl
	11125-11625	Cutting 7, length 500m, maximum depth 6.1mbgl
	2740-3350	Cutting 10, length 610m, maximum depth 4.2mbgl
Carboniferous Pennine Coal Measures	8250-8820	Cutting 2, length 570m, maximum depth 7.8mbgl
	8875-9150	Cutting 3, length 275m, maximum depth 2.1mbgl
Triassic Sherwood Sandstone (Woodford Area SPZ3)	12580-13600	Cutting 8, length 1020m, maximum depth 7.4mbgl
Glacial Till / Triassic Sherwood Sandstone (Other Areas)	500-1575	Cutting 9, length 1075m, maximum depth 6.9mbgl

Construction Related Pollution

16.4.2 Silt and sediment laden site runoff generated during construction activities, such as soil stripping and earthworks, can have a detrimental impact if allowed to enter watercourses untreated. Fine sediments can increase water turbidity and smother stream beds, affecting water quality and causing harm to fish, aquatic invertebrates and plants by interfering with feeding, respiration and spawning. The effects of sediment release can extend considerable distances downstream.

16.4.3 In addition, accidental spillages of potential pollutants such as oils, fuels, concrete, cement and sewage from staff welfare facilities can impact both groundwater and surface waters. Oils form a film on the water surface and can coat organisms, blocking respiration, photosynthesis and feeding. Biodegradation of oils in aquatic systems can lead to oxygen depletion; and many hydrocarbons are toxic, persistent

and bio-accumulate in the environment i.e. they build-up in the body tissue both directly and from feeding on other contaminated organisms. Concrete and cement is highly alkaline and can harm aquatic organisms if the pH of the receiving waters are affected.

16.4.4 The risk of construction pollution is highest where the proposed scheme will run alongside the watercourses and in the vicinity of the proposed bridges, outfalls and watercourse realignments. A number of these activities are proposed on the Norbury Brook, which is considered of 'High' importance for both geomorphology and water quality.

16.4.5 Between Ch. 9800 – 10150 the scheme footprint will lie within 50m of the Norbury Brook for approximately 330m, with a separation of 10m at the closest point. Mitigation to prevent the migration of soils/sediment into the brook and control accidental spillage associated with construction will comprise a lined barrier along this length of the proposed scheme corridor, this may take the form of a straw bale wall lined with silt fencing.

16.4.6 The scheme proposals involve the realignment of 125m of the Norbury Brook in the vicinity of Ch. 8800 – 8900. The mobilisation of construction sediment will be mitigated through offline construction i.e. the diversion channel is constructed under dry conditions, with the watercourse flows diverted into the new channel once it is completed.

16.4.7 Bridge crossings are also proposed on the Norbury Brook and Lady Brook, which is considered of 'High' importance for geomorphology. A pedestrian footbridge is proposed on the Norbury Brook at Ch. 8955 which will replace the existing footbridge in the vicinity of the proposed diversion. A new road bridge is proposed on the Lady Brook at Ch. 10300. Both bridges will involve construction on the banks of the two brooks. Whilst both have been designed with clear spans, thus avoiding the need for construction within the channel, the works will involve the introduction of bank protection, particularly on the Lady Brook, to address potential erosion in the vicinity of the structures. Temporary works will involve the use of cofferdams along the margins of the watercourse to enable construction to proceed and prevent the migration of soils and sediment into the watercourses.

16.4.8 Similarly, the construction of the road drainage outfalls on the Lady Brook immediately upstream and downstream of the proposed bridge, at Ch. 10300, will require some in channel construction works. As described above cofferdams will be used to isolate the working area, allow dry working and prevent sediment migration.

16.4.9 With the above proposed measures in place the magnitude of the impact on the Norbury and Lady Brooks will be minor adverse, resulting in a potential significance of slight. The risk of significant impact associated with construction pollution in the

remaining locations where works will be required immediately adjacent to or in close proximity to watercourses relate to watercourses of low to medium importance. In all instances mitigation measures similar to those described above, including restrictions on working distances and the provision of temporary barriers to prevent migration of sediments, will ensure that any pollution will be minor such that impacts on water quality and biodiversity will be short-term and either of minor or negligible magnitude, resulting in a potential significance of slight or neutral.

Pollution Related to Routine Runoff

16.4.10 A broad range of potential pollutants, such as hydrocarbons i.e. fuel and lubricants, fuel additives, metal from corrosion of vehicles, de-icer and gritting material, can accumulate on road surfaces. These can subsequently be washed off the road during rainfall events, polluting the receiving waterbodies. Routine runoff from road drainage networks can result in both acute and chronic impacts on water quality and subsequently on the biodiversity of the receiving watercourses, due to both soluble and sediment bound pollutants. The results demonstrate that, allowing for proposed mitigation in the form of wetlands and attenuation ponds, all networks individually pass all elements of the HAWRAT and EQS assessments, except for Network F for which appropriate mitigation measures are being developed.

16.4.11 Consequently the magnitude of routine runoff impacts for most of the individual networks is negligible, resulting in a potential significance of neutral. Network F individually has a potential significance of moderate. Further mitigation measures will be investigated to reduce the impact to slight or neutral.

16.4.12 Individual and cumulative assessment of routine runoff has been undertaken for the proposed scheme networks which interact either with each other or with adjacent networks associated with the existing A555, the proposed Ringway Road Highway Improvements Works and the proposed Airport City development.

16.4.13 The full calculations and results of the HAWRAT and EQS assessments for the seven proposed road drainage networks (Figures 5.24 to 5.27) are presented in Appendix 16C. The results are summarised in Table 16 4 for the individual network impacts and in Table 16-5 for the cumulative impact of networks which will interact. A description of the potential significance of impacts follows.

Network A

16.4.14 Network A will drain the proposed realigned section of the A6, between Norbury Hollow Road and Yew Tree Avenue, an area of approximately 2.5Ha. The proposed network outfall will be located on the Threaphurst Brook, adjacent to the Hazel Grove Golf Club access road.

16.4.15 Network A passes all elements of both the HAWRAT and EQS assessments without mitigation. Network A passes all elements of both the HAWRAT and EQS assessments without mitigation. The Threaphurst Brook has been assessed as having a 'Medium' importance. As the network passes both the HAWRAT and EQS assessments the routine runoff impact magnitude has been assessed as 'Negligible', giving a subsequent significance of 'Neutral'.

Network B and C

16.4.16 Network B will drain the proposed scheme between the A6 junction and the bridge over the Lady Brook at Mill Hill Hollow, an area of approximately 5.6Ha. The proposed network outfall will be located on the Lady Brook, downstream of the proposed road bridge and the Network C outfall.

16.4.17 Network C will drain the proposed scheme between Mill Hill Hollow and the West Coast Mainline (WCML), an area of approximately 6.4Ha. The proposed network outfall will be located on the Lady Brook, upstream of the proposed road bridge and Network B outfall.

16.4.18 Due to the close proximity of the Network B and Network C outfalls on the Lady Brook cumulative HAWRAT and EQS assessments have been undertaken in addition to individual assessments for each outfall. The Lady Brook has been assessed as having a 'Medium' importance. The results of the individual HAWRAT and EQS assessments indicate individual routine runoff impact magnitudes of 'Negligible', giving a subsequent impact of 'Neutral' for each network. Similarly, the cumulative routine runoff impact has been assessed as having a 'Negligible' magnitude and a subsequent significance of 'Neutral'.

Network D and E

16.4.19 Networks D and E drain the eastbound and westbound carriageways of the proposed scheme between the WCML and the proposed junction with the A5102 Woodford Road at the eastern end of the A555, an area of approximately 8.3Ha. For the purposes of the water quality assessment these networks are considered as a single entity. Network D & E will discharge into the Spath Brook via an existing A555 drainage network, referred to as A555/PS4.

16.4.20 Network A555/PS4 drains the A555 between the A5102 Woodford Road and the A34 junction, an area of approximately 7.2Ha. The outfall for this network is located on the Spath Brook near Hall Moss Lane and discharges via an oil interceptor, attenuation tanks and a pumping station.

16.4.21 A new carriageway on the A555 does not form part of the proposed scheme planning application. However HD 45/09 states that the interaction of new impacts from highway works with existing impacts may produce cumulative impacts, which should

be considered. Therefore, an individual assessment has been carried out for Network D & E and a cumulative assessment for Networks D & E and A555/PS4.The individual routine runoff assessment found that without treatment Network D & E would pass both the sediment bound pollutant element of the HAWRAT assessment and the EQS assessment, but would fail the soluble pollutant element of the HAWRAT. It was found that a 29% reduction in soluble pollutants was required for the network to pass the HAWRAT assessment.

16.4.22 In order to provide sufficient soluble pollutant treatment a surface flow wetland designed to accept the first flush runoff and located to the south of the proposed scheme alignment and east of Woodford Road is proposed. A wetland is proposed to provide 60% treatment of soluble pollutants in this proportion of the network first flush. Therefore, the overall effective treatment level for the whole network will be 31%. With this treatment in place Network D & E will pass both elements of the individual HAWRAT assessment and the EQS assessment.

16.4.23 The Spath Brook has been assessed as being of 'Medium' importance. The results of the individual HAWRAT and EQS assessments with mitigation indicate an individual routine runoff impact magnitude of 'Negligible', giving a significance of 'Neutral'.

16.4.24 The cumulative routine runoff assessment found that without any treatment on either Network D & E or Network A555/PS4 both the soluble pollutants element of HAWRAT and the EQS assessment would fail. The combined networks would pass the sediment bound pollutant element of HAWRAT. It was found that a 56% overall reduction in soluble pollutants was required for all elements of the cumulative HAWRAT and EQS assessments to be passed.

16.4.25 The treatment proposed above for Network D & E represents an overall effective treatment level of 14% for the combined network area of 15.7Ha (i.e. 60% treatment of first flush from 27% of combined network area). With this treatment in place the cumulative results improve and the EQS assessment is passed. However the combined networks will continue to fail the cumulative soluble pollutants HAWRAT assessment. An additional 42% reduction in soluble pollutants from the Network D & E runoff would be required to pass the cumulative HAWRAT and EQS assessments.

16.4.26 With the proposed Network D & E treatment in place the results of the cumulative HAWRAT and EQS assessments indicate that the combined networks will achieve a cumulative impact magnitude of 'Minor Adverse', giving an impact significance of 'Slight'.

16.4.27 It is judged that a cumulative impact of slight significance is acceptable in this instance and therefore no further treatment of routine runoff is proposed beyond that outlined above for Network D & E.

Network L

16.4.28 Network L will drain the scheme between the proposed junction with the B5358 Wilmslow Road, at the western end of the A555, and from approximately 300m east of the Styal railway line. This network drains an area of approximately 5.2Ha. It is proposed that Network L will discharge into the Spath Brook via an existing A555 drainage network, referred to in this document as A555/PS3.

16.4.29 Network A555/PS3 drains the A555 between the A34 junction and the B5358 Wilmslow Road, an area of approximately 6.7Ha. This network discharges via an oil interceptor, storage tanks, pumping station and c.980m long pipe into the Spath Brook as it passes through the Handforth Dean Industrial Estate (immediately adjacent to the Handforth railway line).

16.4.30 As discussed previously HD 45/09 stipulates that a cumulative assessment should be carried out where the interaction of new and existing impacts may result in a cumulative impact. Therefore, an individual assessment has been carried out for Network L and a cumulative assessment for Networks L and A555/PS3.

16.4.31 Individually it was found that Network L will pass all elements of the HAWRAT and EQS assessments without treatment. Therefore, no water quality treatment is proposed for this network in relation to routine runoff impacts.

16.4.32 The Spath Brook has been assessed as being of 'Medium' importance. The results of the individual HAWRAT and EQS assessments indicate an individual routine runoff impact magnitude of 'Negligible', giving a significance of 'Neutral'.

16.4.33 Cumulatively Networks L and A555/PS3 will pass the sediment bound pollutant element of the HAWRAT assessment and the EQS assessment without treatment. However they will fail the cumulative soluble pollutant element of HAWRAT. It was found that an 8% overall reduction in soluble pollutants was required for all elements of the cumulative HAWRAT and EQS assessments to be passed.

16.4.34 Without any proposed treatment on the combined Networks L and A555/PS3 the results of the cumulative HAWRAT and EQS assessments indicate a cumulative impact magnitude of 'Minor Adverse', giving a significance of 'Slight'.

16.4.35 Given the value / sensitivity of the watercourse the mitigation and residual impact is thought to be proportionate and acceptable in this instance and no specific treatment of routine runoff is proposed.

Network M

16.4.36 Network M will drain the scheme from approximately 300m east of the Styal railway line to the B5166 Styal Road, an area of approximately 1.7Ha. It is proposed

Network M will discharge into the Gatley Brook adjacent to Cunningham Drive via an existing surface water sewer c.730m long.

16.4.37 Network M passes the sediment bound pollutant element of the HAWRAT assessment and the EQS assessment without treatment. However the network fails the soluble pollutant element of the HAWRAT assessment and requires a 28% reduction in soluble pollutants in order to pass.

16.4.38 A first flush surface flow wetland is proposed, which will accept the first flush from the entire network. The wetland will be located adjacent to the Styal Road junction, between Tedder Drive and the Styal Road. This wetland will provide 30% treatment of the first flush. With this proposed treatment in place the network will pass all elements of the HAWRAT and EQS assessments.

16.4.39 The Gatley Brook has been assessed as being of 'Medium' importance. The results of the individual HAWRAT and EQS assessments indicate an impact magnitude of 'Negligible', giving a subsequent significance of 'Neutral'.

Network F

16.4.40 Network F will drain the scheme between the B5166 Styal Road junction and the Ringway Road, an area of approximately 2.7Ha. It is proposed that Network F will discharge into the Baguley Brook via the network associated with the Ringway Road Highway Improvement Works (RRHIW).

16.4.41 Full details of the RRHIW drainage network are not available. However, it is assumed that this will drain the widened Ringway Road West and the new Metrolink line which will run parallel to this road. No information is available regarding proposed treatment for this drainage network however it is anticipated that it will discharge into the Baguley Brook immediately adjacent to the Ringway Road and opposite the Hilton Hotel.

16.4.42 The land through which Bagluey Brook flows at the location of the outfall is identified to be part of the Airport City development, with the outfall of the development highway drainage discharging into the same section of Bagluey Brook, upstream of Painswick Pond. No information is available regarding proposed treatment for this drainage network.

16.4.43 Flow data for Baguley Brook is not currently available but evidence indicates it is fed solely from local highway drainage and localised surface runoff. Therefore, a conservative flow rate of 0.5l/s has been assumed for the assessments in this report.

16.4.44 Individual HAWRAT and EQS assessments have been carried out for an assumed Network F. Cumulative assessments with the new highway works west of Network F and the AC developments has been carried out using information available to date.

As this data is subject to change, the cumulative assessments are subject to future revision as further data becomes available. Currently it is assumed that no mitigation for water quality purposes is being carried out for these two developments in order to determine any required future mitigation.

16.4.45 Individually it was found that Network F will fail all elements of the HAWRAT but passed the EQS assessments without treatment. Water quality treatment processes are currently being developed for this network in relation to routine runoff impacts. A 39% reduction in soluble pollutants and 10% reduction in sediment bound pollutants would be required for the Network F to pass the HAWRAT element of the assessment.

16.4.46 The Baguley Brook has been assessed as being of 'Medium' importance. The results of the individual HAWRAT and EQS assessments indicate an individual impact magnitude of 'Moderate Adverse', giving a subsequent impact of 'Moderate'.

16.4.47 Cumulatively Networks F and RRHIW and AC will fail the sediment bound pollutant element of the HAWRAT assessment and the EQS assessment without treatment. It was found that a 71% overall reduction in soluble pollutants and sediment bound pollutants would be required for all elements of the cumulative HAWRAT and EQS assessments to be passed. For Network F, RRHIW and AC, the results of the cumulative HAWRAT and EQS assessments indicate that the combined networks will achieve a cumulative impact magnitude of 'Major Adverse', giving a subsequent impact of 'Large'. An additional 71% reduction in soluble pollutants and 71% reduction in sediment bound pollutants from the cumulative Network F, RRHIW and AC runoff would be required if the impact were to be 'neutral.'

16.4.48 Further treatment of routine runoff would be investigated beyond that outlined above for Network F. In order to achieve the 71% reduction in soluble pollutants and sediment bound pollutants, a series of SuDS treatments would be required, for example grass channels followed by surface flow wetlands. However, due to the constrained location, alternative proprietary treatment mechanisms will also be considered.

Table 16-4 Summary of individual routine runoff assessment results

Water Feature	Network ID	Proposed Treatment / Mitigation	HAWRAT Results			EQS Results		Impact / Significance
			Cu[1]	Zn[2]	Sed[3]	Cu[1]	Zn[2]	
Threaphurst Brook	A	Attenuation pond	Pass	Pass	Pass	Pass	Pass	Negligible / Neutral
Lady Brook	B	Attenuation pond	Pass	Pass	Pass	Pass	Pass	Negligible / Neutral
	C	Attenuation pond	Pass	Pass	Pass	Pass	Pass	
Spath Brook	D&E	Proposed wetland & attenuation pond treating 60% of network	Pass	Pass	Pass	Pass	Pass	Negligible / Neutral
	L	None	Pass	Pass	Pass	Pass	Pass	
Gatley Brook	M	Proposed wetland	Pass	Pass	Pass	Pass	Pass	Negligible / Neutral
Baguley Brook	F (prior to the development of mitigation measures)	Requires 39% treatment to pass which will comprise a mixture of swales, wetlands, ponds and or other proprietary systems	Fail	Fail	Fail	Pass	Pass	Major Adverse / Large

1 Cu - copper, 2 Zn - zinc, 3 Sed - sediment

Table 16-5 Summary of cumulative routine runoff assessment results

Water Feature	Network ID	Proposed Treatment / Mitigation	HAWRAT Results			EQS Results		Impact / Significance
			Cu[1]	Zn[2]	Sed[3]	Cu[1]	Zn[2]	
Lady Brook	B + C	2 x attenuation ponds proposed	Pass	Pass	Pass	Pass	Pass	Negligible / Neutral

Water Feature	Network ID	Proposed Treatment / Mitigation	HAWRAT Results			EQS Results		Impact / Significance
			Cu[1]	Zn[2]	Sed[3]	Cu[1]	Zn[2]	
Spath Brook	D&E + A555/PS4	Wetland & attenuation pond treating 27% of cumulative network area proposed	Fail	Fail	Pass	Pass	Pass	Minor Adverse / Slight
	L + A555/PS3	None	Fail	Pass	Pass	Pass	Pass	
Baguley Brook	F + RRHIW + Airport City (prior to the development of mitigation measures)	Requires 77% treatment to pass which would comprise a mixture of swales, wetlands, ponds and or other proprietary systems	Fail	Pass	Fail	Pass	Fail	Major Adverse / Large

1 Cu - copper, 2 Zn - zinc, 3 Sed - sediment

16.4.49 While developing the drainage design for the above networks a number of mitigation options using current conventional Sustainable Urban Drainage Systems (SUDS) techniques were considered. However, there were significant constraints, such as the vertical alignment of the road, drainage gradients and available land. The mitigation proposed is judged to be the best treatment that can feasibly be provided using conventional SUDS techniques.

16.4.50 Further discussions with the Ringway Road Highway Improvement Works and Airport City developers will continue throughout the design to determine appropriate and suitable solutions to be incorporated into the drainage design at network F to reduce and mitigate, to acceptable levels, the potential effect of the cumulative outfall.

Pollution Related to Accidental Spillages

16.4.51 On all roads there is a risk that road traffic accidents or vehicle fires may result in accidental spillage of potential pollutants on the road surface. These may then enter the road drainage network and subsequently be discharged to the water environment, causing an acute pollution event.

16.4.52 Full details of the accidental spillage assessment calculations and results are provided in Appendix 16C, a summary is provided in Table 16-6 and Table 16-7 below.

Table 16-6 Summary of individual accidental spillage assessment results

Water Feature	Network ID	Accidental Spillage Return Period (years)
Threaphurst Brook	A	1010
Lady Brook	B	1041
	C	3849
Spath Brook	D&E	496
	L	1616
Gatley Brook	M	2041
Baguley Brook	F	1693

Table 16-7 Summary of cumulative accidental spillage assessment results

Water Feature	Network ID	Accidental Spillage Return Period (years)
Lady Brook	B + C	922
Spath Brook	D&E + A555/PS4	121
	L + A555/PS3	214
Baguley Brook	F + RRHIW + Airport City	233

16.4.53 As can be seen the results for both the individual and cumulative accidental spillage assessments are well within the target of at least a 1 in 100 year return period recommended in the DMRB. As a result the magnitude of the impacts due to accidental spillage is negligible, resulting in a potential significance of neutral.

16.4.54 It should be noted that the results presented above do not include any allowance for mitigation measures. The results indicate that no specific accidental spillage mitigation is required. However the attenuation ponds and wetlands proposed for flood risk and routine runoff mitigation will also provide some accidental spillage mitigation. In addition shut-off valves are proposed on all networks, which will allow the networks to be isolated in the event of an accidental spillage.

Increased Flood Risk

16.4.55 The proposed scheme could potentially increase flood risk as a result of development within the floodplain, increased runoff rates and volumes from hardstanding areas and proposed channel modifications such as watercourse realignment.

16.4.56 The scheme has been designed to avoid impinging on floodplain wherever possible. The proposed crossings of the Norbury and Lady Brooks (Ch. 8955 and Ch. 10300 respectively) have been designed as a clear span bridge, with the abutments located outside of the floodplain.

16.4.57 The proposed widening of the A555/A34 junction would result in a small area of these works located within flood zone 2 of the Spath Brook (NGR 386725 384325). In consultation with the EA it has been determined that the extent of floodplain that will be lost will be insignificant and mitigation works are not required.

16.4.58 The proposed discharges from the seven road drainage outfalls will be attenuated to greenfield runoff, to prevent any increase in runoff rate or volume due to the introduction of impermeable road surfaces.

16.4.59 The proposed diversions of the Oxhey Brook (Ch. 480-725) and Norbury Brook (Ch. 8800-8900) will be designed to maintain the channel capacity. Hydraulic modelling of the preliminary design of the Norbury Brook realignment has demonstrated there will be negligible change in the flow characteristics of the brook for flood event return periods up to and including the 1 in 100 year plus climate change event.

16.4.60 There are a number of land drains within the hydrological catchments of the Oxhey, Norbury, Poynton and Lady Brooks which the scheme will intersect. Some of the land drains alternate between piped and open ditch sections. It is proposed that the piped sections of a number of these will be extended under the scheme footprint in order to maintain the original alignment and connectivity of the drains. The remaining drains will be diverted into the earthworks drainage as they are unlikely to convey

sufficient flows to warrant culverting. It has been assessed that these diversions will have negligible impact on the hydrology and flood risk of the associated brooks.

16.4.61 With the above proposed measures in place the overall magnitude of the impact on the hydrology and flood risk of the relevant brooks will be negligible, resulting in a potential significance of neutral.

Geomorphological Changes

16.4.62 Channel modifications such as watercourse realignment and the construction of in-channel structures can result in changes to the geomorphological regime, such as erosion, deposition and channel migration. A reduction in morphological diversity can subsequently impact on water quality and biodiversity.

16.4.63 The realignment of the Norbury Brook will result in a 20m shortening of the original 125m long reach. The proposed realigned channel will be designed to replicate the existing incised channel profile including the pools and riffles observed in the original channel, where feasible. This will help maintain the hydraulic capacity and flow dynamics of the channel, and maintain the existing erosion and deposition regime.

16.4.64 Erosion protection measures may be required where there are sharp bends in the diversion. 'Soft engineering' techniques such as the use of geotextiles, live willow revetment, coir rolls and brushwood mattresses will be used where feasible.

16.4.65 The reach of the Oxhey Brook which will also be realigned is a heavily modified, straightened channel, with limited geomorphological interest. The diversion will be designed to maintain the hydraulic capacity of the channel.

16.4.66 The proposed Norbury Brook and Lady Brook watercourse crossings have been designed as clear span bridges which will not interfere with the geomorphological regime of watercourse channel. Erosion protection of the Lady Brook bridge abutments may be necessary to protect these from scouring during flood events, however soft engineering techniques will be employed where feasible to minimise the impact on the floodplain morphology.

16.4.67 All proposed road drainage outfalls will be constructed to current good practice standards to minimise the impact on the geomorphology of the relevant watercourses. This will include construction of the outfall structures flush to the watercourse bank, with discharge in the direction of watercourse flow. Outfall structure headwalls, wingwalls and erosion protection aprons, if required, will be designed to prevent erosion of the bed and banks of the watercourse.

16.4.68 With the above proposed measures in place the magnitude of the impact on the geomorphology of the Norbury Brook will be minor, resulting in a potential

significance of slight. The impact on all other watercourses will be of negligible magnitude, resulting in a potential significance of neutral.

Loss of Standing Waters

16.4.69 There are numerous small ponds scattered throughout the scheme corridor. The proposed alignment of the scheme will result in the loss of 17 of these ponds.

16.4.70 Eight of the ponds which will be lost have been identified as GCN habitat by the project ecologists. Further information is provided in Chapter 11 – Ecology and Nature Conservation. The remaining six ponds will be replaced on a 1:1 basis, resulting in a total of 34 new ponds being created to replace the 17 ponds lost. As a result the magnitude of the impact is considered to be moderate, resulting in a potential significance of beneficial.

Groundwater Changes

16.4.71 Ten road cuttings are proposed as part of the scheme. Where these cuttings are deep they have the potential to intersect the groundwater table, resulting in dewatering effects such as changes to groundwater flows and levels in the surrounding area. These effects can subsequently impact on nearby groundwater dependant features, such as wetlands and groundwater abstractions.

16.4.72 The results of the groundwater assessment are provided in full in Appendix 16C, a summary is provided in Table 16-8 below.

Table 16-8 Summary of groundwater assessment results

Water Feature	Chainage (m)	Cutting No.	Radius of Influence (m)	Magnitude	Significance
Glaciofluvial Sands & Gravels	800-1100	1	0	Negligible	Neutral
Carboniferous Pennine Coal Measures	8250-8820	2	19.0	Minor Adverse	Slight
	8875-9150	3	0	Negligible	Neutral
Glacial Till	9610-9940	4	0	Negligible	Neutral
	10080-10175	5	0	Negligible	Neutral
	10380-10850	6	1.5	Minor Adverse	Neutral
	11125-11625	7	4.2	Minor Adverse	Neutral
Triassic Sherwood	12580-	8	24.7	Minor Adverse	Slight

Water Feature	Chainage (m)	Cutting No.	Radius of Influence (m)	Magnitude	Significance
Sandstone (Woodford Area SPZ3)	13600				
Glacial Till / Triassic Sherwood Sandstone (Other Areas)	500-1575	9	No data	Unknown – likely Minor Adverse	Unknown – likely Slight
Glacial Till	2740-3350	10	0	Negligible	Neutral

16.4.73 In determining the magnitude of impact from each cutting the proximity and likely effect of groundwater drawdown on groundwater dependant wetlands and abstractions was considered in addition to the effect on the aquifer itself.

16.4.74 Cutting 9 is located in an area where there are no ground investigation data available at present, therefore it has not been possible to calculate a radius of influence. However, based on the data for the other cuttings it is judged likely that there will be an impact of potential neutral significance.

Design Mitigation

16.4.75 The impact assessment has informed the development of the planning and design proposals in the form of relevant measures targeted at mitigating potential impacts associated with the proposed scheme.

16.4.76 The measures incorporated into the planning and design proposals to avoid, or reduce potential impacts are schedules in Appendices 16E. They include:

- use of SUDS features such as surface flow wetlands to remove hydrocarbons, soluble metals, sediment and sediment bound pollutants from road drainage discharges where the HAWRAT and EQS assessments have identified a need for treatment;
- a commitment to investigate further during the implementation, where feasible, specialist proprietary treatment systems to treat cumulative discharges, such that they pass all elements of the HAWRAT assessment;
- shut-off valves will be installed on all drainage networks to isolate the networks in the event of an accidental spillage. The SUDS features included on the networks for treatment of routine runoff will also contribute to the control of pollution from accidental spillage;
- all road drainage discharges will be attenuated to greenfield runoff rates;

- road drainage outfall structures will be designed flush with the watercourse bank and will discharge in the direction of flow. The structure headwalls, wingwalls and erosion protection aprons will be designed to prevent erosion of the watercourse bed and banks;
- clear span bridges will be constructed over the Norbury Brook and Lady Brook, with bridge supports constructed set back from the watercourse channel and floodplain, to minimise potential flood impacts and protect the integrity of the river banks;
- river bank erosion protection will be installed if necessary at the Lady Brook bridge crossing to maintain the current channel alignment and protect the bankside access track passing under the bridge;
- existing culverted land drains will be extended under the proposed scheme footprint or will be diverted into the earthworks drainage;
- watercourse diversions will be aligned and profiled to maintain hydraulic capacity, replicate existing channel gradients and cross-sections and reflect riffle and pools sequences, particularly on the Norbury Brook;
- where erosion protection is required within the new diversion channels, soft engineering techniques will be used where feasible. This may include the use of geotextiles, live willow revetment, coir rolls and brushwood mattresses, where applicable; and
- road cuttings which intercept the groundwater table will be designed with appropriate drainage to deal with groundwater inflows.

Construction Mitigation

16.4.77 Mitigation beyond the design commitments described above and which will be incorporated into the CEMP for the proposed scheme will include:

- oil absorbent booms will be installed, as appropriate, on the surface watercourses immediately downstream of the works area, and will be regularly inspected and maintained;
- temporary cut-off drains will be used uphill and downhill of the working area to prevent clean runoff entering and dirty water leaving the working area without appropriate treatment;
- vegetated buffer strips will be maintained adjacent to all watercourses;
- where works are required on the watercourse banks, or in-channel, vegetation clearance will be restricted to the immediate working area and will be undertaken only immediately prior to the commencement of those works. Vegetation will be re-established as soon as practicable. If necessary additional measures such as geotextiles (biodegradable and non-

biodegradable), mulching, brushwood mattresses etc. will be used to protect soils before vegetation has re-established, particularly on the watercourse banks;

- sediment laden water generated on site will be appropriately treated before discharge. This may be through the use of silt fences, silt traps, filter bunds (possibly straw bales or gravel bunds), settlement ponds and/or proprietary units such as a 'siltbuster'. Discharges will not be direct to any watercourse, but will be made to ground, with suitable erosion protection put in place;
- control and treatment measures will be regularly inspected to ensure they are working effectively;
- local weather forecasts will be monitored and works scheduled accordingly. In particular earthworks and in-stream works will be stopped during storm events;
- emergency response plans will be developed and spill kits made available on site;
- all relevant consents will be sought from the EA for temporary discharges and in-stream works;
- construction compounds and stockpiling areas will be located at least 50m from sensitive watercourses;
- fuels and potentially hazardous construction materials will be stored in bunded areas with external cut-off drainage; fuel will be stored in double skinned tanks with 110% capacity;
- fuelling and lubrication of construction vehicles and plant will generally be on hardstandings or on haul roads, where reasonably practical, with appropriate cut-off drainage and located away from watercourses. In the event of plant breakdown drip trays will be used during any emergency maintenance and spill kits will be available on site;
- construction plant will be checked regularly for oil and fuel leaks, particularly when construction works are undertaken in or near the existing site waterbodies;
- waste fuels and other fluid contaminants will be collected in leak-proof containers prior to removal from site to an approved recycling facility;
- cement will be delivered to site in ready-mix lorries. Washing out of these lorries will be carried out off site; and
- foul drainage from site welfare facilities will be disposed of appropriately. This may be by discharge to the foul sewer or by collection in septic tank for disposal off site.

16.4.78 The above list is not exhaustive. The CEMP will incorporate guidance from all relevant EA Pollution Prevention Guidelines (PPG).

16.4.79 Specific Construction Method Statements (CMS) will be developed and implemented for construction works in or near the watercourses, including the construction of the bridges, outfalls and watercourse realignments. These will include details of methods proposed to ensure dry working conditions and minimisation of sediment pollution of the watercourses. These may include offline working, or isolation of the working area using cofferdams.

16.4.80 A programme of water quality monitoring on the relevant watercourses, upstream and downstream of the working corridor will be implemented throughout the construction phase. The monitoring parameters and frequency will be agreed with the EA prior to construction works commencing.

16.5 Conclusions and effects

16.5.1 The table below summarises the potential impacts and resulting significance of effects from the construction and operation of the proposed scheme. The assessment has concluded that, with the inclusion of the proposed design and mitigation measures, impacts on the geomorphology, hydrology and flood risk of surface waters and on the water quality, flows and levels of groundwaters will be no greater than slight at specific locations and will be slight overall.

16.5.2 The proposed scheme will not have significant effects on water quality and biodiversity at four out of the five local watercourses, namely Threaphurst, Lady, Spath and Gatley Brooks. Without mitigation the proposed scheme will have a significant effect on water quality and biodiversity at Baguley Brook.

Table 16-9 Summary of effects

Potential Impact	Feature	Attribute	Importance	Magnitude	Significance
Pollution due to increased sedimentation and increased risk of accidental spillage of pollutants such as oil, fuel and concrete during construction	Oxhey Brook	Water Quality & Biodiversity	Low	Minor Adverse	Neutral
	Threaphurst Brook		Medium	Minor Adverse	Slight
	Norbury Brook		High	Minor Adverse	Slight
	Poynton Brook		Medium	Negligible	Neutral
	Lady Brook		Medium	Minor Adverse	Slight
	Spath Brook		Medium	Minor Adverse	Slight
	Gatley Brook		Medium	Minor Adverse	Slight
	Baguley Brook		Medium	Minor Adverse	Slight
	Standing Waters (ponds)		Medium	Negligible	Neutral
	Glacial Till	Water Supply, Water Quality & Biodiversity	Low	Negligible	Neutral
	Glaciofluvial Sands & Gravels		Medium	Negligible	Neutral
	Carboniferous Pennine Coal Measures		Medium	Negligible	Neutral
	Triassic Sherwood Sandstone (Woodford Area SPZ3)		High	Negligible	Neutral
	Triassic Sherwood Sandstone (Other Areas)		Medium	Negligible	Neutral

Potential Impact	Feature	Attribute	Importance	Magnitude	Significance
	Triassic Mercia Mudstone		Low	Negligible	Neutral
Pollution due to operational routine road runoff from individual outfalls	Threaphurst Brook	Water Quality & Biodiversity	Medium	Negligible	Neutral
	Lady Brook		Medium	Negligible	Neutral
	Spath Brook		Medium	Negligible	Neutral
	Gatley Brook		Medium	Negligible	Neutral
	Baguley Brook		Medium	Negligible	Neutral
Pollution due to operational routine road runoff from cumulative outfalls	Lady Brook	Water Quality & Biodiversity	Medium	Negligible	Neutral
	Spath Brook		Medium	Minor Adverse	Slight
	Baguley Brook		Medium	Major Adverse	Large
Pollution due to operational accidental spillage from individual outfalls	Threaphurst Brook	Water Quality & Biodiversity	Medium	Negligible	Neutral
	Lady Brook		Medium	Negligible	Neutral
	Spath Brook		Medium	Negligible	Neutral
	Gatley Brook		Medium	Negligible	Neutral
	Baguley Brook		Medium	Negligible	Neutral
Pollution due to operational accidental spillage from cumulative	Lady Brook	Water Quality & Biodiversity	Medium	Negligible	Neutral
	Spath Brook		Medium	Negligible	Neutral

Potential Impact	Feature	Attribute	Importance	Magnitude	Significance
outfalls	Baguley Brook		Medium	Negligible	Neutral
Increased flood risk due to development within the floodplain, increased runoff from hardstanding areas and proposed channel modifications	Oxhey Brook	Floodplain	Low	Negligible	Neutral
	Threaphurst Brook		High	Negligible	Neutral
	Norbury Brook		Medium	Negligible	Neutral
	Poynton Brook		Medium	Negligible	Neutral
	Lady Brook		Medium	Negligible	Neutral
	Spath Brook		High	Negligible	Neutral
	Gatley Brook		Low	Negligible	Neutral
	Baguley Brook		Low	Negligible	Neutral
Changes in geomorphological regime such as erosion, deposition and channel migration due to proposed channel modifications	Oxhey Brook	Geomorphology	Low	Negligible	Neutral
	Threaphurst Brook		Medium	Negligible	Neutral
	Norbury Brook		High	Minor Adverse	Slight
	Poynton Brook		Medium	Negligible	Neutral
	Lady Brook		High	Negligible	Neutral
	Spath Brook		Low	Negligible	Neutral
	Gatley Brook		Low	Negligible	Neutral

Potential Impact	Feature	Attribute	Importance	Magnitude	Significance
	Baguley Brook		Negligible	Neutral	Neutral
Loss of standing waters where proposed scheme will be constructed through existing ponds	Standing Waters (ponds)	Water Quality, Biodiversity	Medium	Negligible	Neutral
Changes in groundwater flows and levels as a result of groundwater drawdown effects from dewatering of deep cuttings	Glacial Till	Water Supply, Groundwater Flow, Biodiversity	Low	Minor Adverse	Neutral
	Glaciofluvial Sands & Gravels		Medium	Negligible	Neutral
	Carboniferous Pennine Coal Measures		Medium	Minor Adverse	Slight
	Triassic Sherwood Sandstone (Woodford Area SPZ3)		High	Minor Adverse	Slight
	Glacial Till / Triassic Sherwood Sandstone (Other Areas)		Low / Medium	Unknown – likely Minor Adverse	Unknown – likely Slight

17 Cumulative Effects

17.1 Scope of the assessments

17.1.1 The following potential cumulative effects have been addressed through this assessment:

- those which arise from changes caused by a combination of impacts from existing or planned developments and the proposed scheme
- those which arise from a combination of impacts identified by different environmental disciplines within the ES.

17.1.2 The separate developments or environmental disciplines and associated impacts may not be significant. However, when considered together, they may become significant.

17.1.3 Air quality and noise were not considered when assessing cumulative impacts of planned developments as these have been accounted for in the traffic model and therefore have been included within the Do Minimum and Do Something scenarios. Therefore, the cumulative effects of planned developments have already been assessed for these environmental disciplines.

17.2 Approach

17.2.1 To establish a baseline of which developments may contribute to potential significant cumulative effects planning applications which had been approved within SMBC, CEC and MCC were considered. The parameters used to identify an initial list of developments which could have:

- proximity to the proposed scheme.
- type and size of the development.
- proximity to known environmental receptors assessed in this ES

17.2.2 To establish cumulative impacts due to a combination of environmental disciplines a process of identifying clusters or groups of receptors which experience multiple significant impacts was undertaken. These were locations where a combination of decrease in Air Quality, increase in traffic related noise and visual impacts occurred.

17.3 Impact assessment

Planned Developments

17.3.1 All planned developments with the exception of those listed in 17.3.2 were screened out due to their proximity being too far from the proposed scheme or because the size and type of the development was unlikely to have a cumulative effect. All developments in proximity to known environmental receptors considered in the ES were included.

17.3.2 The developments that have been considered within this cumulative impacts assessment are the Airport City development; the Metrolink extension to Manchester Airport and a car park north of Ringway Road West (Figure 17.1 and 17.2). These developments have been considered with regard to cumulative Landscape and Visual impacts.

17.3.3 The assessment of cumulative effects considers the visibility of developments in relation to single viewpoints of more than one development (collective), views of more than one development in different directions (successional) and views of more then one development but from different viewpoints (sequential).

Airport City

17.3.4 Airport City development extends west from Aviator Way to occupy the tract of open space between Wythenshawe and the airport (Figure 17.2).

17.3.5 Airport City will occupy a substantial tract of land to the west of the proposed scheme and they will, with the exception of some successional views from taller buildings within the airport complex to the south and offices off Aviator Way to the north, be visually distinct from one another.

17.3.6 In travelling west from the most western point of the proposed scheme there will be sequential views connected by the existing office development which will continue with the proposed Airport City development. The combination of the existing development and relative distance between the two is anticipated to result in a slightly increased sense of urbanisation as a result of the loss of areas of mature tree planting, scrub and open ground.

17.3.7 Residential development to the north that forms the fringes of the Wythenshawe housing estate will not be subject to views of both developments due to relatively low elevations, intervening buildings and existing vegetation.

17.3.8 The effect of the proposed developments on landscape character is anticipated to be limited to an increased sense or urbanisation within this largely urban fringe landscape. The loss of existing mature trees and hedgerows will be readily

perceptible to the west as a result of the Airport City development however the relative lack of existing vegetation associated with this part of the proposed scheme corridor will not be readily perceived as being significantly modified as a result of the progression of either development.

17.3.9 Overall the two developments will be perceived as visually distinct and will not combine within the majority of views to result in significant cumulative effects on landscape character and visual receptors.

Car Park

17.3.10 The proposed Car Park (Figure 17.1) will occupy the land encompassed by Ringway Road West, Shadowmoss Road and Styal Road north of the proposed scheme and will, with the exception of successional views from Shadowmoss Road and Ringway Road, is visually distinct from each other. It is anticipated that successional views of the Car Park and the proposed scheme will be most pronounced from the properties on the north side of Ringway Road West. However, the proposed scheme will already be partially screened from these properties by the existing road and the planting associated with the proposed scheme. The addition of the Car Park is not considered to result in significant cumulative visual impacts.

17.3.11 Similar to Airport City the effect of the Proposed Developments on landscape character is anticipated to be limited to an increased sense of urbanisation due to the loss of agricultural fields and a number of trees and hedgerows. This will be perceptible to the west as a result of the Car Park. However, this is not considered significant as the landscape will not be modified in this context as both the Car Park and this section of the proposed scheme will be adjacent to residential properties and the airport which typify the urban fringe. In this regard the combination of the two developments will not encroach into the landscape character further east associated with Styal and a more rural setting.

17.3.12 Overall the two developments will be perceived as visually distinct and will not combine within the majority of views to result in significant cumulative effects on landscape character and visual receptors.

Metrolink

17.3.13 The new Airport Line, between Chorlton and Manchester Airport has its final stop before the airport on Shadowmoss Road approximately 250m from its junction with Ringway Road. (Figure 17.1 and Figure 17.2) The line is due to open in 2016, will provide a tram every 12 minutes and will become a part of the existing noise climate. This will be in addition to the noise associated with the new road will result in a adverse cumulative effect for properties on Carsdale Road.

17.3.14 The properties that will experience a decrease in noise, on both Ringway Road and Shadowmoss Lane, as a result of the proposed scheme will potentially experience an increase due to the introduction of the Metrolink. However, it is not possible to conclude whether this will be a net increase or decrease or whether this constitutes a positive or adverse cumulative effect.

Combination of Environmental Impacts

17.3.15 The assessments have demonstrated that some receptors will be subject to adverse cumulative impacts as a result of localised deterioration in air quality, increases in traffic-related noise and visual impact as the proposed scheme passes near to the following receptors:

- the existing A6 where the bus bridge crosses the proposed scheme.
- properties at Old Mill Lane;
- properties at Darley Road, Ashbourne Road and Mill Fold Lane;
- Norbury Hall;
- Brookside Garden Centre;
- Mill Hill Hollow;
- Lower Park Road;
- Albany Road;
- Woodford Road Bramhall;
- Wilmslow Road;
- Teddar Drive; and
- Carsdale Road.

17.3.16 The assessments also considered locations where the proposed scheme will result in cumulative impacts where a combination of impacts of a less high order would occur,

17.3.17 It is acknowledged that the majority of properties adjacent or close to the proposed scheme will experience increases of traffic related noise and adverse visual impacts in the opening year and these are considered adverse cumulative impacts.

17.3.18 Traffic levels are expected to increase in the design year of operation yet adverse impacts related to visual impacts, as the mitigation landscaping and planting matures, are expected to reduce. As a result the magnitude of cumulative impacts of this type will also reduce for the majority of properties.

17.3.19 In addition, the assessment acknowledges that cumulative impacts relating to air quality and traffic related noise as a result of the proposed scheme will generally

occur at properties adjacent or close to the A6 through Disley and the proposed junctions at the A6 tie in, the A523, Woodford Road (Poynton), Woodford Road (Bramhall), Hall Moss Lane, the A34, Wilmslow Road and the tie in with Ringway Road.

17.3.20 Residents outside of the immediate proposed scheme corridor will, in general, be subject to a beneficial cumulative impacts where local air quality will improve and traffic-related noise will reduce as traffic is re-directed onto the proposed scheme.

17.4 Conclusions and effects

17.4.1 The assessments conclude that for a number of properties adjacent to the proposed scheme there will be significant and adverse cumulative effects. The assessment further concluded that the proposed scheme will result in significant beneficial effects outside of the immediate proposed scheme corridor in relation to air quality and traffic related noise.

18 Schedule of Environmental Commitments

18.1.1 The key mitigation measures reported in this ES are scheduled below and will form a mandatory schedule of commitments under the contract(s) for construction and future management and maintenance of the proposed scheme. Key commitments are scheduled in Table 18-1.

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Table 18-1 Schedule of Environmental Commitments

Reference Number	Mitigation Measure	Point of Implementation	Monitoring Requirements
Air Quality			
AQ1	The measures focus on the mitigation of construction phase related dust: • roads and accesses will be kept clean; • grout or cement-based materials will be mixed using a process suitable for the prevention of dust emissions; • fine material will not be stockpiled to an excessive height in order to prevent exposure to wind and/or dust nuisance; • dust generating activities (e.g. cutting, grinding and sawing) will be minimised and weather conditions considered prior to conducting potentially dust emitting activities; • if possible, plant will be located away from site boundaries close to residential areas; • water will be used as a dust suppressant where applicable; • drop heights from excavators to crushing plant will be kept to a minimum. • distances from crushing plant to stockpiles will be kept to the minimum practicable to control dust generation associated with the fall of materials; • skips will be securely covered; • soiling, seeding, planting or sealing of completed earthworks will be completed as soon as reasonably practicable following completion of earthworks; • dust suppression and the maintenance of the surface of access routes will be appropriate to avoid dust as far as practicable, taking into account the intended level of trafficking;	Prior to any construction activities	None

Reference Number	Mitigation Measure	Point of Implementation	Monitoring Requirements
	• wheel Wash facilities at major site exits • material will not be burnt on site; and • engines will be switched off when not in operation.		
Cultural Heritage			
CH1	An archaeological watching brief will be specified in areas where buried assets are likely to be found. A qualified archaeologist will oversee excavation and ground works, and if any buried archaeological finds or features are uncovered, work will immediately halt and the County Archaeologist informed. Further mitigation will then be agreed with the planning archaeologist as appropriate before works could continue. The following cultural heritage sites as shown on Figure 9.1: • Site 34, 35, 37 Norbury Mill • Site 39 Buildings at Carr Wood • Site 42 Norbury settlement	During excavations and earthworks at these sites	A qualified archaeologist will oversee all excavation works at the specified sites. Written Scheme of Investigation to be agreed with planning archaeologist prior to works commencing. Final report to be agreed with planning archaeologist.
CH2	Geophysical surveys will be undertaken at Cultural Heritage Site 7, 14, 17, 19 and 148 (Figure 9.1 and Figure 9.7). The type of survey to be undertaken will be agreed in advance with the County Archaeologist. If archaeological remains or features are identified or suspected following the geophysical surveys, a programme of trial trenching will be undertaken in agreement with the planning archaeologist.	Prior to excavations or other ground works that could disturb buried remains in the vicinity of the site.	A qualified archaeologist will undertake the survey. Written Scheme of Investigation to be agreed with planning archaeologist prior to works commencing. Final report to be agreed with planning archaeologist.
CH3	Measured surveys will be used to record any topographical or landscape features of historical significance or interest prior to their removal. Measured surveys will	Prior to excavations and	A qualified archaeologist will undertake the survey. Written

Reference Number	Mitigation Measure	Point of Implementation	Monitoring Requirements
	be undertaken at the following sites: • Site 20 Ridge and furrow • Site 89 Ridge and furrow	earthworks that will result in the loss of the features.	Scheme of Investigation to be agreed with planning archaeologist prior to works commencing. Final report to be agreed with planning archaeologist.
CH4	Norbury Mill Leat will be recorded in plan and section by trenching prior to construction activities that will impact the site.	Prior to any construction activities that will impact the site	A qualified archaeologist will undertake the survey. Written Scheme of Investigation to be agreed with planning archaeologist prior to works commencing. Final report to be agreed with planning archaeologist.
CH5	Trial trenching will be undertaken at the following sites: • Site 38 Site of Norbury Mill House • Site 43 Norbury Toll House • Site 53 Bowerstump, site of building or house • Site 97 Site of structure at Moss Nook • Site 149 Prehistoric Wetland If any significant archaeological remains are discovered these will be recorded and further mitigation as necessary agreed with the planning archaeologist.	Prior to excavations or other ground works that could disturb buried remains in the vicinity of the site.	A qualified archaeologist will undertake the survey. Written Scheme of Investigation to be agreed with planning archaeologist prior to works commencing. Monitoring visits will be required by the planning archaeologist during trial trenching. Final report to be agreed with planning archaeologist.
CH6	Paleoenvironmental sampling will be undertaken at the Site 42 Norbury Enclosure.	Prior to excavations or other ground works that could disturb buried	A qualified archaeologist will undertake the sampling. Written Scheme of Investigation to be agreed with planning archaeologist prior to works commencing. Monitoring visits

Reference Number	Mitigation Measure	Point of Implementation	Monitoring Requirements
		remains in the vicinity of the site.	may be required by the planning archaeologist during sampling. Final report to be agreed with planning archaeologist.
CH7	The boundary post at Site 45 will be recorded in situ through photographs and measured drawings and removed from site to be deposited with Stockport Museum Service.	Prior to the commencement of construction activities	A qualified archaeologist will undertake the survey. Written Scheme of Investigation to be agreed with planning archaeologist prior to works commencing. Final report to be agreed with planning archaeologist.
CH8	Building surveys will be undertaken at all structures and buildings that will be demolished. The level of survey for each site will be agreed with the planning archaeologist in advance but will include a measured plan, photographic record and written description as a minimum. Sites where building surveys will be undertaken are: • Site 59 Hawthorn Farm • Site 150 Post Medieval Settlement	Prior to demolition of the structure or building	A qualified archaeologist will undertake the survey. Written Scheme of Investigation to be agreed with planning archaeologist prior to works commencing. Monitoring visits may be required by the planning archaeologist during the survey. Final report to be agreed with planning archaeologist.
CH9	A number of sites will be recorded in section as they are excavated. If significant archaeological remains are uncovered further surveys or excavations will be undertaken depending on the nature of the uncovered remains in agreement with the planning archaeologist. Sites where section records will be undertaken are: • Site 88 Field / township boundary near Poplar Farm	During excavation at specified sites	A qualified archaeologist will undertake the sections. Written Scheme of Investigation to be agreed with planning archaeologist prior to works commencing. Monitoring visits will be required by the planning

Reference Number	Mitigation Measure	Point of Implementation	Monitoring Requirements
	• Site 89 Outwood Farm Ridge and Furrow • Site 117 Lynchet / field boundary • Site 118 Lumb Lane • Site 144 and 145 Linear Cropmarks • Site 150, 152, 153 and 155		archaeologist during sections. Final report to be agreed with planning archaeologist.
CH10	Level 1 Photographic Recording will be undertaken at: • Site 18 Millgate Farm • Site 41 Norbury Hall	Prior to construction	A qualified archaeologist will undertake the survey. Written Scheme of Investigation to be agreed with planning archaeologist prior to works commencing. Monitoring visits may be required by the planning archaeologist during the survey. Final report to be agreed with planning archaeologist.
Landscape and Visual Effects			
LV1	The planting strategy for the scheme includes a mix of planting and habitat creation proposals with combined objectives of landscape and ecological mitigation. In the context of landscape objectives, the proposals provide for integration of the proposed scheme into the local landscape and screening of the road and its associated traffic where sensitive receptors will be potentially subject to significant visual impacts. As the detailed design is developed, it will be a requirement of the contract that the planting proposals accord with the objectives, functions and extent detailed in the landscape proposals shown in the preliminary	During and post construction	As part of the adopting Local Authorities maintenance regime

Reference Number	Mitigation Measure	Point of Implementation	Monitoring Requirements
	design assessed in this ES, specifically in relation to areas identified for screening purposes.		
LV2	The proposals include the introduction of landscape earthworks to screen views of the road and its traffic. They also provide for grading out of engineered slopes in areas where the scale of the slopes and their relationship to neighbouring areas and receptors will otherwise result in potentially severe impacts.	During construction	None
LV3	Planting types will comprise three grassland types (LE1), seven native planting types (LE2), hedgerows (LE4), and three wetland habitats (LE6). Appendix 10B details each planting type and Figures 5.31 to 5.44 shows the proposed locations of each planting type.	During and post construction	As part of the adopting Local Authority's maintenance regime
Ecology and Nature Conservation			
EC1	Compensatory habitats have been integrated into the landscape proposals which also serve to integrate the scheme into the wider landscape and screen sensitive visual receptors. Compensatory habitat includes species rich hedgerows, woodland, semi-improved species rich grassland and ponds. Appendix 10B provides details for each landscape area providing compensatory habitat and Figures 5.31 to 5.44 show the proposed locations of compensatory habitat.	During and post construction	As part of the adopting Local Authorities maintenance regime
EC2	34 new ponds will be created throughout the landscaped areas of the proposed scheme to replace existing ponds that will be lost. Replacement ponds will be designed to maximise ecological value, with each having a profile to maintain open water whilst providing areas for aquatic plants to root and grow. Planting will allow ecologically valuable flora to develop and will be specified by a qualified ecologist.	During and post construction	As part of the adopting Local Authorities maintenance regime

Reference Number	Mitigation Measure	Point of Implementation	Monitoring Requirements
EC3	To minimise potential impacts to ecological receptors in watercourses, a number of measures will be formalised in the CEMP. Such measures will include: • storage of chemicals and fuels away from watercourses in secure bunded storage; • adherence to the Environment Agency Pollution Prevention Guidance; • toolbox talks given to all contractors detailing the control measures in place when working close to watercourses; and • presence of an ecological clerk of works when working close to watercourses.	Prior and during construction	Ecological clerk of works will be present when working close to watercourses
EC4	The banks of watercourses affected by construction works will be re-profiled and sedimats™ will be pinned to them to ensure they remain stable whilst providing a suitable base for vegetation to develop.	During and post construction	As part of the adopting Local Authorities maintenance regime
EC5	Badger setts close to the scheme will be protected and badgers using them safeguarded by putting measures in place to avoid impacts. Storage and movement of equipment near badger setts will be avoided, and the setts themselves monitored by the ecological clerk of works for damage. Toolbox talks to contractors will prevent accidental damage. These measures will be formalised in the CEMP.	Throughout construction	Ecological clerk of works will monitor badger setts for damage
EC6	All known badger setts which fall within the working corridor will be closed using one-way gates to make sure badgers are not using them and replaced by construction of new setts. The old setts will be dug out after a period of monitoring. Such works will proceed under licence from Natural England.	Prior to construction	Ecological clerk of works will monitor badger setts to ensure they have been vacated before being dug up
EC7	Fragmentation effects of badger territory and mortality of badgers on roads will	During and post	None

Reference Number	Mitigation Measure	Point of Implementation	Monitoring Requirements
	be mitigated by the use of underpasses under the route and badger resistant fencing to prevent access to the road and guide badgers to suitable crossing points.	construction	
EC8	Tree roosts will be identified through surveys prior to construction. If any roosts were found in trees to be felled, bat boxes will be put up on trees adjacent to the road prior to the roost tree's felling. Felling of trees will be undertaken using a scheme of "soft felling", whereby each limb of the tree is cut, lowered carefully to the ground and inspected by an ecological clerk of works for bats. Such works will proceed under licence from Natural England.	Prior and during construction	Surveys prior to construction will identify trees with potential bat roosts requiring felling.
EC9	Trees and scrub will be planted on bat commuting lines to provide "hop overs", which are high points of vegetation close to the roadside which allow bats to fly to the other side of the road, avoiding potential collision and casualties.	During construction	As part of the adopting Local Authorities maintenance regime
EC10	In addition to mitigation measures EC1 and EC2 which will compensate for lost great crested newt habitat and EC7 which will link amphibian meta-populations, a number of measures which will be formalised in the CEMP will mitigate potential impacts to GCNs during construction. These measures will include: • capture and exclusion of GCNs and other amphibians from the construction areas; and • assisted migration for GCNs and other amphibians where temporary severance of territory has resulted from the construction areas Such works will proceed under licence from Natural England.	Prior and during construction	Works will be undertaken by a qualified ecologist
EC11	A destructive hand search of all areas suitable as habitat for amphibians and reptiles will be undertaken in advance of vegetation clearance. This will involve hand searching for individual reptiles and amphibians followed by removal of the	Prior to vegetation	Works will be undertaken by a qualified ecologist

Reference Number	Mitigation Measure	Point of Implementation	Monitoring Requirements
	top layers of soil to prevent their returning. Removed individuals will be released in suitable nearby habitat.	clearance	
EC12	Vegetation clearance will be undertaken outside of the bird nesting season (typically March to July inclusive). Where this is not possible, surveys will be undertaken by an appropriately experienced ecologist to check for the presence of active nests to establish if clearance can proceed during the breeding season. Where active nests are identified, work in the vicinity of such areas will not be allowed to proceed until the young have fledged.	Prior to vegetation clearance	Works will be undertaken by a qualified ecologist
EC13	A survey will be undertaken during the summer prior to construction to determine whether any kingfisher burrows are present and if they are, whether they could be disturbed during construction. If kingfisher burrows are present and in use, then work will proceed to close the burrow in winter when it is not used by these birds (it cannot be closed during their breeding season, which begins in April and lasts until the end of July).	The summer prior to the commencement of construction	Works will be undertaken by a qualified ecologist
EC14	An eradication programme to remove the stand of Japanese knotweed and the stands of Himalayan balsam will take place to avoid spreading this plant, prevent future impacts on habitats and potential damage to the finished scheme. The ecological clerk of works will monitor the stand during construction. A suitably qualified contractor will undertake the eradication scheme.	Prior to and during construction	Ecological clerk of works will monitor the stands during construction to ensure they are eradicated and do not spread

Reference Number	Mitigation Measure	Point of Implementation	Monitoring Requirements
Geology and Soils			
GS1	Detailed investigations and sampling will be undertaken by the contractor in advance of detailed design to enable the nature and extent of any potential contaminants present to be identified. Should contamination be encountered, then further testing and quantitative risk assessment will follow to allow the design of appropriate mitigation to ensure that site staff and the public are not exposed to contaminants. Where this involves removal of materials, the resultant material will be disposed of to a suitably licensed facility in accordance with the Duty of Care Regulations 1991.	Prior to construction	None
GS2	Measures to minimise the risk of exposure of construction workers to contaminants associated with soils and materials on site will comprise: • clearly specified personal protective equipment in line with best practice for working with the contaminants identified through the targeted ground investigation; • clearly defined working areas and access routes; • plans to carefully strip, handle and separately store soils prior to construction; • the storage of all oil, chemical and hydrocarbon sources in accordance with legal requirements and best practice; and • method statements for addressing the presence and unforeseen occurrences of hazardous substances.	Throughout construction period	Supervision during handling of contaminated materials
Noise and Vibration			
NV1	Specific noise abatement measures will be incorporated as part of a CEMP which	Throughout the	None

Reference Number	Mitigation Measure	Point of Implementation	Monitoring Requirements
	will be implemented during the construction phase. This will include: • undertake a letter drop of local residents detailing the duration and type of works to be undertaken. A contact telephone number should also be provided in the event of complaints; • best Practice measures to be adopted on site with regards to noise abatement. Best practicable means including maintenance of plant to minimise the noise produced by operations on site, acoustic enclosure of static plant and portable screen where appropriate; • all vehicles and mechanical plant to be fitted with effective exhaust silencers and maintained in good working order; • machinery that is used intermittently will be shut down or throttled back to a minimum during periods when not in use; and • static plant known to generate significant vibration levels to be fitted with acoustic damping.	construction phase	
NV2	Operational noise mitigation measures include the incorporation of bunds / landscaping and noise barriers (Figures 5.31-5.44). In addition low noise surfacing will also be utilised throughout the proposed scheme.	Throughout construction phase	None
Effects on All Travellers			
AT1	Provision of safe access for NMUs to PRoW during the construction phase.	During construction	None
AT2	Construction of a new cycleway and footpath and safe diversions linking the existing network of footpaths severed by the proposed scheme.	During Construction	None
Community and Private Assets			

Reference Number	Mitigation Measure	Point of Implementation	Monitoring Requirements
CPA1	To undergo further environmental consultation with land owners	Ongoing	None
CPA2	To ensure access to agricultural, private and community land is maintained throughout construction	During construction	None
Road Drainage and the Water Environment			
RDWE 1	A commitment to investigate further during the implement, where feasible, specialist proprietary treatment systems to treat cumulative discharges, such that they pass all elements of the HAWRAT assessment.	Prior to construction	None
RDWE 2	Use of SuDS features such as surface flow wetlands to remove hydrocarbons, soluble metals, sediment and sediment bound pollutants from road drainage discharges where the HAWRAT and EQS assessments have identified a need for treatment. Shut-off valves will be installed on all drainage networks to isolate the networks in the event of an accidental spillage. The SuDS features included on the networks for treatment of routine runoff will also contribute to the control of pollution from accidental spillage.	During Construction	None
RDWE 3	All road drainage discharges will be attenuated to green field runoff rates.	During Construction	None
RDWE 4	Road drainage outfall structures will be designed flush with the watercourse bank and will discharge in the direction of flow. The structure headwalls, wingwalls and erosion protection aprons will be designed to prevent erosion of the watercourse bed and banks.	During Construction	None

Reference Number	Mitigation Measure	Point of Implementation	Monitoring Requirements
RDWE 5	Clear span bridges will be constructed over the Norbury Brook and Lady Brook, with bridge supports constructed set back from the watercourse channel and floodplain, to minimise potential flood impacts and protect the integrity of the river banks.	During Construction	None
RDWE 6	River bank erosion protection will be installed if necessary at the Lady Brook bridge crossing to maintain the current channel alignment and protect the bankside access track passing under the bridge.	During Construction	None
RDWE 7	Existing culverted land drains will be extended under the scheme footprint or will be diverted into the earthworks drainage.	During Construction	None
RDWE 8	Watercourse diversions will be aligned and profiled to maintain hydraulic capacity, replicate existing channel gradients and cross-sections and reflect riffle and pools sequences, particularly on the Norbury Brook.	During Construction	None
RDWE 9	Where erosion protection is required within the new diversion channels, soft engineering techniques will be used where feasible. This may include the use of geotextiles, live willow revetment, coir rolls and brushwood mattresses, where applicable.	During Construction	None
RDWE 10	Road cuttings which intercept the groundwater table will be designed with appropriate drainage to deal with groundwater inflows.	During Construction	None

Endnotes

[1]Defra (2012), How can I remove the influence of higher NO_2 concentrations in 2010 from the background maps [online at: http://laqm.defra.gov.uk/laqm-faqs/faq136.html], accessed December 2012
[2] Consultant Contractor Report, Balfour Beatty Civil Engineering plc, 15 November 2011
[3] The EU Limit Value for NO_x (Annual Mean of 30 µg/m^3) is only applicable at locations further than 5 km from any built-up areas, industrial installations or motorways. The Designated Sites in this assessment do not meet these criteria but a precautionary approach has been adopted, and hence the Limit Value has been considered.
[4] These are unpublished maps held by Stockport Local Heritage Library, Cheshire Record Office, and the Greater Manchester County Record Office;
[5] SEMMMS 2003 Stage 2 Environmental Assessment Report.
[6] Greater Manchester Archaeological Unit (GMAU) 1991 A6(M) Stockport North–South Bypass: An Archaeological Assessment.
[7] Ibid.
[8] Lancaster University Archaeological Unit. 1995. North West Wetlands Survey 2: The Wetlands of Greater Manchester. Hall D, Wells CE and Huckerby E.
[9] Garner, D 2007 Neolithic and Bronze Age Settlement at Oversley Farm, Styal. BAR series.
[10] Margary, ID. 1957 Roman Roads in Britain. 97
[11] GMAU. 1996. Wilmslow to Hazel Grove Pipeline Corridor. An Archaeological Assessment.
[12] UMAU 1998 Woodford Pipeline, Bramhall.
[13] UMAU 2003 SEMMMMS Major Road Scheme. Stage 3 Assessment.
[14] Greater Manchester Archaeological Unit (GMAU) 1991 A6(M) Stockport North–South Bypass: An Archaeological Assessment.
[15] UMAU 2003 SEMMMS Major Road Schemes. Environmental Assessment Report.
[16] Ormerod, G 1819 History of the County Palatine of Cheshire.
[17] This is the geological information (i.e. soils) used to understand a past environment; climate, ground conditions, plant life etc
[18] UMAU 2007
[19] Burdett. 1770s. Burdett's Map of Cheshire
[20] Arrowsmith, P 1992 Norbury Mill Excavation.
[21] Monograph from UMAU. 1991. A6(M) Stockport North-South Bypass
[22] Arrowsmith, P 1992 Norbury Mill Excavation.
[23] Monograph: Arrowsmith, P. 1992. Norbury Mill, Stockport, Excavation Report. Fletcher, M. 3, 4 Unpublished document: UMAU. 2001. Mersey Bollin Catchment: Stage Three Report: Part 1 (Vol 1). Arrowsmith, P.
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