M8 Baillieston to Newhouse

Stage 3 Report
Part 1: Environmental Statement
Updated 2007

Volume 1

Main Statement and Technical Appendices

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1 Introduction

1.1 The Environmental Statement

This Environmental Statement (ES) presents the findings of an Environmental Impact Assessment (EIA) of the proposal to upgrade the existing A8 between Baillieston and Newhouse to dual three-lane motorway standard or equivalent.

An Environmental Statement was prepared and published in March 2006 to support proposals by Transport Scotland to upgrade the A8 between Baillieston to Newhouse. Since that time, the proposal has been amended, and Transport Scotland is republishing Road Orders and publishing Compulsory Purchase Orders for the project.

The amendments to the scheme are:

- A revised roundabout design at Swinton;
- Minor amendments to drainage management for the road including a new SUDs basin at Swinton and a relocated SUDs basin at Shawhead;
- Additional footpath and cycleway provision, improving links between Bargeddie Bridge and the A752, and between the Shawhead and Eurocentral Interchanges.

These amendments have been incorporated into the environmental impact assessment, and the Environmental Statement has been updated to take these specific amendments into account. The ES is issued in accordance with EC Directive 85/337 (as amended by 97/11/EC and 2003/35/EC) as applied by the Roads Scotland Act 1984.

Volume 1 contains the Environmental Statement and Appendices; Volume 2 contains Figures referenced in Volume 1. The location of the scheme is shown in Figure 1.1.

Any person wishing to make representations about the scheme and the Environmental Statement may do so in writing, addressed to:

Chief Road Engineer
Transport Scotland
Trunk Road Infrastructure & Professional Services
Buchanan House
58 Port Dundas Road
Glasgow
G4 0HF

Written responses are invited within 42 days of the advertised date of publication of the Environmental Statement. Scottish Ministers will take into consideration any representations so made before deciding whether or not to proceed with the scheme with or without modifications.

A Non-Technical Summary has been published to accompany this Environmental Statement and is available free of charge. Copies of the Environmental Statement and the Non Technical Summary are available for download from the website www.m8completion.com. .

The Environmental Statement is available for public viewing at the above address and at the locations listed in the Non-Technical Summary.

1.2 Background to the Scheme

The section of the A8 trunk road between Baillieston and Newhouse was built in the late 1960s and early 1970s. It lies 13km to the east of the City of Glasgow and forms part of the main Trunk Road connecting Edinburgh and Glasgow, serving both east–west and, to a lesser extent, north-south traffic. The A8 Corridor between Baillieston and Newhouse has a multi-function role as:

- a key section of the trunk road network;
- a principal route for freight;
- an inter-urban connection between Central Scotland towns and Edinburgh and Glasgow business centres; and
- an intra-regional distributor between population and employment centres within North Lanarkshire.

Various options for upgrading the A8 between Baillieston and Newhouse have been considered in the past. The most recent of these options was a Public Private Partnership (PPP) project, commonly referred to as the M8 Design, Build, Finance and Operate (DBFO) project, to provide a motorway and all purpose collector-distributor roads with links between them and the local road network. The scheme progressed through Public Local Inquiry (PLI) and the necessary land was purchased through the Compulsory Purchase Order (CPO) process. Construction of this project, although tendered for, was not taken forward by Scottish Ministers.

1.2.1 The Need for the Scheme

In December 2000, following the Scottish Office's 'Travel Choices for Scotland – The Strategic Roads Review', the Scottish Executive appointed a consortium of consultants to undertake multi-modal corridor studies for the A8, the A80 and the M74 corridors – the Central Scotland Transport Corridor Studies (CSTCS). These studies identified and investigated specific interventions to resolve or ameliorate the transport problems within each corridor in order to meet the Government's five policy objectives in respect of Environment, Economy, Safety, Integration and Accessibility. Following the report of the studies, Scottish Ministers announced their decisions in a document entitled 'Central Scotland Transport Corridor Studies – Decisions' (January 2003), which recorded the following:

Executive Decision 3, which reads:

"*The A8 between Baillieston and Newhouse will be upgraded to dual three lane equivalent motorway standard with preparatory work to start immediately for the scheme to be operational prior to 2010."*

The Consultants' Recommendations (from CSTCS) noted that:

If nothing is done, traffic congestion on the A8 corridor will increase with inter-peak flows in 2010 tending towards the peak hour levels experienced in 2000. With significant delays throughout the day, journey reliability will be poor and traffic will use alternative local routes to avoid the A8. The congestion will be seen as detrimental to those situated in the corridor as well as those passing along the corridor.

1.2.2 Traffic Conditions

Traffic studies conducted as part of the scheme assessment (discussed further in Chapter 2) suggest that, in terms of carriageway provision between junctions, various sections of the A8 are presently experiencing high flow conditions which approach, and in some cases exceed, the available capacity. This is particularly true on the section of the A8 around Shawhead where flows are generally in the high or critical range in both directions during both the AM and PM peak hours.

Much of the remaining study area network is operating within capacity, particularly on the motorway network. It should be noted that this does not reflect junction capacities, which during peak periods give rise to traffic queues throughout many parts of the study area, particularly on the A725 approaches to Shawhead Junction and Raith Junction.

If nothing is done and traffic continues to grow, traffic modelling indicates that congestion on the A8 corridor will increase with inter-peak flows in 2010 tending towards the peak hour levels currently experienced. With significant delays throughout the day, journey reliability will be poor and traffic will use alternative local routes to avoid the A8. The congestion will be seen as detrimental to those situated in the corridor as well as those passing along the corridor.

The study area is served by four major traffic corridors, namely M8/A8, M73, M74 and A725, which are interconnected by four key junctions. Shawhead forms the interchange between the A725 and the A8, Baillieston Interchange links the M73 and the A8/M8, Maryville Interchange links the M73 and the M74 and Raith Junction links the M74 to the A725. The conditions at each of these junctions are described below.

A8/A725 Shawhead Junction

Significant levels of congestion occur at Shawhead in and around the AM and PM peak periods.

M8/M73 Baillieston Interchange

The Baillieston Interchange as a whole operates well. However, the M8 eastbound off slip, connecting to the M73 southbound and the A89, is currently carrying about 2600 vehicles in the PM peak. This flow far exceeds its one lane design capacity and effectively represents saturation conditions.

M74/M73 Maryville Interchange

Poor merging provision exists for traffic movements from M73 southbound slip on to the M74 southbound, and from the M74 northbound slip on to the M73 northbound. As such, traffic making these movements often experiences delay.

M74/A725 Raith Junction

Severe traffic problems exist at Raith due to the interaction of heavy turning volumes from the A725 and M74 at the signalised roundabout. Significant congestion occurs in and around the AM and PM peak hours.

1.2.3 Current Scheme Objectives

Scheme specific requirements draw on the recommendations of CSTCS Executive Decision 3, and include:

- provide a dual 3 lane motorway or equivalent;
- apply Demand Management measures as appropriate;
- take account of advance construction work associated with the newly completed A8 Major Maintenance Commission;
- take account of land purchased in connection with previous (shelved) Design, Build, Finance and Operate (DBFO) Scheme;
- take account of previously completed statutory process (motorway line and side road orders); and,
- mitigate the environmental impact of the works where possible.

1.2.4 The Assessment Team

The Scottish Executive appointed MouchelFairhurst JV (a joint venture comprising Mouchel Parkman and WA Fairhurst & Partners) to investigate alternatives and develop a preferred option for the upgrade of the A8 between Baillieston and Newhouse. MouchelFairhurst JV (MFJV) is supported by SiAS (Traffic & Transport Consultants), Young Associates (Environmental Consultants) and Roger Tym & Partners (Economic Development Consultants), with specialist inputs from Air Quality Consultants (AQC) and Hamilton and McGregor (Noise and Vibration Consultants).

1.2.5 Previous Studies

An Environmental Impact Assessment study was originally undertaken in 1993 (M8 Motorway Environmental Statement and Non-Technical Summary) in relation to the M8 DBFO project, the purpose of which was to provide a motorway and all purpose collector-distributor roads with links between them and the local road network. The assessment reports were reviewed as part of the current assessment process; however a fresh impact assessment process commenced in 2003 (MFJV Inception Report 2003) in recognition of the time lapse between the previous studies and the present scheme, and the emergence of new environmental legislation and good practice in the intervening period.

The Scottish Strategic Roads Review was announced to the Westminster Parliament on 19 June 1997 and the paper reporting the conclusions of that review was published by the Scottish Executive in November 1999.

The Scheme Decisions which accompanied the publication of the Strategic Roads Review announced that the A8 and A80 upgrading should be considered alongside other potential transport solutions in a multimodal corridor study, i.e. to consider ways in which a high proportion of commuters could make such journeys by public transport.

A consortium of consultants was appointed by the Scottish Executive in December 2000 to undertake multi-modal corridor studies for the A8, A80 and M74.

The overall aims of the studies were to:-

- recommend plans of specific interventions for the A8 and the A80 to resolve or ameliorate the transport problems within each corridor;
- recommend a set of measures which would complement the M74 Completion Scheme and ameliorate any remaining transport problems in the corridor;
- provide practical, deliverable and prioritised solutions to problems on all modes of transport;
- develop programmes of actions for the three corridors in the short-term (up to 2005), medium term (up to 2010) and the longer term (up to 2020); and
- meet the Government's five objectives for the environment, economy, safety, integration and accessibility.

2 Scheme Selection

2.1 Introduction

The purpose of this chapter is to provide a summary of the option identification and selection process that has led to the current preferred Scheme.

2.2 Consideration of Options for Improvement

The identification of alternative alignments and junction strategies are described in the DMRB Route Option Assessment Report (MFJV / 18 October 2004). It recognised the previous alignments and schemes developed for the M8 DBFO project and those suggested in the CSTCS. The Report also reviewed improvement options developed to take account of more recent changes in development and needs.

Three route corridors (Blue, Pink and Orange) were identified which could host route options which satisfy the commission requirements. These were generally either offline following the line of the M8 DBFO (Blue Corridor), on the line of the existing A8 (Pink Corridor), or further south providing an alternative route south of Eurocentral and Chapelhall (Orange Corridor). These corridors are shown on Figures 2.1a-c.

Approximately twenty-six route options or combinations were developed within these three corridors. These were examined by the Project Team at internal reviews as well as Value for Money workshops, and were refined to a core of three options (A, B and C), which were capable of delivering the commission aspirations in full.

The junction strategies recognised the existing level of access between the local roads and the trunk road network that is currently available in the corridor, and attempted to preserve or enhance this provision. This strategy incorporated a number of measures, which included:

- retaining key junctions and movements, with direct access to the proposed motorway, with access available elsewhere from an All Purpose Road (APR), and with the APR following the same general corridor as the new Motorway; and
- direct access to the motorway for strategic (long distance) traffic, with all other traffic utilising the released road capacity of the recently improved A8.

However, the provision of connections to and from the motorway at the same locations as those that currently exist on the A8 would have had severe safety implications, and some rationalisation of provision was required.

2.3 Stage 2 Assessment

The Stage 2 Route Option Assessment Report and Stage 2 Environmental Assessment Report were submitted to the Scottish Executive in November 2004. The report described and made comparative assessments of the three Options: A, B and C. There were broad similarities in all three routes being proposed in that they all commenced at the existing Baillieston Interchange and ran to the south of the A8 at Shawhead before

returning to the line of the existing A8 from the junction at Eurocentral to the junction at Newhouse. As far as is practicable within current design standards, the routes occupied land already in the ownership of the Scottish Ministers. The principal differences between the options lay in the interconnections between the new motorway and the All Purpose Road (APR), and of course the proposed junction strategy.

Option A incorporated motorway junctions at Baillieston Interchange, Kirkshaws, Shawhead and Newhouse. Junctions on the APR were provided at Kirkshaws, Shawhead, Eurocentral, Chapelhall and Newhouse. This strategy separated local traffic onto the APR and allowed strategic traffic to remain on the motorway network, while providing links to the APR with junction spacing more appropriate to rural motorway design standards.

Option B incorporated motorway junctions at Baillieston Interchange, Shawhead, East of Eurocentral and Newhouse. Junctions on the APR were provided at Shawhead, Eurocentral, Chapelhall and Newhouse. This strategy had the effect of transferring local traffic to the APR from the A89 and also reduced the likely flow of traffic through Shawhead on the APR by the inclusion of motorway slips adjacent to Eurocentral (but not directly to Eurocentral).

Option C incorporated motorway junctions at Baillieston Interchange, Kirkshaws, Shawhead, East of Eurocentral and Newhouse. Junctions on the APR were provided at Kirkshaws, Shawhead, Eurocentral, Chapelhall and Newhouse. This strategy had the effect of reducing traffic impacts of the scheme on the local road network around Bargeddie, and the A89 in particular, while reducing traffic levels on the APR through Shawhead.

The Stage 2 Engineering, Traffic, Economic and Environmental Assessments indicated a broad similarity in terms of the three schemes considered against all assessment criteria. In terms of key commission objectives, Option B was the least expensive scheme and offered the best return on investment, while providing similar levels of benefit and impact to either Option A or Option C. The Stage 2 report recommended that Option B was progressed as the preferred route.

Subsequently, an Addendum Report (MFJV 2005) was prepared which reflected further design work and assessment undertaken prior to development of the conceptual layout of the Preferred Scheme considered in this Environmental Statement.

The principal amendments made to Option B during this process were:

- increase in motorway carriageway capacity provision between Baillieston Interchange and Chapelhall Junction on the proposed M8 Scheme;
- realignment of the M8 in the vicinity of the A752 at Bargeddie and immediately adjacent to the North Calder Water, moving the motorway further away from the watercourse;
- redesign of the proposed Shawhead Junction; and

- amendments to Eurocentral and Chapelhall Junctions to incorporate direct motorway connections to the proposed M8 to and from the west, with a discontinuous All Purpose Road connecting into these junctions.

2.4 Traffic Assessment

Mouchel Fairhurst JV, through specialist consultant SiAS, has undertaken traffic and transportation modelling and forecasting. The forecasting and assessments were based on a two-tier transport modelling hierarchy comprising:

- Higher Tier – Strategic Model (4-Stage Transport Model); and
- Lower Tier – Local Model (Traffic Microsimulation Model).

The higher-tier Strategic Model, CSTM3A, is an enhanced four-stage multi-modal transport model that incorporates trip generation, mode choice, destination choice and route assignment capabilities. CSTM3A was developed (as an update of CSTM3) for the Central Scotland Transport Corridor Studies (CSTCS) by MVA on behalf of the Scottish Executive.

The Strategic Model is used to provide travel demand forecasts and inputs to the environmental and economic assessments. In addition, the Strategic Model forecasts provide estimates of traffic growth that are applied to the lower tier, Local Model.

The use of CSTM3A ensures a consistent approach with the methodologies adopted for the M74 Completion and M80 Stepps to Haggs commissions in modelling the strategic and multi-modal aspects of the proposed schemes.

The lower tier, Local Model is a Paramics traffic microsimulation model covering the main strategic routes within the immediate sphere of influence of the Scheme. The function of the Local Model is to provide more detailed outputs to aid the design and operational assessments of Scheme options.

During the CSTCS, the Scottish Executive approved forecast planning and economic scenarios for the application of CSTM3A in forecast mode. A range of scenarios was devised and tested during CSTCS that resulted in two scenarios, Scenario 1 (S1) and Scenario 2 (S2), being carried forward for the plan development of the study corridors. These have been adopted for the M8 Baillieston to Newhouse Study to ensure consistency with the CSTCS. In general, S1 represents a higher level of growth than S2. Strategic Model runs, which were used for the economic and environmental assessments, were undertaken for Scenarios S1 and S2 and years 2010 and 2020.

Outputs from the Strategic Model (Scenario 1) were used to assist with the air quality and traffic noise and vibration assessments that have been carried out and reported in this Environmental Statement. Scenario 1 was used to provide higher growth and hence ‘worst case’ predictions for the air quality and traffic noise and vibration assessments.

2.4.1 Do-Minimum Network

There is a number of transport schemes planned or due for implementation that influence the M8 Baillieston to Newhouse Preferred Scheme. The scheme assessment assumes that these measures are in place prior to the Preferred Scheme proceeding.

This improved network is commonly referred to as the Do-minimum or Committed Do-minimum (CDM) and has been defined as comprising the road improvement schemes shown in Table 2.1 below and other transportation improvement initiatives that are planned to be in place prior to the opening year of the proposed M8 scheme (2010).

The Do Minimum highway and public transport networks were based largely on the assumptions adopted for the CSTCS Do Minimum network with the addition of the M74 Completion and M80 Stepps to Haggs commissions.

Table 2.1 – 2010 Committed Schemes, Do Minimum Network (Additional Projects to Existing Network)

Ref	Authority	Scheme
1	Edinburgh	A8000 dualling
2	Falkirk	M876 Junction 2 Slip Roads
3	Glasgow	Quality Bus Corridor 1 - Faifley to Baillieston
4	Glasgow	Kingston Bridge - Removal of Restrictions
5	Glasgow	Finnieston Bridge
6	North Lanarkshire	Gartcosh Park & Ride and Public Transport Interchange
7	North Lanarkshire	Bargeddie Signals to roundabout conversion
8	North Lanarkshire	Closure of A8011 Central Way, Cumbernauld
9	North Lanarkshire	Ravenscraig Link Roads
10	ScotRail	May 2001 timetable improvements
11	ScotRail	September 2001 timetable improvements
12	ScotRail	Twice daily Carstairs to Edinburgh service
13	Scottish Executive	A8 Baillieston to Newhouse Major Maintenance
14	Scottish Executive	A876 Kincardine Bridge Eastern Link
15	Scottish Executive	A876 Kincardine Bridge
16	South Lanarkshire	Rutherglen Town Centre Improvements

Ref	Authority	Scheme
17	South Lanarkshire	Cambuslang Town Centre Improvements
18	South Lanarkshire	A71/A72 Garrion Bridge Improvements
19	Stirling	Stirling - Alloa Sustainable corridor
20	East Renfrewshire	Glasgow Southern Orbital
21	Scottish Executive	M77 Fenwick to Malletsheugh
22	Glasgow	Quality Bus Corridor Measures (QBC) - Battlefield Road
23	Glasgow	QBC Measures - Dundrennan Rd
24	Glasgow	QBC Measures - Rhannan Rd
25	Glasgow	QBC Measures - Tollcross
26	Glasgow	QBC Measures - Possil Road
27	Glasgow	QBC Measures - Clarkston
28	Glasgow	QBC Measures - Great Western Road
29	Glasgow	QBC Measures - Paisley Road West
30	Glasgow	QBC Measures - Maryhill Road
31	Glasgow	QBC Measures - Dumbarton Road
32	Glasgow	QBC Measures - Gallowgate/Shettleston
33	Scottish Executive	M8 Junction 21 (Seaward Street) Improvements
34	Glasgow	Dumbreck Road Traffic Management/Bus Priority Measures
35	Glasgow	East End Regeneration Route
36	South Lanarkshire	Larkhall Rail Service
37	Scottish Executive	M80 Stepps to Haggs Including Auchenkilns Roundabout Improvement
38	Scottish Executive	M74 - Polmadie Road/Aikenhead Road Connection
39	Scottish Executive	M74 Completion - Fullarton to Kingston Area
40	Strathclyde Developments Limited	Strathclyde Business Park Road Infrastructure Improvements

During Stage 2 design & assessment, traffic modelling of the local area indicated very strongly that the Do-minimum network would experience significant traffic congestion on the network at several locations on the periphery of the proposed M8 scheme in 2010. The consequence of this congestion is that traffic would not reach the A8 corridor and therefore the full traffic implications, including the economic benefits of any proposed improvements, would not be appropriately modelled, or benefits realised.

In cases such as this, where the expected congestion is beyond tolerable limits, it is good practice to develop and model further improvements to the Do-minimum network which release this traffic. In effect, the constraints in the network are removed and the scheme options are then assessed to evaluate their performance.

For this commission, improvements have been identified that supplement the Committed Do-minimum network. This revised network is referred to as the Enhanced Do-minimum (EDM) in this report.

Modelled interventions have included capacity improvements on:

- M8 Eastbound, Junction 10 (Easterhouse) to Junction 8 (Baillieston Interchange);
- M73 Junction 2 (Baillieston) to Junction 1 (Maryville);
- M74 West of Junction 4 (Maryville);
- M74 Junction 4 (Maryville) to Junction 5 (Raith); and
- closure of local road connections to M73 at Junction 1 (Maryville).

The capacity improvements are generally achieved by providing an additional traffic lane on the existing hardshoulder, and constructing a new discontinuous hardshoulder where practicable.

These measures are themselves subject to further assessment work to determine their optimum configuration and are referred to as the Associated Network Improvements (ANI). The ANI themselves are presently undergoing DMRB Assessment.

While the ANI enhances the operational and economic benefits anticipated, the provision of the Preferred Scheme is not dependent on implementation of the ANI.

3 The Preferred Scheme

3.1 Description Of Scheme

This chapter provides a detailed description of the preferred scheme, and the conceptual design that has been developed. The plan and profile of the proposed M8 route are shown on Figures 3.1a-e. The text is presented as an overall description initially of the motorway alignment and includes a general description of the proposed junctions. The mainline alignment is described in sections between these junctions and the junctions themselves are described in detail later in this chapter.

The proposed motorway includes junctions, some with limited direct motorway connection, at Baillieston Interchange, Shawhead Junction (A725), Eurocentral Junction, Chapelhall Junction and Newhouse Junction. In addition to the provision of a new motorway, the overall scheme includes an All Purpose Road (APR) that caters for local movements between the surrounding built up areas including Baillieston, Bargeddie, Coatbridge, Bellshill and Chapelhall and the strategic motorway network. The APR also caters for traffic movements that are not directly provided via the proposed motorway junctions.

The proposed motorway completes the M8 between Edinburgh and Glasgow. It commences at Junction 9 with improvement works to the capacity of the existing M8 diverge to the A89/M73. The main alignment of the proposed M8 is approximately 11.0km long and runs from the existing Baillieston Interchange (Junction 8) at the western extent to the existing Newhouse Junction in the east (Junction 6).

The proposed M8 is generally to the south of the existing A8 trunk road between Baillieston Interchange and Eurocentral Junction. At Eurocentral the motorway alignment is partially online with respect to the proposed eastbound carriageway, however much of the westbound carriageway sits offline, until just east of Chapelhall Junction where the scheme crosses to the north of the existing A8 trunk road prior to tying in immediately to the west of the existing Newhouse Junction.

The APR incorporates significant lengths of the existing A8 trunk road and further lengths of new build. The new lengths are at the western extent between the A89 Coatbridge Road and Braehead (Cutty Sark) Railway Bridge and between Orchard Farm Railway Bridge and Eurocentral Junction. To the east of Eurocentral Junction the APR is provided as one-way links on the north and south of the proposed M8.

The scheme also connects with the A725 Bellshill Bypass at Shawhead Junction.

Local roads also affected by construction of the scheme are the A752, the B799 and the A73, which in general are north south routes which connect into the proposed remodelled junctions in the case of the B799 and the A73, or remain in their present alignment as is the case with the A752.

3.2 Mainline Motorway Alignment

The proposed new motorway is 10.3km long and runs from the existing Baillieston Interchange (Junction 8) at the western extent to the existing Newhouse Junction in the east (Junction 6). From the online connection at Baillieston the alignment is generally to the south of the existing A8 through the proposed Shawhead Junction with the A725 Trunk Road, before returning 'online' through Eurocentral to Newhouse junction.

3.2.1 West of Baillieston Interchange to Shawhead Junction

This section is approximately 5.1km long.

The existing Eastbound diverge from the M8 to the A89 Coatbridge Road and the M73 Southbound carriageway is improved with the provision of an additional diverge lane.

The existing Baillieston Interchange remains in its current form in terms of motorway access and carriageway provision.

The proposed motorway commences at Baillieston Interchange on the line of the existing A8/M8. From this position the alignment curves to the south, off-line by approximately 100m at Chainage 1,100m adjacent to Braehead Farm. From this point, the alignment turns northwards back towards the existing A8 trunk road, crossing above the A752 Aitkenhead Road and the slip road to the westbound A8 carriageway.

In profile, the route goes into cutting of approximately 4.0m depth in order that headroom clearance to the Glasgow to Whifflet railway line can be achieved. This will require the provision of a new Railway Underbridge adjacent and to the south of the existing Braehead (Cutty Sark) Railway Bridge. From the Railway Bridge to the A752 the profile switches from cut to fill of up to 8m in height, alternating to cutting approximately 8.0m in depth and returning to embankment up to 7m on approach to the A752 overbridge.

From the A752 the alignment lies between the A8 Trunk Road and the North Calder Water valley. At Chainage 2,000m, the alignment turns southwards again, diverging from the A8 corridor running south of Shawhead Farm on a sweeping right hand bend.

From approximate Chainage 3,220m, the alignment turns on a left hand bend, towards the proposed Shawhead Junction at Chainage 4,400m. At this point the proposed centreline is approximately 350m south of the existing A8.

Over this section, the profile is initially on embankment as it leaves the A752 overbridge and crosses the Luggie Burn. This embankment rises above the valley of the Luggie Burn to a maximum height of 14m. In the context of the adjacent A8, the proposed road will be raised by up to 5m above the level of the existing A8 to maintain clearance headroom to the westbound A8 slip road connections with the A752. The average height of the embankment over this length is approximately 5m. This embankment diminishes and at Chainage 2,140m the profile is close to existing ground level. Adjacent to Bankhead Farm where the route turns away from the existing road, it cuts through the landform to a maximum depth of around 15m. The profile continues to climb gently

towards the A725 at Shawhead but remains in cutting to provide headroom clearance to the existing road. This section is through sidelong ground resulting in deeper cutting slopes to the north in comparison with the south.

3.2.2 Shawhead Junction to Eurocentral Junction

This section is approximately 2.5km long.

After Shawhead, the alignment slowly turns northeast towards the existing A8, to run on the line of the existing A8 on the approach to Eurocentral Junction.

In profile, this section emerges from the cutting below the A725 onto embankment and significant structure as it crosses the North Calder Water before returning to cutting on the east bank of the river. This cutting continues at an average depth of 3 to 4m before rising to existing ground level and crossing above the Airdrie-Motherwell railway line, which itself is in cutting.

3.2.3 Eurocentral Junction to Newhouse Junction

This section is approximately 3.4km long.

The route runs parallel to the existing A8 but is offset to the south to accommodate an eastbound All Purpose Road (APR) generally within the existing A8 road boundary. It continues on this alignment through Chapelhall Junction, and then runs to the north of the existing A8 as it turns towards the Newhouse Junction. The route then follows the existing M8 as it crosses Newhouse Junction. The horizontal design of this section should be optimised to maximise the use of the A8 carriageways, either within the new motorway, or for either carriageway of the parallel APR, along this section.

The vertical design between Eurocentral and Newhouse is targeting the existing A8 road levels along this section. There is a short section of embankment between Chapelhall and Newhouse of maximum height 5m where the proposed road runs north of the existing A8.

3.3 Motorway Cross Section

The proposed motorway cross section comprises standard cross sections as described in 'TD 27/05 Cross Sections and Headrooms' within the Design Manual for Roads and Bridges Volume 6. Typical road cross-sections are shown on Figure 3.2.

3.3.1 West of Baillieston Interchange to Shawhead Junction

The cross section of the eastbound M8 to the west of Baillieston Interchange is amended to provide an additional diverging lane. This additional lane results in a four lane running carriageway from the M8 Junction 9 until the nearside lanes diverge, leaving two lanes continuing under Baillieston Interchange on the M8.

Between Baillieston Interchange and Shawhead Junction, the proposed motorway will be Dual 3 Lane motorway (D3M). This will be achieved by a lane gain to the mainline

section in the eastbound direction at the proposed merge slip road from Baillieston Interchange. In the westbound direction, the opposite occurs where one of the proposed motorway lanes drops as a diverge slip road to Baillieston interchange.

D3M cross section comprises 2 carriageways. Each carriageway has a hard shoulder of 3.3m width and 3 lanes totalling 11m width. There is a hardstrip of 0.7m width and a central reserve of minimum width 3.1m. This central reserve width is the minimum required and in general the actual provision will be greater than this to allow for forward visibility criteria and other design features.

On either carriageway a verge width of 3.5m is considered desirable to accommodate the minimum requirements of TD 27/05 and to provide for other design features such as drainage and communication ducting for motorway control systems, as well as sign locations and structural foundations.

3.3.2 Shawhead Junction to Eurocentral Junction

Between Shawhead Junction and Eurocentral Junction, the proposed motorway will be D3M with an auxiliary lane between the junctions resulting in Dual 4 Lane motorway (D4M) cross-section. The D4M provision is necessary as this section caters for significant weaving traffic between Shawhead and Eurocentral Junctions. This will be achieved by a lane gain to the mainline section in the eastbound direction at the proposed merge slip road from the Shawhead Junction, which subsequently drops again at the Eurocentral Junction diverge slip road. In the westbound direction the opposite occurs with the lane gain occurring from the Eurocentral merge slip road and the lane drop occurring towards the southbound A725 Bellshill Bypass.

D4M cross section comprises 2 carriageways. Each carriageway has a hard shoulder of 3.3m width and 4 lanes totalling 14.7m width. There is a hardstrip of 0.7m width and a central reserve of minimum width 3.1m. This central reserve width is the minimum required and in general the actual provision will be greater than this to allow for forward visibility criteria and other design features.

On either carriageway a verge width of 3.5m is considered desirable to accommodate the minimum requirements of TD 27/05 and to provide for other design features such as drainage and communication ducting for motorway control systems, as well as sign locations and structural foundations.

3.3.3 Eurocentral Junction to Chapelhall Junction

Between Eurocentral Junction and Chapelhall Junction the proposed motorway will be D3M. This will be achieved by dropping a lane from the mainline section in the eastbound direction at the proposed diverge slip road to Eurocentral Junction. In the westbound direction the opposite occurs and the merge slip road from Chapelhall Junction is provided as a lane gain.

The D3M cross section is as described previously for the section between Baillieston Interchange and Shawhead Junction.

3.3.4 Chapelhall Junction to Newhouse Junction

Between Chapelhall Junction and Newhouse Junction the proposed motorway reverts to Dual 2 lane Motorway (D2M). This will be achieved by a lane drop from the mainline to the diverge slip road at Chapelhall Junction. In the westbound direction the existing D2M section is continued through from Newhouse Junction.

D2M cross section comprises 2 carriageways. Each carriageway has a hard shoulder of 3.3m width and 2 lanes totalling 7.3m width. There is a hardstrip of 0.7m width and a central reserve of minimum width 3.1m. This central reserve width is the minimum required and in general the actual provision will be greater than this to allow for forward visibility criteria and other design features.

On either carriageway a verge width of 3.5m is considered desirable to accommodate the minimum requirements of TD 27/05 and to provide for other design features such as drainage and communication ducting for motorway control systems, as well as sign locations and structural foundations.

3.4 Motorway Junctions

3.4.1 Junction Strategy

The assessment work undertaken during these studies has led to the provision of new or improved junctions facilitating access directly onto the motorway at:

- Baillieston Interchange;
- Shawhead;
- Eurocentral;
- Chapelhall; and
- Newhouse.

Some movements at these junctions will however require making use of the proposed APR and are not provided directly from and to the proposed motorway. A description of each motorway junction is given below.

3.4.2 Baillieston Interchange

Immediately to the west of Baillieston Interchange, works are necessary to improve the diverging capacity of the existing slip road that leads to the A89 Coatbridge Road and the link to the M73 southbound carriageway. As described previously, this link is currently operating significantly beyond its theoretical design capacity and is a known bottleneck on the existing network. The proposed enhancement works comprise the addition of an extra nearside lane such that 2 lanes diverge to the A89/M73 and 2 lanes continue through the Baillieston Interchange as at present. While the observed operational difficulties may be improved to some extent by the M74 Completion Scheme (by others) they will not be completely removed and since the M8 Preferred Scheme utilises this slip to cater for movements to Bargeddie and Coatbridge that are not available from the proposed M8 to the east, these capacity enhancements are needed in the existing

network, the Do-minimum network and the Proposed network incorporating the M8 Preferred Scheme.

Motorway access to and from the east is maintained and is provided by two new east facing slip roads to replace the existing slip roads at this location. The proposed slip roads are both 2 lanes wide.

As the Baillieston Roundabout will cater only for motorway traffic with the upgrade of the A8 to Special Road, it is proposed to introduce motorway regulations on the existing A8 between the proposed Swinton Roundabout and Baillieston Interchange and on the Baillieston Interchange Roundabout itself.

3.4.3 Shawhead Junction

At Shawhead junction direct access is available from the A725 northbound directly to the M8 eastbound via a loop slip road, and in the opposite direction from the M8 westbound directly to the A725 southbound. All other manoeuvres will require making use of the APR network; in particular all east and west travel movements to and from the Coatbridge area. In addition, northbound A725 traffic heading to the west will also require using the APR.

Both motorway slip roads require 2 lane carriageways to cater for the projected traffic flows.

3.4.4 Eurocentral Junction

Motorway connections at Eurocentral are provided to serve traffic movements to and from the west. There are no motorway connections to the east; these manoeuvres utilise the proposed APR. The proposed diverge slip road is 2 lane and the merge is a single lane carriageway.

3.4.5 Chapelhall Junction

Motorway connections at Chapelhall are provided to serve traffic movements to and from the west. There are no motorway connections to the east, again these manoeuvres utilise the proposed APR. The proposed diverge slip road is 2 lane and the merge is a single lane carriageway.

3.4.6 Newhouse Junction

Motorway connections at Newhouse Junction are provided to serve traffic movements to and from the east. There are no motorway connections to the west; these manoeuvres utilise the proposed APR. The continuation of the APR route to the east of these slip roads will be motorway link roads, as they connect to and from the M8 to the east and west respectively, and all purpose traffic will be directed to leave the network at Newhouse Junction. The proposed slip roads to and from the APR are single lane carriageways, whereas those to and from the M8 are two lane carriageways.

3.5 Local Road Network

The local road network provided or amended by the scheme comprises an All Purpose Road (APR), the A89 Coatbridge Road, the A752 Aitkenhead Road, the A725 Bellshill Bypass, Eurocentral Access (Townhead Avenue), B799 Bo'ness Road, Woodhall Cottage Road and the A73 Bellshill Road.

3.5.1 All Purpose Road (APR)

The APR provides the link from the strategic motorway network to and from the surrounding area and adjacent developments. The APR comprises much of the existing A8 between Baillieston and Eurocentral. A new section of APR is proposed to the west of Braehead (Cutty Sark) Railway Bridge, travelling to the south west of Bargeddie and connecting to the existing A89 at a new roundabout junction east of the M73.

This section of the APR is D2AP with the provision of hardshoulders.

Immediately west of Eurocentral Junction the APR splits into two separate one way carriageways each with two lanes plus hardshoulders running to the north and south of the proposed M8. East of Eurocentral Junction the hardshoulders are replaced with hardstrips.

At Eurocentral Junction, the APR connects at the location of the existing junction roundabouts. The roundabouts themselves require to be reconstructed to accommodate the additional links provided as part of the preferred scheme. Both carriageways also connect into the proposed roundabouts at the Chapelhall Junction and then continue through to the Newhouse Junction and immediately beyond. At Newhouse Junction, the APR is provided as discrete carriageways which merge with the existing eastbound M8, and diverge from the existing M8 westbound carriageway to the east of the existing Newhouse Junction.

In terms of the profile of the APR, the sections that utilise existing A8 carriageway are generally unaltered from existing levels.

The proposed APR from the A89 Junction at Baillieston commences immediately to the east of the M73 motorway. From this point it heads due south, immediately entering cutting, which increases in depth to 15m as the alignment curves around Bargeddie to tie in with the existing APR at the Braehead (Cutty Sark) Railway Bridge.

At the Eurocentral Junction the eastbound APR deviates from the line of the existing A8 adjacent to Orchard Pond and climbs on embankment towards the proposed northern roundabout. The roundabout levels are similar to existing levels. The maximum height of embankment at this location is approximately 8.5m. The continuation of the eastbound APR to the east of Eurocentral is also on embankment; however the level drops back to the existing road levels within approximately 300m.

The westbound APR ties into the existing A8 at the Orchard Farm Railway Bridge. It deviates to the south of the A8 and climbs over the proposed M8 motorway on a skewed

overbridge on significant embankments up to 11m in height. The APR then connects into the proposed south roundabout at Eurocentral at a similar level to the existing roundabout. To the east of Eurocentral Junction the westbound APR levels are controlled by the level of the adjacent M8 motorway other than at the Eurocentral and Chapelhall Junctions.

APR Junctions

As described above, there are junctions on the APR at the following locations:

- A89 Coatbridge Road;
- Bargeddie (unaltered);
- Shawhead;
- Eurocentral;
- Chapelhall; and
- Newhouse.

A new roundabout is provided on the A89 Coatbridge Road immediately to the east of the M73 motorway. This roundabout facilitates access to the APR from the M73 via the existing Baillieston Interchange.

At Bargeddie, the existing A752 Aitkenhead Road and the slip roads to and from the APR are unaltered.

The APR junction at Shawhead remains largely unaltered from that which presently exists on the A8 trunk road. The exception is that the diverge from the westbound carriageway that currently links to the A725 southbound is stopped up; this movement being made either from the proposed M8 or via the subsequent slip road that loops back to the A725 from the existing A8. At Shawhead, three signalised junctions are proposed on the A725. The first replaces the existing mini roundabout on Kirkshaws Road / Hagmill Road, the second replaces the roundabout at the top of the slip road from the eastbound APR and the third is located where the westbound APR slip road forms a cross-road junction with the A725 and North Road.

At the Eurocentral Junction, the existing overbridge is retained in its current format. The proposed APR connects into the roundabouts on the west side. In addition the roundabouts are required to accommodate the west facing slip roads directly to the proposed M8. The APR continues towards Chapelhall Junction. There are no direct motorway connections from Eurocentral to the East. This access is provided via the proposed APR.

At Chapelhall, a new overbridge will be provided on the B799 Bo'ness Road. The new structure is required as the existing overbridge at this location cannot accommodate the proposed motorway and APR cross section within its existing span. Access at Chapelhall is possible to and from the APR. A further overbridge is provided between the proposed

dumbbell roundabouts to improve the north-south connectivity between the proposed M8 and the existing and future developments at Eurocentral and Ravenscraig respectively.

As described previously the continuation of the proposed APR at Newhouse will be constructed as motorway link roads. These link roads will be carried on two new structures crossing above an amended Newhouse Roundabout and therefore traffic will have a free-flow route to and from the existing M8 motorway to the east. The APR also has connections to the Local Road Network at the A73.

3.5.2 A89 Coatbridge Road

The alignment of the A89 Coatbridge Road is unaltered by the scheme. There are however two new roundabouts provided. The first is located at Swinton, immediately to the east of Baillieston, and facilitates turning movements to and from the APR and the strategic motorway network at this location. The second is at the junction with the APR and is described above. It is proposed to modify the existing roundabout layout at the junction of the A752 and the A89 to a signalised crossroad layout.

3.5.3 A8 Baillieston Interchange Roundabout to Swinton Roundabout

It is proposed that the A8 between the Baillieston Interchange Roundabout and the proposed Swinton Roundabout is realigned to the south by 80m to increase the distance to the A89 at the tie-in to the new Swinton Roundabout. This realignment necessitates the provision of a new bridge for the A8 over the M73 to M8 westbound slip road.

3.5.4 A752 Aitkenhead Road

There are no proposed physical amendments to the layout or location of the A752 Aitkenhead Road other than at its junction with the A89 Coatbridge Road described above. The existing facilities for non–motorised users or NMUs (including pedestrians and cyclists) are maintained on the A752.

3.5.5 A725 Bellshill Bypass

The existing A725 Dual Carriageway is affected by the scheme adjacent to the existing Shawhead Junction with the A8. The proposed layout removes some of the difficulties encountered within the existing layout where the B7070 North Road merges on the offside of a single lane of the northbound A725.

The proposed A725 cross section is Dual 2 Lane All Purpose Road. The realignment applies from a point immediately north of the existing grade separated junction from Righead Industrial Estate. The alignment then deviates to the west of the existing northbound carriageway, returning on line immediately south of the slip road from the westbound A8. The 2 lanes northbound, plus auxiliary lane, replace the existing single lane at this location. The auxiliary lane is a lane gain/lane drop arrangement provided between the merge from Righead Industrial Estate and the diverge slip road to the M8 eastbound.

In the southbound direction 2 lanes are provided from north of the A8 over a new bridge immediately east of the existing structure and continue to run parallel to the realigned northbound A725. The existing A725 southbound will be stopped up, however part of its alignment will be occupied by the proposed M8 westbound diverge slip road which merges with the southbound A725 to the south of Shawhead Junction. This merge is provided with a length of auxiliary lane and ties in north of the existing diverge to Righead Industrial Estate, therefore 3 lanes are provided in the southbound direction over a length of approximately 250 metres between these points.

It is proposed to include NMU facilities catering for north-south movements along the A725. These measures include roadside footpaths/cycleways, grade separated facilities at the Shawhead Junction and across the proposed A725 (from the B7070 North Road), with connections into the Strathclyde Business Park and existing east-west recreational routes and pedestrian phases within traffic signal timings.

3.5.6 B7070 North Road

The existing North Road is realigned from the point where it crosses above the existing A725 southbound carriageway. A new structure is provided at this location to carry the proposed B7070 above the proposed slip road from the M8 westbound to the A725 southbound. The alignment then curves to the east before turning west to form a new cross road, traffic controlled junction with the proposed A725. The proposed cross section of the road is a single carriageway S2 and incorporates a footpath for NMUs linking into Bellshill.

3.5.7 Eurocentral Access (Townhead Avenue)

The existing spine road through Eurocentral is of dual carriageway cross section. The remodelling of the southern roundabout requires the alignment and profile of the spine road to be amended to tie back into existing levels. This realignment is required over a length of approximately 360m. The existing routes for NMUs are maintained in this location.

3.5.8 B799 Bo'ness Road

The existing B799 Bo'ness Road is carried on a structure over the A8 trunk road. There is insufficient span within this structure to accommodate the proposed cross section of the M8 motorway and adjacent APR. In order to maintain traffic movements during construction, the proposed bridge will be constructed off-line approximately 40m to the west of the existing road. The proposed cross section of this road is a single carriageway (S2). The proposed level of the realigned B799 requires construction of embankments up to 8 metres in height, to a similar elevation as the existing road.

A new footpath for NMUs is provided on this link connecting into existing routes and proposed sections of the B802 Woodhall Mill Road.

3.5.9 B802 Woodhall Mill Road

The existing Woodhall Mill Road is realigned to connect with the north east roundabout at Chapelhall Junction. The alignment on approach to Chapelhall follows the existing gradient. A new footpath for NMUs is provided connecting existing routes into the B799 Bo'ness Road provisions.

3.5.10 A73 Bellside Road

The proposed amendments comprise the remodelling of the existing roundabout and its approaches at Newhouse Junction. In general, some resurfacing and localised level changes will be necessary to accommodate the proposals.

3.6 Amount and Nature of Landtake

The overall scheme requires the purchase of land to allow its construction, future operation and maintenance. Some of the land that is necessary has previously been purchased by the Scottish Ministers during the preparation of the M8 DBFO scheme in the mid 1990s. The total landtake necessary for the scheme is approximately 344ha, of which 229ha is already in the ownership of Scottish Ministers. Additional land totalling approximately 115ha will therefore need to be purchased.

3.6.1 Road Drainage

The proposed scheme falls within the catchment area of the North Calder Water, a major tributary of the River Clyde. The following watercourses are situated within the scheme corridor. These are all tributaries of the North Calder Water and are listed below from west to east and shown in Figures 15.1 and 15.2.

- North Calder Water (main branch);
- Unnamed Burn 1 (South of Bargeddie);
- Luggie Burn;
- Unnamed Burn 2 (South of Kirkshaws);
- Red Burn;
- Shirrel Burn;
- Unnamed Burn 3 (North East of Eurocentral);
- Unnamed Burn 4 (South of Chapelhall);
- Kennel Burn;
- Shotts Burn; and
- Several local drainage channels, pools and ponds.

A description of the North Calder Water and its tributaries and water features is provided in Chapter 15 Water Quality and Drainage. The nature of the existing floodplain and flooding are also described therein.

As part of the A8 Major Maintenance contract, the old A8 drainage systems were replaced to take account of the new carriageway width.

The new A8 drainage systems were designed in accordance with DMRB. It includes carrier, filter, and channel drains as well as road gullies. Whilst provision such as filter drains would provide some treatments of carriageway runoff, no attenuation facility was included.

The existing drainage outfall locations are described in Chapter 15 Water Quality and Drainage.

3.6.2 Proposed Drainage for the New Road

The overall drainage strategy has been developed in accordance with DMRB and SUDS design manual and Planning Advice Note (PAN) 61 advice on good practice and other relevant information. The primary function of the road drainage is to drain the carriageway and associated road construction. The adopted drainage strategy will follow the 'management train approach'. The main objective would be to treat and control runoff as near to the source as possible, thus protecting downstream habitats.

Solutions developed will thus provide suitable habitats for flora and fauna reducing flood risk and protecting the downstream watercourses from point source, diffuse and accidental contamination.

The outfall design will include 20m^3 volume of storage, as recommended by DMRB, for defence against accidental spillage, for example from overturned lorries.

The SUDS proposals for the new road will promote the use of source control methods such as filter drains and swales. The site controls such as extended detention basins with wet pool for attenuation and treatment of surface runoff prior to discharge to the existing watercourses will be an essential part of the drainage design. In accordance with DMRB the attenuation basins will be designed to cater for 1 in 100 year flood event. Preliminary designs have assumed that peak discharge rates will be limited to the 1 in 2 year 'greenfield' runoff.

Following discussion with North Lanarkshire Council (NLC), further attenuation will be provided in the designed freeboard to accommodate 1 in 200 year flood event. Overland flow routes will also be provided for more extreme events allowing safe discharge of the runoff towards the associated watercourse.

Assessments show that the road construction does not impinge on the floodplain of the North Calder Water during 1 in 200 year flood return period including the effect of climate change. Hence there is no floodplain storage loss as a result of the new road development.

3.7 Construction Programme

The aim of the construction sequence will be to minimise disruption to the existing environment and avoid unnecessary delay and disruption to existing road users and the

surrounding area. Individual operations, such as earthworks and piling operations, will be restricted in terms of the working hours and noise/vibration levels during the course of the construction contract to achieve this mitigation.

The potential difficult locations include areas where the new road is very close to, or in the same location as, the existing road. Areas of Greenfield construction are more straightforward in terms of avoiding conflict. Each area of construction will be phased to enable the following order of works, earthworks in conjunction with drainage, structures as required, pavement operations and finishing works, such as white lines, signs and lighting, will generally be undertaken last and immediately prior to the road being open to traffic. There may be interim phases where temporary traffic management utilises the final surface of the proposed road but prior to completion of all finishes.

The description which follows is not intended to limit a contractor to a particular order of events but demonstrates an example of how a scheme of this complexity can be constructed. The approach recognises that the existing A8 provides two lanes in each direction for strategic traffic. For description purposes the scheme has been subdivided into sections as described previously in Section 3.8.

- Section 1 - Baillieston to Glasgow-Whifflet railway line;
- Section 2 – Glasgow-Whifflet railway line to A752;
- Section 3 – A752 to A725;
- Section 4 – A725 to North Calder Water;
- Section 5 – North Calder Water to Airdrie-Motherwell railway line;
- Section 6 – Airdrie-Motherwell railway line to Eurocentral;
- Section 7 – Eurocentral to Chapelhall; and
- Section 8 – Chapelhall to east of Newhouse.

A significant aspect to be considered is that the majority of excavated material from Sections 1 to 3 requires to be deposited in Sections 5 to 7. This requires crossing of the A725, the North Calder Water and the Airdrie-Motherwell railway line by construction traffic. It is envisaged that at Shawhead, the haul route will be taken below a temporary realignment of the A725 to the west of its current alignment. Crossing of the Calder is likely to require temporary structures which themselves need to be implemented with minimal disruption to the valley floor.

Baillieston to Eurocentral is almost entirely offline and can be constructed with minimal disruption to through traffic on the A8. There will be some conflict during operations to construct the tie-ins at Baillieston Interchange for example; however the presence of 2 lanes plus hardshoulder in each direction, giving six lanes in total, provides adequate capacity to allow two lanes in each direction to be maintained through staged traffic management.

From Eurocentral to Newhouse there are significant proportions of online construction. However there is little difference between proposed and existing levels and additional carriageway being constructed. Between Eurocentral and Chapelhall Junctions the entire proposed westbound carriageway and APR can be constructed while the existing A8 remains in use. This provides three lanes plus hardshoulder and two lanes on the APR, a total of six lanes that can be used temporarily while the eastbound M8 and APR are constructed. Switching of traffic between these situations may require short periods of lane closure outside of peak hours, to facilitate temporary tie-in construction.

Similarly to the east of Chapelhall Junction, much of the eastbound M8 and APR sits to the north of the existing A8 corridor and can be constructed while the A8 remains in operation, with traffic switching to allow construction of the online sections. Over this section each carriageway of the proposed M8 provides two lanes plus hardshoulders, giving five lanes including APR to cater for the temporary situation. Again short periods of single lane running may be required to alter the traffic management.

The apparent pinch point over this section is the existing B799 Bo'ness Road overbridge. The existing span is insufficient to accommodate the final motorway and APR configuration and so the new bridge must be constructed and available for traffic before full use of the proposed cross section can be made. It is likely that temporary traffic management will be required here to allow bridge supports to be constructed that are within the existing eastbound A8 carriageway. Once completed, the existing bridge can be demolished and the remaining elements of cross section constructed at this location.

Short lengths of temporary road may be required, for instance between the approach to the southern dumbbell roundabout at Chapelhall and the merge slip road only two lanes plus hardshoulder are proposed, and it may be necessary to link these sections in the short term to provide a continuous route for two lanes of traffic in each direction. It is envisaged that the proposed bridge between the dumbbells at Chapelhall may not be constructed until four lanes of the proposed cross section are available to traffic.

Throughout the remainder of the scheme there will be potential disruption at Eurocentral and Chapelhall Junctions while local road diversions are constructed, however no road closures are envisaged. At Shawhead Junction, additional land will be made available to the Contractor to allow the final scheme to be constructed while maintaining traffic flows on the A725 Bellshill Bypass and the B7070 North Road.

A further consideration in the construction sequence is the excavation and deposition of earthworks materials throughout the site. It is envisaged that prior to bulk earthworks being undertaken between Sections 3 to 6, the contractor will require to construct a haul road through the site, bridging obstacles including the A725, the North Calder Water and the Airdrie-Motherwell railway line. This route will be necessary to avoid the expense of double handling the materials or running construction vehicles on the existing A8 trunk road.

3.8 Earthworks

The assessment of the earthworks quantities has been based on the conceptual alignment of the road. For the purposes of undertaking this assessment the engineering slopes have been assessed to be 1V:2.5H in cuttings and 1V:2H in embankments. The soils encountered and their suitability for classification as engineering fill has been based on the ground investigations undertaken during MFJV studies and on historical investigations undertaken by others during investigation of the M8 DBFO scheme.

Site investigations and assessment work undertaken to date indicate that much of the material to be excavated to form the route of the new motorway and link roads will require further processing to allow it to be utilised in the construction of the embankments that support the roads in areas. The alternative to this process would be to transport material off-site and import the required materials from elsewhere into the site. This approach however is unlikely to prove economic on such a scale and it is envisaged that the contractor will make significant efforts to utilise the locally won materials from excavations within the site.

It is preferable that the bulk quantities should be moved the least distance within the confines of the site to minimise disruption from the earthworks activities. An assessment has been undertaken to identify from where material is excavated, the condition it may be expected to be in and where it can be placed. This has involved considering the site in several sections. The sections have typically been identified by constraints that exist which prevent straightforward access from west to east through the site.

The bulk quantities are as tabulated below and are described relevant to discrete sections along the scheme:

- Section 1 - Baillieston to Glasgow-Whifflet Railway;
- Section 2 – Glasgow-Whifflet Railway to A752;
- Section 3 – A752 to A725;
- Section 4 – A725 to North Calder Water;
- Section 5 – North Calder Water to Airdrie-Motherwell Railway;
- Section 6 – Airdrie-Motherwell Railway to Eurocentral;
- Section 7 – Eurocentral to Chapelhall; and
- Section 8 – Chapelhall to east of Newhouse.

A summary of the quantities within these sections is detailed in Table 3.1 below.

Table 3.1 Summary of Earthwork Quantities (approximate)

	Material Excavated	Engineering Fill Available	Engineering Fill Required	Landscaping Fill Required	Total Fill Required
Section 1	345,415	212,870	47,240	1,550	48,790
Section 2	233,940	108,125	124,910	8,920	133,830
Section 3	855,270	623,445	155,495	34,650	190,145

	Material Excavated	Engineering Fill Available	Engineering Fill Required	Landscaping Fill Required	Total Fill Required
Section 4	333,330	262,830	109,725	-	109,725
Section 5	148,835	99,690	9,530	3,030	12,560
Section 6	92,940	55,830	550,390	20,000	570,390
Section 7	227,270	136,430	944,830	288,280	1,233,110
Section 8	127,090	64120	188,480	-	188,480
Totals	**2,364,090**	**1,563,340**	**2,130,600**	**356,430**	**2,487,030**

The bulk earthworks for the complete scheme are approximately:

- Cut Material – 2,364,090 m^3
- Fill Material – 2,487,030m^3

Within these amounts, approximately 1,563,340m^3 of excavated material can be re-utilised within the embankments. Approximately 1,089,860m^3 of this material will require treatment to enable classification as general fill or capping. To avoid excessive import and off-site disposal, improvement of the excavated material is an option to ensure a larger proportion falls within the acceptable parameters for re-use. This could be achieved, for example, by lime/cement modification and stabilisation techniques. This form of treatment requires traditional excavation and placement of 'marginal' material, with subsequent spreading and mixing of the lime/cement undertaken by typical agricultural type plant. The material is then left for a period of time, several hours typically, prior to compaction by standard construction plant. Further special laboratory testing in advance of the construction contract will be required to confirm the suitability of the soils for treatment and the extent of improvement necessary.

This treatment of 'marginal' material still results in the requirement to import approximately 567,000m^3 to the site. Approximately 356,430m3 of material is required to undertake landscape and mitigation works. This landscape fill is available from the excavated material within the site. Approximately 444,060m^3 will require to be disposed to licensed tips. However, the final design of the scheme will be undertaken by the construction contractor and it is desirable that they seek to minimise the material to be imported to the site and disposed of 'off-site'.

A significant aspect to be considered is that the majority of excavated material from Sections 1 to 3 requires to be deposited in Sections 5 to 7. This requires crossing of the A725, the North Calder Water and the Mossend Railway by construction traffic. It is envisaged that at Shawhead, the haul route will be taken below a temporary realignment of the A725. Crossing the North Calder Water is likely to require temporary structures which themselves need to be implemented with minimal disruption to the valley floor.

3.9 Structures Required

3.9.1 Structural Types

The new principal structures associated with the new works have been divided into a number of generic sub-groups and the number of each type is listed in Table 3.2. The

structures which require modification are listed in the table highlighting the individual requirements.

Table 3.2 – Summary of Principal Structures

Description of Structure	Number of Structures	Comment
Bridges Carrying Roads and Crossing Roads	9	New Principal Structures
Rail Bridge Railway Over Road	1	New Principal Structure
Rail Bridge Road Over Railway	1	New Principal Structure
River Crossing	2	New Principal Structures
Accommodation Bridges	4	New Principal Structures
Culverts	2	New Principal Structures
Footbridges	5	New Principal Structures
Mammal Underpass	1	New Principal Structure
Widening of Existing Road Bridge	1	Modification to Existing Structure
Widening of Existing Road over Rail Bridge	1	Modification to Existing Structure
Extension to Existing Underpass	1	Modification to Existing Structure
Extension to Existing Culvert	1	Modification to Existing Structure
Modification to existing culvert. Retention of widened verge above.	1	Modification to Existing Structure
Individually Identified Retaining Walls	2	New Principal Structures
Total	**32**	

3.9.2 Existing Structures within the Route Corridor to be Demolished

There are a number of existing structures within the route corridor which will require demolition to accommodate the proposed route option. These are listed in Table 3.3 together with a brief description of each structure.

Table 3.3 - Summary of Existing Principal Structures to be Demolished

Structure Name	TRDBD Bridge No. *	Description of Structure	Comment
Baillieston to Swinton Bridges	M8S 8-8 50 & M8S 8-8 40	Bridges over M73 to M8 west bound link. 3 span reinforced concrete, integral piers.	Demolition to be phased with construction of new structure, S2.
Braehead Farm Bridge	A8 100	Bridge over A8. 4-Span R.C. deck, bank seat abutments. Overall length approximately 60 metres.	Existing accommodation structure to be demolished and replaced with a new overbridge.
Chapelhall Junction	A8 30	B799 over A8 4-Span deck comprising reinforced concrete encased steel beams, bank seat abutments. Overall Length approximately 52 metres.	Existing structure to be demolished and replaced with new structure to the west.
Rosehall Bridge	A725 260	B7070 over A725 westbound carriageway. Single span deck, full height abutments. No available records	Existing structure to be demolished and replaced with a new structure to carry the realigned B7070 over the new A725 southbound slip road

* TRDBD denotes Scottish Executive Trunk Roads & Bridges Database

3.10 Property Demolished

The construction of the scheme necessitates the demolition of one property at Braehead Farm.

At Orchard Farm, the proposed motorway impacts on the southern extents of the farm yard and outbuildings but does not require demolition of the farm cottage, which is derelict.

3.11 Hours of Working

Hours of working and permitted noise levels/durations will be agreed in advance with the relevant Local Authority departments and stipulated as a requirement of the contract. Typical standard working hours are likely to be from 0700 to 1900 Monday to Friday. Some weekend and limited night working may be required but will need to be programmed and agreed in advance in accordance with the requirements of the contract.

3.12 Construction Site Access Routes

Haul routes will wherever possible be restricted to land within the site. This will require the Contractor to identify and construct a temporary route within the site boundary to transport material from one location to the other. This may also require the erection of temporary structures to cross major obstacles such as the A725 and the North Calder Water.

Access points to the construction site from the local road network will be stipulated within the Employer's Requirements and will be determined on the basis of safety, proximity to the site boundary from the A8 and other local roads, and to minimise disruption.

3.13 Lighting

As is the case along the existing A8, the motorway, junctions and the APR will be lit. Portable lighting may be required during the construction phase if natural light is inadequate during working hours. Portable lighting may also be required overnight in areas where temporary traffic diversions are in place.

3.14 Fencing

Temporary and permanent fencing will be required during the construction and operation of the scheme to maintain public safety, define and limit working areas, prevent unauthorised access and to protect adjacent land.

3.15 Temporary Compounds and Storage Areas

Contractor's compounds and material storage areas will be established at appropriate locations in the vicinity of construction activities. The precise location of the storage areas have not yet been determined, and will be considered by the contractor at a later stage. However, the compounds will be sited appropriately, away from all watercourses and so that, after site restoration, there are no permanent environmental impacts.

The position of the contractor's main compound(s) will depend on many factors and cannot at this time be fixed with certainty. There are potential locations within land currently owned by Scottish Ministers, for example opposite Kirkshaws Cemetery to the south of the existing A8, and the former compound area used during the A8 Major Maintenance Scheme; but ultimately this is a decision for the contractor. At centres of activity, it is likely that the contractor will require staff facilities resulting in several satellite compounds remote from the main contractor compounds. In addition, at the large bridge construction sites, set down areas may be required for the fabrication of major structural elements. The opportunity for these remote sites will be limited to land made available to

the contractor at the outset of the scheme and it will be up to the contractor to ensure that the construction and traffic management programme makes appropriate allowance.

Once the areas for the compounds are agreed, topsoil will be stripped and the area covered with sub-base or similar type material. The area may also be surfaced if appropriate. Portable cabins will be erected on site to accommodate offices and welfare facilities. Main compounds will require mains water connection, septic tanks which will be required for foul water drainage or foul connections as appropriate, and an electricity supply (which may be provided either by generator or by connection to mains supply). Connection of telephone lines will generally also be required.

The reinstatement of the compound area(s) will require the removal of temporary services, surfacing and sub-base and the area finished to the satisfaction of the landowner.

3.16 Traffic Management

Disturbance to and restrictions upon existing traffic will be avoided wherever possible. Traffic management will however be required during the construction phase, and may comprise temporary road diversion to avoid conflict with construction site traffic/activities, access and speed restrictions and traffic signalling. A detailed traffic management plan for the scheme will be developed by the Contractor, and agreed in advance in accordance with the requirements of the contract

3.17 Pollution Prevention

The Contractor will be required to comply at all times with the requirements of the contract specification with regard to prevention of pollution. Consultation has been undertaken with SEPA with respect to measures required to prevent pollution to watercourses, and to deal with accidental spillages and discharge points to watercourses. The specific measures to be utilised during construction works will be agreed between the Contractor and SEPA in advance of any works on site.

3.18 Landscaping

A conceptual landscaping design has been developed for the preferred scheme. The aim of the final planting scheme will be to blend the new road alignment into the surrounding landscape as much as possible. Planting will be in keeping with existing natural vegetation patterns and types and native species (of local provenance and where practicable local origin) will generally be used. It is envisaged that sufficient topsoil will be available from site to accommodate required landscape contours using material from construction excavation.

4 Approach and Methods

4.1 Introduction

The aims of the DMRB Stage 3 ES are:

- to expand on the DMRB Stage 2 information collated regarding the environment of the study area and to focus on the most significant aspects;
- to identify and assess predicted environmental impacts associated with the scheme; and
- to identify measures to avoid or mitigate adverse impacts and enhance beneficial impacts so that these can be incorporated into the scheme detailed design, construction and operation.

This chapter describes the general approach to the environmental assessment and methods used in the assessment process for each environmental subject area.

4.2 General Approach to the Assessment

4.2.1 The Design Manual for Roads and Bridges Volume 11

The ES has been prepared in general accordance with the guidance provided by DMRB (1993 and amendments).

DMRB, Volume 11 (Environmental Assessment) provides guidance on the level of environmental impact assessment required at key stages in the development of such schemes and the requirements for reporting of the potential effects on the environment.

As advised in DMRB, the Environmental Assessment for proposed road schemes comprises three stages that progressively require greater levels of assessment detail. A Stage 1 Environmental Assessment is a preliminary assessment aimed at identifying environmental advantages, disadvantages and constraints associated with broad route corridors or improvement strategies. An indication of potential effects is provided which at this stage is unlikely to take into account detailed road alignments or mitigation measures.

A Stage 2 Environmental Assessment aims to identify factors and effects that require investigation in order to select a preferred route or improvement strategy.

At Stage 3 a detailed assessment of the preferred scheme is undertaken. This will involve an environmental impact assessment and the production of an Environmental Assessment Report (EAR) or the publishing of an Statement.

This Stage 3 ES has been undertaken with respect to the twelve environmental topics described in DMRB Volume 11:

- Air Quality;

- Cultural Heritage;
- Disruption Due to Construction;
- Ecology and Nature Conservation;
- Landscape Effects;
- Land Use;
- Traffic Noise and Vibration;
- Pedestrians, Cyclists, Equestrians and Community Effects;
- Vehicle Travellers;
- Water Quality and Drainage;
- Geology and Soils; and
- Policies and Plans

4.2.2 Assessment Methods

The assessment of impacts has been undertaken in accordance with the following general process for all environmental parameters:

- identify baseline conditions of the site and its environs;
- consider potential impacts and assess their significance, taking into account sensitivity of resources and magnitude of impact;
- identify appropriate mitigation measures to address the impacts identified; and
- assess the significance of residual impacts.

Consideration has also been given to the potential for cumulative/interactive (also in-combination) impacts. In a broad sense, cumulative impacts refer to the accumulation of effects on the environment relative to other past, present or foreseeable actions that occur in an additive or interactive manner.

The impact assessment for each environmental parameter has been undertaken in comparison with a 'baseline' situation. The 'baseline' generally refers to the existing conditions and how these are predicted to change if the scheme did not proceed and no other work was undertaken (Do Nothing). As described in Section 2.4, a number of transport schemes are planned, or due for implementation, that influence the proposed scheme, and the assessment assumes that these measures are in place prior to the M8 Baillieston to Newhouse Scheme proceeding. This improved network is referred to as the Committed Do Minimum (CDM) and is used in the Air Quality, and Traffic Noise and Vibration assessments.

Baseline information has been gathered through site visits, the review of maps, data collection, reports obtained from statutory and non-statutory organisations, and field surveys.

4.2.3 Predicted Impacts

Predicted impacts arising from the scheme have been identified and described and an assessment of the level of significance for each effect determined as far as practicable in relation to the topic area under consideration.

Significance varies according to the environmental aspect or topic area being considered and the context in which the assessment is made, and depends to a large degree on the availability of data relating to existing environmental conditions and the value applied to these conditions. However, in general, the level of significance of impacts has been defined using a combination of the sensitivity of the environmental feature and the magnitude of impact. The significance of impacts has been defined as far as is practicable in the appropriate chapters of this Environmental Statement.

Sensitivity has generally been defined according to the relative value or importance of the feature, i.e. whether it is of national, regional or local importance, or by the sensitivity of the receptor in the case of the air quality and noise assessments.

Magnitude of impact has been determined by reference to any applicable legislative or policy standards or guidelines, and the following factors:

- the degree to which the environment is affected, e.g. whether the quality is enhanced or impaired;
- the scale of the receptors of change, e.g. the size of land area or number of people affected and degree of change from the existing situation;
- the scale of change resulting from impacts; and
- whether the effect is temporary or permanent.

The nature of impacts may vary and may be direct or indirect, secondary, cumulative, short, medium or long-term, reversible or irreversible. Impacts may be positive (beneficial) or negative (adverse).

4.2.4 Mitigation

Where possible, mitigation measures have been developed based on guidance provided in Planning Advice Note 58 on EIA as illustrated in Table 4.1. This considers mitigation as a hierarchy of measures ranging from prevention of environmental effects by avoidance, through to compensatory measures for effects that cannot be remedied. At this stage, the conceptual design has a series of specific mitigation strategies identified and incorporated into the scheme which will be be expanded upon and form part of Contractual documents. The mitigation strategies will require further design and refinement by the Contractor as part of the specimen design prior to the commencement of construction activities.

Table 4.1 Hierarchy of Mitigation Measures

Level of Mitigation	Definition
Prevent	To prevent adverse environmental effects at source for example through choice of site or specification of construction equipment. For example the route alignment has been altered where practicable to avoid sensitive locations, including moving the motorway alignment to avoid the need to cross the North Calder Water more than once.
Reduce	If adverse effects cannot be prevented, steps taken to reduce them through such methods as minimisation of cause of impact at source, abatement on site and abatement at receptor. For example the addition of noise screening at several points along the proposed route to reduce adverse noise impacts.
Remedy/offset	When effects remain that cannot be prevented or reduced, they are offset by such remedial or compensatory action as provision of environmental improvements, opportunities for access and informal recreation, creation of alternative habitats and prior excavation of archaeological features. For example new crossing points and footpath/cycleway enhancements for non-motorised users (pedestrians/cyclists etc.) and extensive areas of new woodland, scrub and hedgerow planting.

The approach to the mitigation of adverse environmental impacts is to avoid them where possible. This will be achieved by consideration of ways in which to prevent adverse effects at source, rather than relying on measures to mitigate the effects. This can include consideration of scheme design and the incorporation of special features into the design (such as access arrangements for vehicles or pedestrians), Employer's Requirements, or by proposals relating to operational equipment or working methods for inclusion in the Contract Documents.

Where avoidance of impacts is not feasible (due to engineering or economic requirements), measures will be included to minimise or reduce potential impacts through abatement measures either at source, at the site (for example, by the use of noise attenuation measures or screen planting and landscaping), or at the receptor (for example, translocation of plant species).

4.2.5 Residual Impacts

The assessment of significance of residual impacts takes into account mitigation measures that will be adopted in each chapter of this ES. Mitigation measures which are possible, but not definite, are not included in the residual impact assessment since they are aspirational and cannot be guaranteed at the present time. Further detailed requirements will be included in Contractual documents as appropriate.

5 Consultations

5.1 Introduction

The purpose of a consultation exercise is to:

- ensure that statutory consultees (i.e. those with responsibilities for protecting the environment and regulating any activities which may adversely affect existing environmental conditions) and other non-statutory bodies with a particular interest in the environment are informed of the proposed scheme and are provided with an opportunity to comment;
- obtain baseline information regarding existing environmental site conditions;
- establish key environmental issues and identify potential impacts to be considered during the environmental assessment;
- identify those issues which are likely to require more detailed study and those which can be justifiably excluded from further assessment; and
- provide a means of identifying the most appropriate methods of impact assessment.

5.1.1 List of Consultees

Consultees (see Table 5.1) were initially contacted by letter in Oct/Nov 2003 as part of the DMRB Stage 2 assessment; providing information on the details of the proposed scheme and requesting baseline information, records and comments concerning the proposals. The information requested was tailored specifically for each consultee and a location plan showing the proposed section of road for improvement provided.

Further consultation meetings, emails, letters and telephone calls in 2004 and 2005 supplemented and updated the initial contacts.

5.1.2 Consultee responses

The key issues raised by the individual consultees are summarised in Appendix 5.1.

Table 5.1 List of Consultees

Statutory Consultee	Non-statutory Consultee *
Glasgow City Council (Land Services, Environmental and Protection Services; Development and Regeneration; and Biodiversity Officer)	Botanical Society of the British Isles
Health and Safety Executive	British Trust for Ornithology
Historic Scotland	Butterfly Conservation (Scotland)
North Lanarkshire Council (Protective Services; Traffic and Transport; Planning and Environment; Biodiversity Officer)	Central Scotland Forest Trust
RCAHMS	Clyde Amphibian and Reptile Group
Scottish Environment Protection Agency (SEPA)	Clyde Bat Group
Scottish Executive, SEERAD	Clyde River Foundation
Scottish Natural Heritage	Concern for Swifts (Scotland)
	Forestry Commission Scotland
	Hamilton Natural History Society
	Plantlife Scotland
	River Clyde Fisheries Management Trust
	Road Haulage Association
	Royal Society for the Protection of Birds
	Scottish Badgers
	Scottish Ornithologists Club
	Scottish Rights of Way and Access Society
	Scottish Wildlife Trust
	Smiths Gore (For Coal Authority)
	Sustrans Scotland
	West of Scotland Archaeology Service

* Other non-environmental organisations, such as Utilities, were also consulted and their responses are discussed in the DMRB Route Option Assessment Report (MFJV 2004).

6 Air Quality

6.1 Introduction

This chapter describes the expected air quality impacts associated with the proposed A8 upgrade to motorway standard between Baillieston and Newhouse (the Scheme). The impacts assessed are those resulting from construction activity and those caused by emissions from traffic. Construction impacts are only likely to occur within the immediate vicinity of the works, but the proposed Scheme has the potential to influence traffic movements, and thus air quality, on roads that are some distance from the A8 Corridor.

The air quality assessment begins with the same study area as the transport model, which includes the whole of Central Scotland, as well as a representation of roads much further away. Within this large area the "local" air quality assessment focuses on those locations where impacts are expected to be greatest. Such locations include residential properties, schools, and any potentially sensitive ecosystems which are near to proposed new roads or to existing roads where a significant change in vehicle numbers is expected. Figure 6.1 describes the local air quality Study Area, which includes parts of North Lanarkshire, Glasgow, West Lothian, Falkirk, and South Lanarkshire; but lies mostly within North Lanarkshire. The local assessment focuses on two pollutants: nitrogen dioxide and fine particles (PM_{10}) which are the pollutants of greatest concern from road vehicles in a local context. The "wider-scale" assessment focuses on five pollutants: carbon monoxide; nitrogen oxides; total hydrocarbons; PM_{10} and carbon dioxide and calculates the change in total emissions from the entire modelled road network.

The local air quality assessment focuses on the year 2010, which, in terms of air quality, is a worst-case estimate for the opening year of the Scheme. A range of measures introduced at the national level to steadily reduce vehicle emissions mean this is also expected to be the worst-case year for the Scheme. The wider-scale air quality assessment focuses on both 2010 and on the design year, which is 2020.

6.2 Baseline Assumptions

The proposed Scheme is one of three road upgrade proposals that are all closely linked; the other two being the M74 junction 5 (Raith) upgrading and the M8 Baillieston to Newhouse Associated Network Improvements (ANIs). Both of these other proposals are the subject of separate assessment, however, traffic modelling carried out as part of the assessment of the proposed scheme by SiAS indicates that the objectives and benefits of the Scheme will only be realised if the two other proposals also go ahead. Thus, if the air quality assessment were based on traffic data which simulated the construction of the proposed Scheme in isolation, it is considered that this assessment would be based on an underestimate of the traffic flows and operational characteristics most likely to ultimately materialise for the Scheme. The road traffic model has therefore not been run to predict the impacts of the proposed Scheme against a future year baseline of the existing network.

In common with the other sections of this Environmental Statement that deal with impacts related to road traffic, a pragmatic approach has been taken in order to assess the impacts associated with the Scheme. The approach describes the air quality impacts that the Scheme is likely to bring about, assuming that each of the other two proposals also goes ahead. It relies on assessing the with-Scheme scenario against an Enhanced Do-Minimum (EDM) described in Chapter 2, Section 2.4 Traffic Assessment. The road traffic model includes committed developments and also representations of both the Raith improvements and the ANIs[1]. Thus, the with-Scheme results predict the impacts with each of the three proposals in place. The difference between the EDM and the with-Scheme is the impact attributable to the A8 upgrade Baillieston-Newhouse Scheme alone.

Because each of the three separate road proposals will clearly influence the same road network, the opportunity has been taken to assess their cumulative impacts. This has been done by comparing the predicted with-Scheme traffic flows against those associated with the Committed Do-Minimum (CDM) traffic network (which includes committed developments only). The difference between the CDM and with-Scheme will thus be the cumulative impacts of all three proposals together. The approach can be summarised thus:

- Scheme-only impacts = with-Scheme minus EDM
- Cumulative impacts = with-Scheme minus CDM

It should also be noted that the air quality assessment is based on traffic growth predictions modelled under CSTM using the high growth "Scenario 1". It is thus a worst-case assessment which is considered unlikely to be achieved in reality. Scenario 2, representing a moderate growth prediction has been used as the basis of other aspects of the scheme design and assessment, but for the air quality and noise and vibration assessments (see Chapter 13 Noise and Vibration), a precautionary approach assessing potential worst case conditions has been adopted in line with guidance set out in Design manual for Roads and Bridges (DMRB).

6.3 Methods

6.3.1 Policy Context and Assessment Criteria

The air quality assessment has been carried out in accordance with the DMRB Volume 11, Section 3, (Highways Agency, 2003) and with reference to the following documents:

- The Environment Act 1995, Part IV;
- The Air Quality Strategy for England, Scotland, Wales and Northern Ireland 2000;

[1] Various design options for Raith and the ANIs were considered at Stage 2. The transport model for the current Scheme was run before any decision was made regarding which options would be promoted for each proposal. "Typical" designs have thus been used for both Raith and the ANIs.

- The Air Quality Strategy for England, Scotland, Wales and Northern Ireland: Addendum, 2003;
- The Air Quality (Scotland) Regulations 2000;
- The Air Quality (Scotland) Amendment Regulations 2002.

Reference has also been made to Interim Advice Note 61/05, which has been issued as a supplement to the DMRB 11.3. The assessment presented here was carried out before the Highways Agency issued advice note HA 207/07 (Highways Agency, 2007). The advice contained within this note has thus not been included in this assessment. It is, however, considered that the conclusions of the assessment would be unaffected by the guidance contained in advice note HA 207/07.

The significance of both existing and future pollutant concentrations is best assessed by reference to the national air quality standards and objectives established by the Government to protect human health. The 'standards' are set as concentrations below which effects are unlikely even in sensitive population groups, or below which risks to public health would be exceedingly small. They are based purely upon the scientific and medical evidence of the effects of a pollutant. The 'objectives' set out the extent to which the Government expects the standards to be achieved by a certain date. They take account of the costs, benefits, feasibility and practicality of achieving the standards. The objectives are prescribed within the Air Quality (Scotland) Regulations, 2000 (Stationery Office, 2000 (Scottish Statutory Instrument 2000 No. 97)). The objectives for nitrogen dioxide had to be achieved by 2005 and will also continue to apply in 2010. The objectives for PM_{10} had to be achieved by 2004 and will continue to apply in 2010. The Air Quality (Scotland) Amendment Regulations 2002 (Stationary Office 2002 (Scottish Statutory Instrument 2002 No. 297)) define more stringent objectives for PM_{10}, that will apply in 2010. A summary of these objectives is provided in Table 6.1. The 1-hour nitrogen dioxide objective is in practice less stringent than the annual mean objective. An analysis of national roadside monitoring data has shown that an exceedence of the 1-hour objective is only likely if the annual mean is greater than 60 $\mu g/m^3$ (Laxen and Marner, 2003). It is therefore not considered further in this assessment.

The European Union has also set limit values for both nitrogen dioxide and PM_{10} (Stationery Office, 2007 (Scottish Statutory Instrument 2007 No. 182)). Achievement of these values is a national obligation rather than a local one. The EU limit value for nitrogen dioxide is the same level as the UK objective but is to be achieved by the later date of 2010. The EU limit values for PM_{10} are the same level as the 2004 UK objectives, and had to be achieved by 2005. Thus, assessing against the nitrogen dioxide and PM_{10} objectives for Scotland provides the most stringent approach.

There are no statutory objectives for dust. It is therefore common practice to provide a qualitative assessment based largely on experience elsewhere, as well as focusing on mitigation measures to minimise emissions.

Table 6.1 Relevant Air Quality Objectives

Pollutant	Air Quality Objective		Strategy Compliance Date
	Concentration: μg/m^3	Measured as	
Nitrogen dioxide (NO_2)	200	1 hour mean; not to be exceeded more than 18 times per year	31/12/2005
	40	Annual mean	31/12/2005
Particles (PM_{10}) (gravimetric)	50	24 hour mean; not to be exceeded more than 35 times per year	31/12/2004
	40	Annual mean	31/12/2004
	50	24 hour mean; not to be exceeded more than 7 times per year	31/12/2010
	18	Annual mean	31/12/2010

The air quality objectives only apply at locations where members of the public are likely to be exposed to air pollution for the time period specified in the objective. Thus, for the annual mean and 24-hour objectives that are the focus of this assessment, the primary receptors will be residential properties.

The Air Quality Strategy for England, Scotland, Wales and Northern Ireland 2000 and its 2003 Addendum set out how different sectors can contribute to achieving the air quality objectives. Local Authorities are seen to play a particularly important role. Every authority must carry out a review and assessment of air quality in its area to identify whether the objectives will be achieved by the relevant date. If this is not expected to be the case, the Authority must declare an air quality management area (AQMA), and prepare an action plan in pursuit of the necessary improvement. The AQMA can be larger than the area of exceedence if the Local Authority believes that this is beneficial.

6.3.2 Impact Significance

In order to simplify interpretation of the predicted local air quality impacts, a series of descriptors has been defined which describe impact magnitude and overall impact significance. The definition of impact magnitude is solely related to the degree of change in pollutant concentrations. Impact significance takes account of the impact magnitude and also of the absolute concentrations and how they relate to the air quality objectives or other relevant standards.

There is no official UK guidance on defining air quality impact magnitude and significance, and the criteria used are ultimately based on professional judgement. . The criteria used in this assessment are the same as those defined by the Irish National Roads Authority in its Guidelines for the Treatment of Air Quality during the Planning and

Construction of National Road Schemes (NRA, 2006) and are presented as an example in the Planning for Air Quality guidance prepared by the National Society for Clean Air and Environmental Protection (NSCA, 2006). They are set out in Appendix AQ.1.

Because the assessment of construction impacts is ultimately subjective, it is not appropriate to simplify the predicted same impacts using descriptive criteria. The wider scale impacts are assessed according to the same impact magnitude criteria as those used for local air quality impacts. The significance of the impacts of the Scheme as a whole is ultimately assessed subjectively, based on professional judgement.

6.3.3 Local Air Quality Assessment Methods

Information on existing and predicted future levels of air pollutants has been obtained from:

a) Discussion with, and review of air quality review and assessment reports by: North Lanarkshire Council, Glasgow City Council, West Lothian Council, South Lanarkshire Council, and Falkirk Council;

b) Monitoring data from continuous analysers and diffusion tubes supplied by North Lanarkshire Council, Glasgow City Council, West Lothian Council, South Lanarkshire Council, and Falkirk Council;

c) Estimated background concentrations of nitrogen oxides (NO_x), nitrogen dioxide and PM_{10} published by Defra and the Devolved Administrations (DAs) (2007a); and

d) Dispersion modelling, as described below.

The DMRB 11.3 recommends that if a scheme is likely to give rise to significant impacts, the Stage 3 assessment should involve detailed dispersion modelling. Because the proposed Scheme is likely to influence air quality across a large area, including several AQMAs, detailed dispersion modelling has been undertaken.

The calculations have been performed using the AAQuIRE dispersion model (described in detail at www.fabermaunsell.com), which is one of the models accepted by Defra and the DAs (2007b) for use in air quality review and assessment, and is suitable for use in DMRB Stage 3 air quality assessments. The road-transport facet of this model is based around algorithms from the internationally validated CALINE 4 dispersion model. The meteorological data required for modelling pollutant dispersion were taken from the complete hourly dataset from the Met Office site at Glasgow Centre, this being the closest to the study area, for the full 2004 calendar year. When this assessment began, 2004 was the most recent full calendar year of both meteorological and air quality monitoring data and was thus the most appropriate year to use.

The traffic data used in the air quality assessment have been supplied by SiAS. Only roads on which traffic flows are likely to change significantly as a result of the Scheme are likely to have a significant influence on local air quality. The local air quality assessment has thus focused on those roads that are expected to experience at least a

10%[2] change in annual average (1-way)[3] traffic flows due to the Scheme, where flows (either with or without the Scheme) would be at least 2500 vehicles per day (1-way). Roads on which absolute (1-way) flow changes of at least 2500 vehicles per day, even where this is less than a 10% change, have also been included, as have all new roads that would be constructed as part of the Scheme. All of these roads have been explicitly entered into every run of the dispersion model. In addition, all other roads that are included in the transport model and fulfil one of the following criteria have also been included in every model run.

a) Links that are a part of the same roadways as links with a 10% change in 1-way flow, even where these links have less than a 10% change (for example the opposite carriageway of a road, or a slip road);

b) All roads within 200m of any of the air quality receptors; or

c) Roads which clearly join two 10% change roads but which will not, in themselves, experience a 10% change (in other words, the explicitly modelled road network has been augmented so that it is more coherent).

All of the links that have been explicitly included in the model are shown in Figure 6.1. Emissions from those roads that have not been explicitly included will be accounted for by addition of predicted background concentrations, which have been taken from the national maps published by Defra and the DAs (2007a). These background maps include emissions from both traffic and non-traffic sources. There will inevitably be some double-counting of the traffic emissions. Further details of the modelling methodology are given in Appendix 6.1 (AQ1).

Air quality has been modelled at ninety-three receptors, which are shown in Figure 6.1. These locations have been chosen to represent the roadside façade of the closest residential property to roads where the largest changes in traffic flows are expected, with the exception of Receptors 62 (48 Main St, Chapelhall)[4], 92 (Auld House, Coatbridge) and 93 (Manse Road, Motherwell), which represent worst-case locations within North Lanarkshire Council's AQMAs, and Receptors 1 to 4, which represent automatic monitoring locations. It should also be noted that Receptors have been included at

[2] It is common practice to screen out roads with less than a 10% change in flow from local air quality assessments because such changes would have a very small impact on air quality.

[3] The screening used 1-way flows because 2-way traffic data were not readily available. The approach used is at least as stringent as the more typical method of a 10% change in 2-way flow (and 5000 vehicles per day).

[4] Receptors 1 and 62 appear to overlap on Figure 6.1. Receptor 62 represents a property, while Receptor 1 represents an air quality monitor on the opposite side of the same road junction. The position of Receptor 62 is shown in more detail in Figure 6.2.

Orchard Farm Cottage (R78), Carnbroe Mains Cottage (R79) and Douglas Support (R80). None of these properties is currently residential, but each is directly adjacent to the proposed new road. Thus, if residential properties were to occupy these sites in the future, then they would represent worst-case locations for emissions from the proposed new road. Including them is a very conservative approach.

In addition to predicting pollutant concentrations at specific receptors, the assessment has also included a count of properties that would be expected to experience either an increase or a reduction in pollutant concentrations as a result of the proposed scheme. This is not, strictly, a requirement of a Stage 3 DMRB assessment, but it does provide a useful indication of the overall impacts of a scheme. The property count has included all ordnance survey, non-business, address points that are within 200m of one of the explicitly included road links (as shown in Figure 6.1). There are 50,927 residential properties within 200m of the defined links. These properties will potentially be affected by changes in emissions from all roads in the study area. It is not practicable to model the changes in concentrations at each of these properties. However, a method has been devised for this project to model the change in concentrations at representative properties. This has relied on the use of post codes, which typically represent a group of 16 properties in a relatively small area[5]. There are 3,109 such post-code areas. Nitrogen dioxide concentrations at one property in each post-code area have been modelled explicitly for both the EDM and with-Scheme[6]. The difference represents the change with the Scheme, which may be +ve or –ve, depending on whether the concentrations increase or decrease. All the properties within the post-code area are assigned with this modelled plus or minus. The +ve values are summed and the –ve values summed, to provide an indication of the overall number of properties expected to experience a deterioration or an improvement in air quality with the Scheme. This analysis has not been carried out for the cumulative assessment.

[5] In built-up areas, where there could be numerous roads with the potential to significantly influence ambient concentrations, the areas used typically span about 50m and often much less. In more rural areas, a single post code might represent a larger area than this, but typically, the density of the road network also tends to be lower in such areas. Thus, less resolution is needed in order to predict the sign of the change in concentration. Although the absolute pollutant concentrations within a post code area may vary considerably, air quality at each property within a post-code area is likely to be primarily influenced by the same roads. This will mean that, for example, if a single property within a post code experiences an improvement due to the Scheme, all properties within that post-code are likely to experience an improvement. While there will be some cases in which this does not hold, these will be very infrequent.

[6] Within each post code area concentrations will vary depending on the distance from nearby roads. Because of this, the modelled concentrations (as opposed to whether there is an increase or decrease in concentration) will not provide a reliable indication of concentrations at individual properties.

This method of assigning predicted changes to property counts is more thorough than the methodology set out in the Scottish Transport Appraisal Guidance (STAG), which relies on concentrations predicted using the DMRB screening model, because it takes account of the potential influence of every affected road at each location. The STAG methodology only looks at the roads closest to counted properties. The method used also has the advantage of not requiring paired 2-way traffic data, which were not readily available.

6.3.4 Treatment of PM10 Data

The PM10 data included in this assessment are based on measurements made with Tapered Element Oscillating Microbalance (TEOM) monitors which are known to under predict the mass of volatile particles. National guidance is to multiply TEOM measurements by 1.3 to predict gravimetric equivalent data (Defra 2007a; Defra 2007b). Guidance to local authorities in Scotland is that a lower adjustment factor might be more appropriate (Defra 2007a; Defra 2007b). North Lanarkshire Council have recently used a factor of 1.2, derived in part from their own data analysis. The factor of 1.3 has been retained in this assessment, since it will give larger concentrations than the alternative, lower, factor and with thus tend to give worst-case results. Since the model has been verified using adjusted-TEOM measurements, the model results are also considered to be worst-case.

6.3.5 Ecological Air Quality Impact Assessment Methods

In accordance with Interim Advice Note 61/05 to the DMRB, an assessment of potential impacts on vegetation has also been carried out. The detail of this assessment is described in Appendix AQ.1.

6.3.6 Wider-Scale Air Quality Assessment Methods

An estimate of the total emissions of five pollutant categories: carbon monoxide (CO); nitrogen oxides (NOx); total hydrocarbons (THC); particulate matter (PM_{10}) and carbon dioxide (CO_2) has been undertaken according to the methodology set out in DMRB 11.3, using the DMRB spreadsheet V1.02 (November 2003) [7]. This assessment addresses the change in total emissions that would result from the proposed scheme compared to the Do-minimum alternative. The assessment has been carried out for base years 2001 and 2004 (with the 2004 traffic data derived as described in Appendix AQ.1), the opening year (2010) and the design year (2020). The assessment has included all traffic on the entire modelled network, not just the links that were explicitly included in the local assessment.

[7] As noted in section 6.3.1, the assessment has not been updated to take account of the methodology provided in advice note HA207/07 (Highways Agency 2007) which is accompanied by an updated version of the DMRB spreadsheet (V1.03) which calculates carbon dioxide emissions in a different way to version V1.02.

6.3.7 Construction Impact Assessment Methods

Locations sensitive to dust emitted during construction will be places where members of the public are regularly present. Residential properties and commercial operations close to the works will be most sensitive to construction dust. Any sensitive vegetation or ecosystem that is very close to dust sources might also suffer some negative effects.

It is very difficult to quantify dust emissions. It is thus not possible to predict changes to dust soiling or PM_{10} concentrations with any confidence. In these circumstances, it is common practice to provide a qualitative assessment based largely on experience elsewhere, as well as focusing on mitigation measures to minimise emissions. The distance criteria set out in Table 6.2 have been used to assist this qualitative assessment. These distances are based on professional experience drawn from involvement with assessments of many different types of project, discussions with many practitioners in the field, and from published reports. The approach adopted for assessing potential construction dust impacts is a count of the number of properties that might be affected. The property counts are based on Ordnance Survey Address point data. The precise approach used is described in detail in the assessment section.

Table 6.2 Assessment Criteria for Dust from Construction Activities, with Standard Mitigation in Place

Source		Potential Distance for Significant Effects (Distance from source)		
Scale	**Description**	**Soiling**	**PM_{10} [a]**	**Vegetation effects**
Major	Large construction sites, with high use of haul routes	100 m	25 m	25 m
Moderate	Moderate sized construction sites, with moderate use of haul routes	50 m	15 m	15 m
Minor	Minor construction sites, with limited use of haul routes	25 m	10 m	10 m

6.4 Baseline Conditions

All four local authorities that are within the local air quality study area have carried out reviews and assessments of air quality over a number of years. Their principal conclusions are summarised below:

In 2004, North Lanarkshire Council identified likely exceedences of the 2010 PM_{10} objectives at three locations (north Lanarkshire Council, 2004) and thus declared AQMAs in Motherwell, Coatbridge and Chapelhall. More recent evidence (North Lanarkshire Council, 2007) supports the continuation of these AQMAs. Recent monitoring has also indicated that exceedences of the PM_{10} objectives are likely at Croy and Harthill. The Council is thus in the process of declaring one additional AQMA at Harthill. Further monitoring is being conducted at Croy, but the Council has no immediate plans to declare an AQMA in this area. North Lanarkshire Council also predicts exceedences of the

annual mean nitrogen dioxide objective within the Coatbridge AQMA and in Moodiesburn. The Coatbridge AQMA is thus likely to be declared for nitrogen dioxide as well as PM10. Further monitoring is being carried out in Moodiesburn and the Council has no immediate intentions to declare this area as an AQMA (North Lanarkshire Council, 2007). Of the areas listed above, only Croy is out with the Study Area shown in Figure 6.1. The AQMAs in Motherwell, Coatbridge and Chapelhall, as well as the site of the proposed AQMA in Harthill have all been the focus of specific receptor modelling in this current assessment. Moodiesburn is a considerable distance (approximately 2km) from any of the roads that would be significantly affected by the proposed Scheme (see Figure 6.1) and is thus not the focus of specific receptor modelling.

Glasgow City Council declared the centre of the city an AQMA in 2001, because exceedences of the annual mean nitrogen dioxide objective were predicted. The first Updating and Screening Assessment (Glasgow City Council, 2003) included monitoring data from locations outside the AQMA, where the nitrogen dioxide objective was also likely to be exceeded. The report also acknowledged that there was a risk of the 2010 PM_{10} objectives being exceeded at locations across the city. The Updating and Screening Assessment was followed by a Detailed Assessment (Glasgow City Council, 2005) which concluded that additional AQMAs for nitrogen dioxide were required and that exceedence of the 2010 PM_{10} objectives both within the city centre and also outside of the city centre were likely. . More recently, a second Updating and Screening Assessment was completed in 2006 (Glasgow City Council, 2006), which concluded that the current AQMA for nitrogen dioxide is still valid and that exceedences of nitrogen dioxide and PM10 are still expected outside of the AQMA. There is the possibility that the Council will declare the entire city as an AQMA for PM10, but no decisions will be made until further monitoring has been carried out. Although Glasgow City Council has not currently declared any AQMAs within the Study Area, this assessment has taken account of the possibility that AQMAs might be declared in the future.

West Lothian Council has carried out regular reviews and assessments of air quality (e.g. West Lothian Council, 2007) and has not identified any likely exceedences of the air quality objectives. The Council has thus not declared any AQMAs.

South Lanarkshire Council has also carried out regular reviews and assessments of air quality (e.g. South Lanarkshire Council, 2005) and has not needed to declare any AQMAs (Defra and the DAs 2007a).

Falkirk Council has identified the potential for air quality problems surrounding the petrochemical complex in Grangemouth and has thus declared an AQMA. This relates solely to industrial emissions of sulphur dioxide and is thus not relevant to this report (Falkirk Council, 2005). Falkirk Council has not declared any other AQMAs (DEFRA and the DAs 2007a).

Figures 6.1 and 6.2 identify the locations of the three AQMAs that have been formally declared within the Study Area at the time this report was written. The discussion of modelled impacts of the proposed Scheme separates out impacts within and out with these AQMAs. As is explained above, the AQMAs have only been declared for PM_{10}, but

to avoid confusion, the areas that have been declared as AQMAs are described as "within the AQMAs", regardless of which pollutant they have been declared for. Modelled impacts in those areas that have not been formally declared as AQMAs (including those at Harthill - since this area has not yet been declared) are described as "out with the AQMAs".

Tables 6.3 and 6.4 set out the measurements of nitrogen dioxide and PM_{10} concentrations that were made by the four Councils during 2004, 2005 and 2006 within the Study Area shown in Figure 6.1 As is explained in section 6.3.3, when this assessment began, 2004 was the most recent full calendar year and it thus forms the base year for the assessment and it is these data that the dispersion model has been verified against. Data for the two subsequent years are added for the sake of completeness. The locations that the Councils provided for their monitors were not all precise enough to produce a Figure showing their locations. The measured data in Tables 6.3 and 6.4 have thus been included as indicative of the named streets and areas.

North Lanarkshire Council has operated automatic monitors measuring nitrogen dioxide at seven sites. This Council also monitored nitrogen dioxide using diffusion tubes at a large number of sites. The Council has also operated automatic monitors measuring PM_{10} at six sites within the Study Area. Glasgow Council operates a large number of monitors, but only one of these was within the local air quality Study Area during this period. West Lothian Council operates nitrogen dioxide diffusion tubes at three sites within the Study Area. It has also measured PM_{10} at one site within the Study Area. South Lanarkshire Council operates a number of nitrogen dioxide diffusion tube sites within the Study Area. Falkirk Council operates a number of air quality monitors across its area and two of its diffusion tube sites are within the local air quality Study Area.

The highest measured nitrogen dioxide concentration within the Study Area during 2004 was 45 $\mu g/m^3$ at one of the Bank Street monitors (Bank Street 2) in Coatbridge. The other measurements made during 2004 show that the objective level was exceeded at several locations: but the objective did not apply until 2005. The measurements for 2005 show that the objective was exceeded at Motherwell Cross and at Bank Street 2 in Coatbridge, but achieved elsewhere. The measurements for 2006 indicate that the objective was exceeded at Motherwell Cross and Bank Street 2, and also at another Bank Street site (Bank Street 1) in Coatbridge; Lauchope Street in Chapelhall; the cinema car park at Braehead; New Edinburgh Road in Uddingston; Merry Street in Motherwell; and beside a roundabout in Coatbridge. North Lanarkshire Council (2007) has noted that the apparent increase in measured concentrations between 2005 and 2006 may relate to the way in which they processed their data. The Council (North Lanarkshire Council, 2007) has also explained that the annual mean nitrogen dioxide objective does not apply at all of their monitoring locations and will thus not be exceeded at relevant locations in the Bank Street area or in Motherwell. Similarly, the cinema car park is not representative of relevant exposure.

The PM_{10} measurements show that the 2004 objectives were not exceeded at any of the monitoring sites during 2004, 2005, or 2006. The largest measured annual mean concentration (28 $\mu g/m^3$) was measured at Motherwell Cross during 2006.

Table 6.3 Measured Baseline Annual Mean Nitrogen Dioxide Concentrations within the Local Air Quality Study Area

	Site Type	2004	2005	2006
Automatic Measurements[a]				
Calder Court, Coatbridge	Urban Background	26[g]	n/a	15[i]
Kirk o'Shotts	Roadside	21[g]	n/a	n/a
Harthill	Roadside + Industrial	23	n/a	20
Motherwell Civic Centre	Roadside	23[g]	21	n/a
Chapelhall	Roadside	44[h]	34	35
Wishaw	Roadside	25[g]	28	n/a
Motherwell Cross	Roadside	39[g]	**42**	**41**
North Lanarkshire Council Diffusion Tube Measurements [ab]				
Coatbridge, Bank St 1.	Kerbside	37	33	**44**
Coatbridge 2, Whifflet Court	Roadside	29	25	30
Airdrie 1, Hallcraig St.	Background	26	21	26
Airdrie 3, Springwells Cresc.	Background	20	18	22
Lauchope Street, Chapelhall	Kerbside	39	39	**47**
Civic Centre, Motherwell	Kerbside	38	31	37
Health Centre, Motherwell	Roadside	21	19	19
Emily Drive, Motherwell	Background	15	12	13
Kethers lane, Motherwell	Background	17	15	16
Coursington Road, Motherwell	Roadside	18	12	15
Craigneuk Road, Carfin	Kerbside	18	15	18
Coatbridge 3, Hozier Street	Kerbside	26	15	33
Camp Street, Motherwell	Background	19	18	26
Cinema car park, Braehead	other (motorway)	40	38	**49**
Orchard Farm A8 East	other (motorway)	32	30	38
Salsburgh 1	other (motorway)	21	21	23
Salsburgh 2	other (motorway)	24	22	26
46 Howburn Road, Harthill	other (motorway)	21	17	22
Braehead Farm, Bargeddie W	other (motorway)	38	n/a	n/a
New Edinburgh Road, Uddingston	other (motorway)	40	35	**42**
Alpine Grove, Uddingston	other (motorway)	26	22	28
Fallside Road, Uddingston	other (motorway)	32	28	34
Tinkers Lane, Motherwell	Roadside	29	23	26
Castlehill Road, Overtown	Roadside	23	21	24
Coatbridge, Bank Street 2	Roadside	45	**41**	**52**
Delburn St Motherwell	Roadside	25	22	29
Merry St, Motherwell	Roadside	40	35	**48**
Main St, Chapellhall	Roadside	32	29	37
Main St, Chapelhall	Roadside	35	28	35
Shawhead RBT, Coatbridge	other (motorway)	41	32	**41**
Glasgow City Council Diffusion Tube Measurements [c]				
Easterhouse Sports Centre	Urban background	23	25	24
West Lothian Council Diffusion Tube Measurements [d]				
East Main St, Whitburn	Roadside	21	19	27
59 High St, Bathgate	Background	13	13	19
Cairnie Pl, Whitburn	Roadside	22	14	21
South Lanarkshire Diffusion Tube Measurements [e]				
Cadzow Street, Hamilton	Roadside	29	26	31
Houston Street, Hamilton	Background	15	15	n/a
Balfron Crescent, Hamilton	Background	13	13	13
Burnpark Avenue, Uddingston	Roadside	30	30	29
North British Road, Uddingston	Background	26	24	26
Wordsworth Way, Bothwell	Background	n/a	17	22

	Site Type	2004	2005	2006
Donaldson road, Larkhall	Background	24	21	25
Falkirk Council Diffusion Tube Measurements [f]				
Holehouse, Slamannan	Background	9	n/a	n/a
Slamannan Primary School	Background	10	n/a	n/a
Objective			**40**	

[a] Data taken from North Lanarkshire Council, 2005, 2006 and 2007.
[b] Diffusion tubes were supplied and analysed by Glasgow Scientific Services using 20% Triethanolamine (TEA) in water. Results have been adjusted for bias by North Lanarkshire Council using factors of 0.86 in 2004, 0.78 in 2005 and 0.96 in 2006.
[c] Data taken from Glasgow City Council 2005 and 2006. Diffusion tubes were supplied and analysed by Glasgow Scientific Services using 20% TEA in water. Results have been adjusted for bias by Glasgow City Council based on a collocation study at Glasgow Centre. The adjustment factor was 0.74 in 2004, 0.652 in 2005.
[d] Data taken from West Lothian Council 2005, 2006 and 2007. Diffusion tubes were supplied and analysed by Edinburgh Scientific Services using 50% TEA in acetone. Results have been adjusted for bias by West Lothian Council using factors of 0.94 in 2004, 0.89 in 2005 and 1.19 in 2006.
[e] Data supplied by South Lanarkshire Council. Diffusion tubes were supplied and analysed by Glasgow Scientific Services using 20% TEA in water. Results have been adjusted for bias using the factor provided by Defra (2007b) (sheet version 03/07). The adjustment factor for 2004 was 0.89. The adjustment factor for 2005 was 0.75. The adjustment factor for 2006 was 0.96.
[f] Data taken from Falkirk Council, 2005. Diffusion tubes were supplied and analysed by Harwell Scientific Services using 50% TEA in acetone. Data have been adjusted for bias by Falkirk Council, using a factor of 0.74 which was advised by Harwell Scientific Services and represents a worst-case compared with the results from their own collocation study. There was insufficient time when preparing this updated report to obtain data for 2005 and 2006 from Falkirk Council.
[g] Data from approximately 6 months during 2004 (equal mix of summer and winter) adjusted to annual mean equivalent by North Lanarkshire Council following advice in Defra and DAs (2003b), using a comparison with long-term trends at Glasgow Centre.
[h] Data for approximately five months during winter 2004-2005. Adjusted to annual mean equivalent by following the same approach as that used by North Lanarkshire Council for their other data.
[i] Data for approximately three months in 2006. Adjusted to annual mean equivalent by following the same approach as that used by North Lanarkshire Council for their other data.

Table 6.4 Measured Baseline PM_{10} Concentrations[a] within the Local Air Quality Study Area

Location	Type of Site	Annual Mean ($\mu g/m^3$)			Number of 24-hour exceedences		
Measurement		**2004**	**2005**	**2006**	**2004**	**2005**	**2006**
Calder Court, Coatbridge[b]	Urban Background	19[d]	n/a	18[g]	(36)[i]	n/a	0
Kirk o'Shotts[b]	Roadside	15[d]	n/a	n/a	(39)[i]	n/a	n/a
Harthill[b]	Roadside + Industrial	19	n/a	19	(48)[i]	n/a	7
Motherwell Civic Centre[b]	Roadside	13[d]	18	n/a	(27)[i]	1	n/a
Chapelhall[b]	Roadside	19[e]	22	26	2	0	11
Motherwell Cross[b]	Roadside	13[d]	24	28	(27)[i]	4	7
Cairnie Pl, Whitburn[c]	Roadside	n/a	14[f]	15[h]	n/a	0	2
Objective		**40**			**35** (50[i])		

[a] All results gravimetric equivalent (estimated by Tapered Element Oscillating Microbalance (TEOM) x 1.3).
[b] Data taken from North Lanarkshire Council 2005, 2006 and 2007.
[c] Data taken from West Lothian council, 2006 and 2007.

[d] Data from approximately 6 months during 2004 (equal mix of summer and winter) adjusted to annual mean equivalent by North Lanarkshire Council following advice in Defra and DAs (2003b), using a comparison with long-term trends at Glasgow Centre.
[e] Data for approximately five months during winter 2004-2005. Adjusted to annual mean equivalent by following the same approach as that used by North Lanarkshire Council for their other data.
[f] Annual mean from March 2005 to March 2006.
[g] Data from approximately 3 months during 2006 adjusted to annual mean equivalent by North Lanarkshire Council following advice in Defra and DAs (2003b), using a comparison with long-term trends at Glasgow Centre.
[h] Annual mean from March 2006 to March 2007.
[i] Data presented as 98th percentile 24-hour mean concentrations – which should be assessed against 50μg/m^3 (the 1-hour objective concentration) rather than 35 (the number of permitted exceedences of the 1-hour objective concentration).

In addition to defining baseline conditions using measurements, the dispersion model has been run to predict baseline conditions in 2004 and 2010 at ninety-three receptors. The complete results are presented in Appendix AQ.1, and the results for a selection of fifteen of these receptors are reproduced in Tables 6.5 and 6.6. These fifteen receptors have been chosen to represent those locations where the predicted impacts of the Scheme are most significant. The results are described separately for those areas within and out with the AQMAs shown in Figure 6.2.

6.4.1 Modelled Baseline Concentrations out with the AQMAs

Most of the predicted nitrogen dioxide concentrations in 2004 outwit the AQMAs were below the objective level, but some exceeded the objective level. The objective did not, however, apply during 2004. The highest predicted concentration outwit the AQMAs in 2010 is 37 µg/m^3 at receptor 60 (see Appendix AQ1 and Figure 6.1). Thus, no exceedences of the annual mean nitrogen dioxide objective are predicted in 2010. In terms of PM_{10}, the highest predicted annual mean concentration in 2004 is 23 µg/m^3 at Receptor 87 in Salsburgh. This is well below the 40 µg/m^3 objective for 2004. This receptor also has the largest predicted annual mean PM_{10} concentration in 2010. By 2010, the concentration at this receptor is expected to have fallen to 22 µg/m^3, which will exceed the more stringent objective for 2010. These results thus predict objective exceedences outwit the areas identified by North Lanarkshire Council. This reflects the worst-case approach of this assessment. A comparison of modeled results with measured results is provided in Appendix AQ.1.

6.4.2 Modelled Baseline Concentrations within the AQMAs

The largest predicted nitrogen dioxide concentration within the AQMAs in 2004 is 46 µg/m^3 at Receptor 55 at Whifflet Street. By 2010, the concentration at this receptor is expected to have reduced to 37 µg/m^3, which is below the objective level. Thus, no exceedences of the annual mean nitrogen dioxide objective are expected at the receptors within the AQMAs. Receptor 55 on Whifflet Street also has the highest predicted PM_{10} concentration in both 2004 and in 2010. The predicted concentration in 2004 (22 µg/m^3) is well below the objective for 2004, but the predicted concentration in 2010 (20 µg/m^3) is above the more stringent objective for 2010. A comparison of modeled results with measured results is provided in Appendix AQ.1.

Table 6.5 Predicted Baseline Annual Mean Nitrogen Dioxide Concentrations within the Local Air Quality Study Area

		Site Type	2004	2010 (CDM)[a]
9	3 Brownlee Road, Law, Carluke	Roadside	14	11
15	Omoa Road, Cleland, Motherwell	Roadside	21	17
27	610 Main St, Bellshill	Roadside	36	29
33	26 Cadwell Grove, Bellshill	Roadside	34	28
47	22 Crossview Place, Baillieston	Roadside	35	27
48	43 Roslyn Drive, Baillieston	Roadside	36	29
55	Whifflet Street, Coatbridge **(AQMA)**	Roadside	46	37
61	170 Main St, Calderbank	Roadside	29	25
62	48 Main St., Chapelhall **(AQMA)**	Roadside	36	27
77	Ivycott, Carnbroe Road, Coatbridge	Roadside	43	36
78	Orchard Farm Cottage, Bellshill	Roadside	31	26
81	Higherness Way, Coatbridge	Roadside	37	30
87	1 Dewshill Cottages, Salsburgh, Shotts	Roadside	43	33
92	Auld House, Whifflet Street, Coatbridge **(AQMA)**	Roadside	34	28
93	Manse Road, Motherwell **(AQMA)**	Roadside	33	27
Objective				**40**

[a] The 2010 data are for the CDM model as this will best represent the baseline case.

Table 6.6 Predicted Baseline Annual Mean PM_{10} Concentrations Within the Local Air Quality Study Area [a]

Location		Type of Site	Annual Mean ($\mu g/m^3$)		Number of 24-hour exceedences	
			2004	2010 (CDM)[b]	2004	2010 (CDM)[b]
9	3 Brownlee Road, Law, Carluke	Roadside	11	11	2	2
15	Omoa Road, Cleland, Motherwell	Roadside	13	12	0	1
27	610 Main St, Bellshill	Roadside	18	16	1	0
33	26 Cadwell Grove, Bellshill	Roadside	17	16	1	0
47	22 Crossview Place, Baillieston	Roadside	16	15	0	0
48	43 Roslyn Drive, Baillieston	Roadside	17	16	1	0
55	Whifflet Street, Coatbridge **(AQMA)**	Roadside	22	**20**	6	3
61	170 Main St, Calderbank	Roadside	16	15	0	0
62	48 Main St., Chapelhall **(AQMA)**	Roadside	18	16	1	0
77	Ivycott, Carnbroe Road, Coatbridge	Roadside	21	**21**	5	5
78	Orchard Farm Cottage, Bellshill [c]	Roadside	16	15	0	0
81	Higherness Way, Coatbridge	Roadside	18	17	1	1
87	1 Dewshill Cottages, Salsburgh, Shotts	Roadside	23	**22**	8	6

	Location	Type of Site	Annual Mean ($\mu g/m^3$)		Number of 24-hour exceedences	
92	Auld House, Whifflet Street, Coatbridge **(AQMA)**	Roadside	17	15	1	0
93	Manse Road, Motherwell **(AQMA)**	Roadside	17	16	1	0
Objective			**40**	**18**	**35**	**7**

[a] All results gravimetric equivalent (estimated by Tapered Element Oscillating Microbalance (TEOM) x 1.3, at the moment this is the most reliable approach to Scottish TEOM data but it is thought to be a worst-case approach).
[b] The 2010 data are for the CDM model as this will best represent the baseline case.

6.5 Local Air Quality Impacts

The Scheme impacts are predicted for 2010, which is the proposed Scheme opening year and will thus be the worst-case year for local air quality impacts. As is explained in the Baseline Assumptions section, the with-Scheme predictions can be compared against the predictions for the Enhanced Do-Minimum scenario (EDM) to estimate the air quality impacts of the proposed Scheme. The predicted impacts of the Scheme are appraised using the descriptive criteria set out in Appendix AQ.1. The predicted concentrations of nitrogen dioxide and PM_{10} at ninety-three receptors are set out in Appendix AQ.1. The results are also summarised in Figure 6.1, which highlights the most significant predicted change in air quality (for either nitrogen dioxide or PM_{10}[8]) at each of the ninety-three receptors. In order to simplify presentation, the results for fifteen of the receptors, which have been chosen to represent a sample of the most significant impacts across the study area, are reproduced in Tables 6.7, 6.8 and 6.9. The precise positions of these fifteen receptors are described in Figures 6.3 and 6.4. The results are described separately for those areas within and out with the AQMAs shown in Figure 6.2.

6.5.1 Nitrogen Dioxide Impacts out with the AQMAs

No exceedences of the annual mean nitrogen dioxide objective are likely in 2010 at any of the receptors either with or without the proposed Scheme. The proposed Scheme will improve conditions at some locations and worsen them at others.

The largest deterioration is expected directly adjacent to the proposed new road (R78). A very large change in annual mean nitrogen dioxide concentrations is expected here and this amounts to a substantial adverse impact. As is explained in section 6.3.3, this property is derelict and thus does not represent relevant exposure to air pollutants. It has been included here to provide a robust assessment. Appendix A3 and Figure A3.2 show that moderate to substantial adverse impacts are expected at other non-residential properties in the same area (Receptors 79 and 80), but that the largest predicted adverse impact at an occupied residential property (at which the air quality objectives apply) is slight adverse (e.g. Receptor 61).

[8] Depending on which is most significant in terms of the descriptors set out in Appendix AQ.1

The largest improvement in annual mean nitrogen dioxide concentrations out with the AQMAs is expected at Receptor 77. The expected change here is medium and would constitute a moderate improvement. A moderate improvement is also expected at Receptor 81. Both locations are expected to benefit from a reduction in traffic along the existing A8, as traffic is transferred to the new road. Away from the A8, the largest predicted beneficial impact is slight beneficial (e.g. Receptor 27).

6.5.2 Nitrogen Dioxide Impacts within the AQMAs

Predicted impacts within the AQMAs range from slight beneficial to negligible. Slight beneficial impacts are expected within both the Chapelhall and Coatbridge AQMAs. Any change in concentrations within the Motherwell AQMA will be negligible.

6.5.3 Annual Mean PM_{10} Impacts out with the AQMAs

Out with the AQMAs, the annual mean 2010 PM_{10} objective is likely to be exceeded at six of the ninety-three worst-case receptors without the Scheme and at nine receptors with the Scheme. The difference is brought about by Receptors 73, 78 and 79, of which only Receptor 73 (Manse Rd, Shotts) represents relevant exposure in terms of the objectives. As is explained in section 6.3.4, this assessment has taken a worst-case approach and is thus more likely to show exceedences of the 2010 annual mean PM_{10} objective than the assessment presented by North Lanarkshire Council (2007).

Adverse impacts ranging from moderate to very substantial are expected adjacent to the proposed new road alignment at Receptors 78, 79 and 80. However, as is explained above, none of these represent relevant exposure and are thus not strictly relevant to this assessment. A moderate adverse impact is also expected at Receptor 73 which is described above. Elsewhere, any adverse impacts are expected to be, at most, slight.

The largest improvement in annual mean PM_{10} concentrations out with the AQMAs is expected at Receptor 77. The expected change here would constitute a substantial benefit. A moderate improvement is expected at Receptor 81. Both locations are expected to benefit from a reduction in traffic along the existing A8. Elsewhere, the largest predicted benefit is slight.

6.5.4 Annual Mean PM_{10} Impacts within the AQMAs

The only predicted exceedence of the annual mean PM_{10} objective within any of the AQMAs is at Receptor 55. An exceedence is predicted at this location with or without the proposed Scheme.

Predicted impacts within the AQMAs range from slight beneficial to negligible. Slight beneficial impacts are expected within the Chapelhall and Coatbridge AQMAs. At worst-case locations elsewhere within the AQMAs, any change in annual mean PM_{10} levels is expected to be negligible.

6.5.5 24-hour PM_{10} Impacts out with the AQMAs

No exceedences of the 2010 24-hour PM_{10} objective are expected at any of the receptors out with the AQMAs with or without the proposed Scheme. All of the predicted 24-hour PM_{10} impacts out with the AQMAs are negligible.

6.5.6 24-hour PM_{10} Impacts within the AQMAs

No exceedences of the 2010 24-hour PM_{10} objective are expected at any of the receptors within the AQMAs with or without the proposed Scheme. All of the predicted 24-hour PM_{10} impacts within the AQMAs are negligible.

Table 6.7 Predicted Annual Mean Nitrogen Dioxide Concentrations (µg/m^3) With and Without the Proposed Scheme at Fifteen Receptors

R	Description	2004	2010 Without Scheme [a]	2010 With Scheme	Change due to Scheme (%)	Impact Magnitude	Impact Significance
9	3 Brownlee Road, Law, Carluke	13.6	10.6	10.2	-4	Very Small	Negligible
15	Omoa Road, Cleland, Motherwell	21.2	16.8	17.4	3	Very Small	Negligible
27	610 Main St, Bellshill	36.2	30.1	28.1	-6	Small	Slight Beneficial
33	26 Cadwell Grove, Bellshill	34.1	28.4	30.0	6	Small	Slight Adverse
47	22 Crossview Place, Baillieston	34.6	27.2	27.2	0	Extremely Small	Negligible
48	43 Roslyn Drive, Baillieston	36.3	29.2	29.9	2	Very Small	Negligible
55	Whifflet Street, Coatbridge	45.6	37.2	35.7	-4	Very Small	Slight Beneficial
61	170 Main St, Calderbank	29.2	24.9	27.4	10	Small	Slight Adverse
62	48 Main St., Chapelhall (AQMA)	36.2	27.1	23.5	-13	Medium	Slight Beneficial
77	Ivycott, Carnbroe Road, Coatbridge	42.8	36.0	31.3	-13	Medium	Moderate Beneficial
78	Orchard Farm Cottage, Bellshill [b]	31.1	25.9	35.5	37	Very Large	Substantial Adverse
81	Higherness Way, Coatbridge	36.7	30.1	26.7	-11	Medium	Moderate Beneficial
87	1 Dewshill Cottages, Salsburgh, Shotts	42.8	33.5	33.7	0	Extremely Small	Negligible
92	Auld House, Whifflet Street, Coatbridge (AQMA)	34.5	28.6	28.6	0	Extremely Small	Negligible
93	Manse Road, Motherwell (AQMA).	32.5	26.9	26.9	0	Extremely Small	Negligible
Objective			**40**				

[a] Under the EDM scenario. These predictions are different from those presented in the baseline section, which reflected the CDM scenario.
[b] This property is derelict and thus objectives do not apply here.

Table 6.8 Predicted Annual Mean PM_{10} Concentrations (µg/m^3) With and Without the Proposed Scheme at Fifteen Receptors

R	Description	2004	2010 Without Scheme [a]	2010 With Scheme	Change due to Scheme (%)	Impact Magnitude	Impact Significance
9	3 Brownlee Road, Law, Carluke	11.3	11.0	10.6	-3	Very Small	Negligible
15	Omoa Road, Cleland, Motherwell	13.2	12.5	12.7	2	Very Small	Negligible
27	610 Main St, Bellshill	17.5	17.1	15.9	-7	Small	Slight Beneficial
33	26 Cadwell Grove, Bellshill	16.7	16.0	17.0	6	Small	Slight Adverse
47	22 Crossview Place, Baillieston	16.3	15.1	15.2	1	Extremely Small	Negligible
48	43 Roslyn Drive, Baillieston	17.0	16.2	16.7	4	Very Small	Slight Adverse
55	Whifflet Street, Coatbridge	21.7	**20.0**	**19.6**	-2	Very Small	Slight Beneficial
61	170 Main St, Calderbank	15.6	15.0	15.7	5	Very Small	Slight Adverse
62	48 Main St., Chapelhall (AQMA)	17.6	16.1	15.3	-5	Very Small	Slight Beneficial
77	Ivycott, Carnbroe Road, Coatbridge	21.2	**21.2**	**18.2**	-14	Medium	Substantial Beneficial
78	Orchard Farm Cottage, Bellshill [b]	15.7	15.2	**20.7**	36	Very Large	Very Substantial Adverse
81	Higherness Way, Coatbridge	17.9	17.3	15.5	-10	Medium	Moderate Beneficial
87	1 Dewshill Cottages, Salsburgh, Shotts	22.9	**21.9**	**22.6**	4	Very Small	Slight Adverse
92	Auld House, Whifflet Street, Coatbridge (AQMA)	16.6	15.3	15.4	0	Extremely Small	Negligible
93	Manse Road, Motherwell (AQMA).	17.4	15.9	15.9	0	Extremely Small	Negligible
Objective		**40**	**18**	**18**			

[a] Under the EDM scenario. These predictions are different from those presented in the baseline section, which reflected the CDM scenario.
[b] This property is derelict and thus objectives do not apply here.

Table 6.9 Predicted Number of Exceedences of 50 µg/m^3 as a 24-hour Mean PM_{10} Concentration With and Without the Proposed Scheme at Fifteen Receptors

R	Description	2004	2010 Without Scheme[a]	2010 With Scheme	Impact Magnitude	Impact Significance
9	3 Brownlee Road, Law, Carluke	2	2	3	Extremely Small	Negligible
15	Omoa Road, Cleland, Motherwell	0	1	1	Extremely Small	Negligible
27	610 Main St, Bellshill	1	1	0	Extremely Small	Negligible
33	26 Cadwell Grove, Bellshill	1	0	1	Extremely Small	Negligible
47	22 Crossview Place, Baillieston	0	0	0	Extremely Small	Negligible
48	43 Roslyn Drive, Baillieston	1	0	1	Extremely Small	Negligible
55	Whifflet Street, Coatbridge	6	3	3	Extremely Small	Negligible
61	170 Main St, Calderbank	0	0	0	Extremely Small	Negligible
62	48 Main St., Chapelhall (AQMA)	1	0	0	Extremely Small	Negligible
77	Ivycott, Carnbroe Road, Coatbridge	5	5	2	Very Small	Negligible
78	Orchard Farm Cottage, Bellshill [b]	0	0	4	Very Small	Negligible
81	Higherness Way, Coatbridge	1	1	0	Extremely Small	Negligible
87	1 Dewshill Cottages, Salsburgh, Shotts	8	6	7[c]	Extremely Small	Negligible
92	Auld House, Whifflet Street, Coatbridge (AQMA)	1	0	0	Extremely Small	Negligible
93	Manse Road, Motherwell (AQMA).	1	0	0	Extremely Small	Negligible
Objective		**35**	**7**	**7**		

[a] Under the EDM scenario. These predictions are different from those presented in the baseline section, which reflected the CDM scenario.
[b] This property is derelict and thus objectives do not apply here.
[c] The objective allows seven days but not eight days.

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6.5.7 Overall Local Air Quality Impacts

As is explained in the methodology section, the net change in air quality that would be brought about by the Scheme at each residential property within 200m of roads on which significant changes in concentration are expected, has been predicted by dispersion modelling. Table 6.10 sets out the results, which are also shown in Figure 6.5. As noted above, the approach taken is more thorough than the screening method set out in the Scottish Transport Appraisal Guidance (STAG). Overall, it is likely to show a greater number of properties with an increase than the STAG screening method, because it takes

account of the effect of changes in traffic on roads which are some distance from the properties being counted.

It is important to note that all predicted changes in concentration have been counted in Table 6.10, regardless of how small these changes would be. As can be inferred from the modelled concentrations at the worst-case receptors, the vast majority of the changes described in Table 6.10 will be negligible. Furthermore, at increasing distance from a road, the influence of that road becomes less, and thus many of the properties in the 50m and greater distance bands are being influenced more by the perturbation of the local background by the increase in traffic on the network as a whole than by the changes on the nearby road. This is why many more properties are predicted to experience a deterioration in air quality than an improvement at the larger distances from the road. Closer to the roads, where the impacts will be greatest, the number of properties is far more evenly balanced between improvements and deteriorations. On balance, the overall local air quality impacts are judged to be minor adverse.

Table 6.10 Number of Properties Expected to Experience Improved and Deteriorated Air Quality as a Result of the Proposed Scheme.

Distance From Road Centreline	Number of residential properties likely to experience deteriorated air quality	Number of residential properties likely to experience improved air quality
0m – 25m	3602	2460
25m – 50m	4170	2153
50m – 100m	10049	3742
100m – 200m	19423	5328

6.5.8 Impacts on Vegetation

Appendix AQ.1 sets out in detail the results of the DMRB assessment of impacts on vegetation following the methodology in Interim Advice Note 61/05. There are two Sites of Special Scientific Interest (SSSIs) that might be potentially influenced by changes in air quality due to the proposed Scheme: Tailend Moss, which is a raised bog adjacent to the M8 west of Livingston; and Milburn, which is a wood adjacent to the A71 east of Larkhall. As is explained in Appendix AQ.1, the relevant air quality criteria for ambient concentrations of oxides of nitrogen and those for nitrogen deposition are expected to be exceeded at both of these sites with or without the Scheme. The Scheme will, however, have a slight beneficial impact at both sites.

6.5.9 Cumulative Local Air Quality Impacts

As is explained in the Baseline Assumptions section, comparing the predicted with-Scheme concentrations with those under the Committed Do-Minimum (CDM) scenario provides an indication of the combined impacts of the proposed Scheme along with those of the proposed Raith junction improvement works, and the proposed Associated Network Improvements. The same modelling exercise as that described above for the

Scheme-only impacts has been carried out for the cumulative impacts[9]. The predicted impacts at each of the ninety-three receptors are set out in Appendix AQ.1. The tables in Appendix AQ.1 also highlight whether the cumulative impact significance at any receptor is different from the Scheme-only impact (as described previously).

For nitrogen dioxide, only nine out of the ninety-three receptors would experience cumulative impacts that would be described differently to the Scheme-only impacts. Four of these would experience a negligible impact from the Scheme alone, but a slight adverse cumulative impact. Three would move from negligible to slight beneficial; while the remaining two would move from a slight beneficial impact to a negligible impact. At fourteen of the fifteen receptors that are discussed in detail in the Scheme-impact section, the cumulative impacts would be essentially the same as the Scheme-only impacts. At receptor 27, the impacts would change from slight beneficial to negligible.

For annual mean PM_{10} concentrations, twenty-one out of the ninety-three receptors would experience cumulative impacts that would be described differently to the Scheme-only impacts. Ten of these would experience a negligible impact from the Scheme alone, but a slight adverse cumulative impact. Two receptors would experience a negligible impact from the Scheme, but a slight beneficial cumulative impact. Two would move from slight adverse to negligible, and a further two would move from slight beneficial to negligible. Two would move from slight beneficial to slight adverse, and two would move from slight adverse to moderate adverse. One receptor would move from a slight adverse Scheme-only impact, to substantial adverse cumulative impact. This is receptor 32 (Lysa Vale Place, Bellshill) and is associated with a change from no objective exceedence in the CDM to an objective exceedence with the three proposals in place. The receptor is fairly close to Raith junction and it has thus been focused on as part of the Raith Junction Stage 3 DMRB assessment. At the fifteen receptors that are discussed in detail in the Scheme-impact section, the cumulative impacts would be essentially the same as the Scheme-only impacts.

The cumulative 24-hour PM_{10} impacts are not appreciably different from the Scheme-only PM_{10} impacts.

Appendix AQ.1 sets out the cumulative impacts of all three proposals on the two SSSIs at which Scheme-only impacts were assessed. The improvement that the Scheme would bring about at both sites would be even greater with all three proposals in place. They would still, however, be described as slight beneficial.

6.6 Wider-Scale Impacts

Table 6.11sets out the total emissions of five air pollutants from all vehicles on the road network included in the transport model during 2001, 2004, and both 2010 and 2020 with

[9] The modelled road network has not been redefined for the cumulative impacts analysis, so the network of links explicitly included (as well as the choice of receptors) is based on the Scheme-only impacts.

and without the proposed Scheme. As is explained in the introduction, the modelled road network includes the whole of Central Scotland, as well as a representation of roads much further away. Some national estimates of total emissions are also presented for comparative purposes.

The proposed Scheme is expected to cause an extremely small increase in the emissions of all five pollutants from the modelled road network. The predicted change is not considered to be significant, particularly when compared to the national total emissions data.

Table 6.11 Total Emissions from the Entire Modelled Road Network with National Estimates for Comparison

	Carbon Monoxide (Kt)	THC (Kt)	Nitrogen Oxides (Kt)	PM_{10} (Kt)	Carbon Dioxide (Mt)
2001[a]	74.69	12.15	75.59	2.21	7.87
2004 [a]	51.96	8.64	64.32	1.96	8.72
2010 EDM	36.88	6.16	44.30	1.18	9.36
2020 EDM	38.96	6.34	31.68	0.81	10.31
2010 with Scheme	36.98	6.16	44.39	1.18	9.39
2010 change (EDM To Scheme)	**0.09**	**<0.01**	**0.09**	**0.01**	**0.03**
2010 % change (EDM To Scheme)	**0.2%**	**0.1%**	**0.2%**	**0.4%**	**0.3%**
2020 with Scheme	38.99	6.34	31.76	0.82	10.34
2020 change (EDM To Scheme)	**0.03**	**0.00**	**0.08**	**0.00**	**0.03**
2020 % change (EDM To Scheme)	**0.1%**	**-0.1%**	**0.2%**	**0.6%**	**0.3%**
Comparative Values					
2004 Total UK emissions (UNECE) [b]	2930	1024	1621	154	563
2003 Total UK emissions (IPCC)[c]	2757	1087	1569	-	574
2003 UK Transport emissions (IPCC)[c]	1402	164	709	-	126
2002 Scotland total emissions (IPCC)[c]	-	-	-	-	61
2010 Total UK emissions [d]	-	-	-	-	528
2020 Total UK emissions [d]	-	-	-	-	539
2010 UK transport emissions[d]	-	-	-	-	136
2020 UK transport emissions[d]	-	-	-	-	142

[a] As is explained in Appendix AQ.1, the baseline transport model was run for the year 2001. For the purposes of the local air quality assessment, flows for 2004 were predicted by interpolating between the 2001 model and the 2010 CDM model.

[b] The most recent year available from Defra and the DAs (2007c). Statistics on a United Nations Economic Commission for Europe (UNECE) basis are used to report progress against international targets for sulphur dioxide, nitrogen oxides, ammonia and volatile organic

compounds. UNECE excludes land use change and also shipping in UK ports, but includes aviation emissions below 1000 metres to cover take-off and landing cycles.

[c] The most recent year available from Defra and the DAs (2007c). IPCC emission formats are reported to the United Nations Framework on Climate Change. IPCC includes land use and all emissions from domestic aviation and shipping, but excludes international marine and aviation bunker fuels.

[d] Estimates presented in the Climate Change The UK Programme (Stationery Office, 2006).

6.6.1 Cumulative Impacts

Table 6.12 sets out the total emissions of the five wider-scale air pollutants from all vehicles on the modelled road network under the CDM modelling scenario and compares these figures with the With-Scheme data from Table 6.11. The cumulative impacts of the proposed Scheme along with the Raith junction proposals and the Associated Network Improvements would be larger than those predicted for the Scheme alone, but all of the predicted changes are extremely small and are not considered to be significant when compared with the national total emissions data in Table 6.11.

It should be noted that at present, the only practical method of calculating total emissions across such an expansive road network relies on the average speed of vehicles along each road. Along a free-flowing road, this speed is likely to be fairly representative, but on roads which are congested for part of the time, the average speed might be taken across a wide range of speeds. As is explained in more detail in Appendix AQ.1, this can lead to an under-prediction of emissions from congested road networks.

SiAS predict that without any road improvement works (i.e. the CDM scenario), this road network is likely to become increasingly congested over the next fifteen years. The three road proposals discussed here are expected to relieve this congestion. It is thus likely that the CDM emissions have been under-predicted, particularly in the 2020 scenario. This will mean that the increase in emissions attributed to the Scheme has been over-predicted. Transport Scotland is currently exploring ways to improve the calculation procedures, so as to improve the accuracy of the calculation of emissions and to allow the true benefits of reducing congestion and queuing at junctions to be reflected in the emissions calculations.

Table 6.12 Cumulative Wider-Scale Impacts

	Carbon Monoxide (Kt)	THC (Kt)	Nitrogen Oxides (Kt)	PM_{10} (Kt)	Carbon Dioxide (Mt)
2010 CDM	36.82	6.15	44.26	1.17	9.34
2020 CDM	38.91	6.33	31.65	0.81	10.29
2010 with Scheme	36.98	6.16	44.39	1.18	9.39
2010 change (CDM to Scheme)	**0.15**	**0.01**	**0.12**	**0.01**	**0.05**
2010 % change (CDM to Scheme)	**0.4%**	**0.2%**	**0.3%**	**0.6%**	**0.5%**
2020 with Scheme	38.99	6.34	31.76	0.82	10.34
2020 change (CDM to Scheme)	**0.08**	**0.00**	**0.11**	**0.01**	**0.05**
2020 % change (CDM to Scheme)	**0.2%**	**0.0%**	**0.3%**	**0.8%**	**0.4%**

6.7 Construction Impacts

Dust might be generated from any number of on-site activities, but the main dust sources are likely to be earth movement during site preparation, vehicles travelling over unpaved ground during dry weather, concrete crushers (if used), and lime stabilisation processes. There will also be the potential for some dust generation from construction activities such as handling of dusty materials and cutting of stone or concrete. Site material may also be tracked out along roadways by vehicles leaving the site. During dry weather this material might subsequently be raised as dust by passing vehicles. Mitigation of these impacts is discussed in the next section.

It is not possible at this stage to state with any certainty what activities are likely to take place where. The assessment of construction dust is thus indicative, but the worst-case approach that has been adopted should provide a reasonably robust assessment. Scheme design drawing (Figures 3.1a–e) show all of the roadways, tracks, verges, embankments, drainage ponds etc. that are included in the design Most of the construction works, road laying, and haul routes are expected to be contained within these boundaries. It has thus been assumed that major dust raising activities might occur anywhere within these boundaries. According to Table 6.2, and assuming that standard mitigation measures are in place, there might thus be significant dust soiling up to 100m from the roadways and significant PM_{10} and vegetation effects up to 25m from the roadways.

It is not known at this time where construction vehicles would exit the site onto the main highways and so the worst-case assumption has been made that they might exit the site onto any existing main road. This is followed by a second worst-case assumption, that dirt might be tracked up to 500m along any of these roads. Vehicles passing along these roads are then judged to be a minor source of dust according to Table 6.2. There might thus be some dust soiling within 25m of the centreline of any of these roads and some PM_{10} and vegetation impacts within 10m of the centreline.

Table 6.13 shows the number of properties within the various distance bands described above. It should be stressed that these numbers do not represent the number of properties likely to be affected, but those properties which, based on the information currently available, are thought to have a risk of possible impacts. It is highly unlikely that construction vehicles would leave the site by every possible route, and there will inevitably be just a small number of site exits. The true number of properties at risk of experiencing dust impacts due to tracking out is thus likely to be a small fraction of the number presented in Table 6.13. Even at these properties, the assessment does not imply that significant impacts would be likely, or that if incidents did occur, they would be frequent. Any dust incidents would be highly dependent on the weather, requiring dry conditions and winds blowing towards a receptor. These conditions would also need to be combined with an activity creating dust close to the receptor. This should only be the case if there had been an inadequate application of the mitigation measures, which experience suggests can happen from time to time. Dust-creating activities would not occur at all of the identified locations for the duration of the works. In many locations, the duration will be limited.

There will inevitably be some dust raised outside of this boundary, for example from the construction compounds and from any haul routes that are not within the planned new roadways. However, these activities will be situated as far as possible from any residential properties and are unlikely to add significantly to the counts presented in Table 6.13.

Table 6.13 Number of Properties Potentially Affected by Construction Dust.

	Dust Soiling		PM_{10} Impacts
	Residential	Businesses	Residential
Number of properties potentially affected by dust raised on-site.	441	36	43
Additional number of properties that could be affected by the tracking out of dirt along local roads.	315	31	0

The businesses that might be affected include: offices; a pharmaceutical research laboratory; a pharmaceutical distribution centre; a cinema; restaurants; a hotel; plant and machinery dealers; waste disposal operators; farms; press parts manufacturers; public houses; shops; industrial yards; laundry; haulage contractors; and a garage. There are also car parks associated with the above that might be affected by dust soiling.

There are no SSSIs or EU designated sites within the distances defined above that might be affected by dust impacts.

The number of construction vehicles and plant operating on site will be so small in comparison to existing flows on the surrounding road network that any impact of exhaust emissions on local air quality will be negligible.

6.8 Mitigation

This assessment has identified no specific requirement to mitigate the effects of emissions from road traffic. On the other hand, measures to mitigate dust emissions would be required during the construction phase. This mitigation should be straightforward, as the necessary measures are routinely employed as 'good practice' on construction sites. The measures to be employed during construction would include:

- early construction of a network of paved haul routes across the site;
- locating unpaved haul routes as far as possible from occupied residential properties;
- use of water-sprays to ensure that any unpaved routes across the site are maintained in a damp condition when in use;
- imposition and enforcement of a 5 mph speed limit on unpaved ground;
- sheeting of lorries carrying dusty material on and off site;
- early sealing of open ground with vegetation;
- locating any concrete crushing plant well away from residential areas;

- location of stockpiles of potentially dusty material as far from sensitive locations as possible;
- regular use of a water-assisted dust sweeper on local roads if necessary, to remove any material tracked out of the site;
- regular cleaning of paved areas on-site;
- use of a jet-spray vehicle and wheel wash for all vehicles leaving the site;
- use of water suppression during any demolition works near to occupied residential properties; and,
- use of water suppression during any cutting of stone or concrete.

Where mitigation measures rely on water, it is expected that only sufficient water to damp down the material will be applied. There should not be any excess to potentially contaminate local watercourses.

During all stages of the construction works there will be close liaison with the local community, including the setting up of a well-publicised hotline, together with a rapid response to concerns that may arise.

Whilst the research and investigations undertaken have not identified any significant degree of contamination within the scheme boundaries (see Chapter 16 Geology and Soils), vigilance should be maintained during earthmoving. Where potentially harmful contamination is suspected, the normal methods of assessment should be applied and appropriate action taken.

6.9 Conclusions

A Stage 3 DMRB assessment of the potential air quality impacts associated with the proposed A8 Corridor road improvements has been carried out. Attention has been given to impacts during the construction phase and to local air quality impacts, impacts on sensitive ecosystems, and wider-scale impacts during the operational phase.

In terms of local air quality impacts, the proposed Scheme is expected to improve air quality in some locations and to deteriorate air quality in others. At most locations, any change in local air quality will be negligible, but adjacent to the proposed new route, the impacts would be very substantially adverse. There are, however, no occupied houses in the area where these disbenefits would occur. Close to the existing A8, which would be relieved by the new road, there would be substantial beneficial impacts. Overall, the net effect of the proposed scheme on local air quality is expected to be minor adverse.

No exceedences of air quality objectives are predicted in 2010 (year of scheme opening used for worst-case prediction of impacts). A slight improvement in annual mean concentrations of particulates (PM_{10}) is expected in the Chapelhall and Coatbridge Air Quality Management Areas (AQMAs). Any changes in concentrations within the Motherwell AQMA are anticipated to be negligible.

There are two Sites of Special Scientific Interest that could potentially be influenced by changes in local air quality brought about by the Scheme. According to the assessment methodology set out in DMRB, the Scheme would have a slight beneficial impact at both sites.

In terms of wider-scale impacts, the Scheme is expected to bring about an extremely small increase in the total emissions of relevant air pollutants across the road network. In context, this increase is not judged to be significant.

Any effect of construction vehicle emissions on local air quality will be negligible. The construction works do, however, have the potential to create dust. During construction it would be necessary to apply a package of mitigation measures to minimise dust emissions. Even with these mitigation measures in place, those properties that are closest to the construction works and to site entrances might experience some dust soiling. Any effects would be temporary and any events would be infrequent, depending on the weather conditions and occurrence of dust raising activities.

Attention has also been given to the potential for cumulative operational impacts from this Scheme and from the proposed junction improvements at Raith and the Associated Network Improvements. At the locations on which the local assessment has focused, the cumulative impacts of all three schemes together are unlikely to be substantially different to those from the Scheme alone. In terms of wider-scale cumulative impacts, in 2010 the increases in emissions would range from extremely small to very small for different pollutants. In 2020, the increases range from extremely small to medium. It should be noted that this represents a worst-case assessment.

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7 Cultural Heritage

7.1 Introduction

This section provides an assessment of the potential effects associated with the proposed road improvement scheme with respect to cultural heritage using guidance set out in DMRB Volume 11 (Environmental Assessment).

Cultural heritage refers to archaeological remains, Listed Buildings, Conservation Areas, Historic Gardens, Designed Landscapes and other heritage designations. Generally, four categories of archaeological remains may be encountered comprising:

- upstanding remains: built structures such as buildings, field boundaries, and features such as standing stones and stone circles;
- earthworks: soil-covered remains that can be seen as surface undulations at ground level. These can include ruined buildings or their foundations, banks, mounds, ramparts, ditches, gullies and hollows;
- buried features: soil-covered remains which have no visible trace at ground level (possibly revealed by aerial photography); and
- artefact scatters: scatters of potsherds, flint, tools, metal objects, animal bones, worked stone, mortar or human remains.

Palaeoenvironmental evidence may also be found in association with archaeological remains and this can be used for dating purposes and to provide evidence of past land use or landform change.

The objective of a DMRB Stage 3 cultural heritage assessment is to undertake sufficient investigations to identify the significant archaeological impacts likely to arise from construction of the preferred route and to identify and characterise archaeological constraints and identify mitigation options associated with that route. Historic Scotland (HS) generally assess the information gathered during the Stage 1 and 2 desk studies (and any walkover studies) and establish whether further field survey is required.

HS has determined during Stage 3 consultations that the desk-based collation of information is sufficient to characterise the nature of the identified heritage resource of the study area. However, the issue of previously uncovered remains will need to be addressed as part of a mitigation strategy.

During the consultation exercise undertaken late-2003, early-2004 and in 2005, as described in Chapter 5, HS determined that neither a formal Phase 1 desk assessment nor Phase 2 field evaluation need be undertaken for route planning purposes. HS also advised that the information gathered to date on the location and description of sites of cultural heritage interest within the study area is sufficient and serves the purpose of the formal phases of archaeological work detailed above.

The assessment of effects on cultural heritage is largely based on the location and footprint of the scheme. Information regarding specific scheme components, such as excavation during the construction phase, will be further developed by the Contractor in developing a specimen design. Any activities that may cause disruption or damage to, for example, previously unrecorded features which cannot reasonably be anticipated as part of the Environmental Statement, will need to be addressed by the Contractor.

7.2 Methods

The key objectives of the assessment approach were to:

- identify the known and potential cultural heritage resources on and around the proposed scheme options and to evaluate the importance of sites and features recorded;
- describe the potential effects of the option locations on these resources; and
- recommend any measures to mitigate significant adverse impacts.

These objectives were achieved through establishing the current baseline conditions and subsequently defining any potential effects of the conceptual design on this baseline resource.

7.2.1 Baseline Methods

Information regarding existing and potential cultural heritage features within the vicinity of the proposed options has been collated through a desk-based review of existing archaeological data and consultation with Historic Scotland and West of Scotland Archaeology Service (WoSAS).

7.2.2 Impact Assessment Methods

As outlined in Chapter 4, Approach and Methods, impacts were considered in terms of both the site value and the magnitude of the impact. The significance of predicted impacts was then determined through a combination of value and magnitude.

7.2.3 Site Value

The site value, or status, of each site was determined as detailed in Table 7.1 below.

Table 7.1 Definition of Site Value for Cultural Heritage

Value or Status	Criteria
National	Scheduled Ancient Monuments Listed Buildings (Category A)
Regional	Listed Buildings (Category B), archaeological sites deemed to be of regional interest
Local	Listed Building (Category C), archaeological sites deemed to be of local interest
Negligible	Sites of less than local or negligible importance or sites that have been completely destroyed or otherwise leave no physical trace (and therefore cannot be assigned a value).

Historic Designed Landscapes are not specifically listed in the above table, as the designation may apply to areas of varying significance, from local to national. Levels of importance, based on professional judgement, have been individually assigned to any Designed Landscapes in the vicinity of the scheme.

7.2.4 Impact Magnitude

The severity, or magnitude, of impact was assessed independently of the site value, based on professional judgement informed by planning policy and other relevant guidance, and assigned to one of the categories described in Table 7.2 below.

Table 7.2 Impact Magnitude Criteria for Cultural Heritage

Major, adverse	Between approximately 50% and 100% demolition or loss of a site, or where there would be complete severance of important parts of a site such as to significantly affect the value of the site.
Moderate, adverse	Loss of part (between approximately 15% and 50%) of a site, major severance, major effects on setting, or substantial increases in noise or disturbance, such that the value of a site would be diminished but to a minor degree.
Slight, adverse	Minimal effect on a site (up to 15%) or a medium effect on its setting, or where there would be minor severance, increases in noise, vibration, disturbance or amenity, such that there would be no effect on its value.
Negligible, adverse	Very little appreciable effect on a site, a minimal effect on its setting, or where there are impacts which are not considered relevant to the historic value of a site.
No impact	
Negligible, beneficial	Very little appreciable effect on a site, a minimal benefit to its setting, or where there are impacts which are not considered relevant to the historic value of a site.
Slight, beneficial	Minimal enhancement of a site, a medium beneficial effect on its setting, or where there would be a minor reduction of severance, noise, vibration, disturbance or amenity such that there would be no effect on its value.
Moderate, beneficial	Major reduction of severance, a major beneficial effect on setting, or substantial reductions in noise or disturbance such that the value of a site would be enhanced to a minor degree.

These definitions are based on professional judgement and are necessarily approximate due to the need to address non-tangible issues, such as the relative importance of the specific part of a site to be affected within the context of the overall site.

7.2.5 Impact Significance

The significance of impact (beneficial and adverse) was determined as a combination of the value of the site and the magnitude of impact as shown in Table 7.3.

Table 7.3 Assessment of Significance Criteria

Site Value	Magnitude of Impact			
	Major	Moderate	Slight	Negligible
National	Major	Major	Moderate	Slight
Regional	Major	Moderate	Slight	Negligible
Local	Moderate	Slight	Slight	None
Negligible	Slight	Negligible	Negligible	None

Impacts on sites may be direct (such as damage or severance), or indirect impacts on setting (such as a road in close proximity creating noise or visual impacts on a site). Impacts on the setting of local sites were not considered significant and the setting of local sites was therefore not assessed. The concept of 'setting' is largely a visual concept and, for those sites of more than local importance, has been considered as part of the Landscape Effects assessment (Chapter 11).

7.3 Baseline Conditions

7.3.1 Planning Policy Context

The following national and local policies provide a framework within which the archaeological assessment has been undertaken and mitigation measures recommended. These policies are also discussed in Chapter 17 – Policies and Plans.

- National Planning Policy Guideline (NPPG) 5 - Archaeology and Planning states that the preservation of ancient monuments and their setting is a material consideration in determining proposals for development. NPPG5 provides guidance to the planning authority in determining applications of development that could have effects on sites of importance and the scope for mitigation where necessary and appropriate;
- NPPG18 - Planning and the Historic Environment considers wider issues associated with the historic environment, stating that planning authorities should ensure that planning applications are accompanied by information about the historical, architectural, environmental and archaeological significance of the site affected by proposals, so the effects of proposals can be fully evaluated;
- Planning Advice Note (PAN) 42 - The Planning Process and Scheduled Ancient Monuments focuses on development control and its role in safeguarding archaeological resources. It defines where remains should be preserved in situ, and where it may be appropriate to excavate and record them; and
- The North Lanarkshire Southern Area (Planning Policies ENV20 and ENV 21), the Monklands Local Plan (Planning Policy Env18) and the Glasgow City Plan (Planning Policies ENV9, HER1, HER2, HER4 and HER5) note the importance of cultural heritage features including listed buildings, Scheduled Ancient Monuments, Designed Landscapes and other archaeological features. Scheduled Ancient Monuments and Designed Landscapes are identified as being of national

significance, with a high degree of protection being attached to them. Locally important archaeological sites are also identified in the plan, stating that development proposals must have regard for such sites and plans must respect them.

7.3.2 Consultations

Historic Scotland and WoSAS were contacted in respect of the provision of the following baseline information:

- details of sites of archaeological or built heritage value (national, regional or local);
- details of any Historic Gardens, Designed Landscapes, Listed Buildings or Conservation Areas;
- the potential for unidentified or unrecorded archaeological features or remains; and
- any comments on the proposed scheme.

Information has been provided based on records detailed in the National Monuments Record of Scotland (NMRS) and the regional Sites and Monuments Record (SMR). The NMRS comprises the national collection of material relating to the archaeological and architectural heritage of Scotland, whereas the SMR contains regional information (in this case for the West of Scotland) for all known archaeological sites and finds.

Historic Scotland notes that the scheme does not raise any significant historic environment concerns and that no specific mitigation measures are required (*letter of confirmation 14.2.06*).

7.3.3 Results of the Desk Study

A total of 20 sites were identified in the vicinity of the scheme through consultation and reference to previous studies.

Consultation with Historic Scotland indicates that there are no designated features of cultural heritage within the area of potential works, although one Scheduled Ancient Monument and six listed buildings exist within a very short distance. There remains the potential for unrecorded archaeological features which are not listed on the NMRS. However, previous disturbance associated with road construction, mining, industrial development and more recent upgrade of the A8 plus development of nearby residential areas is likely to have significantly reduced the likelihood of such features.

Details of each site are provided below in Table 7.4 from west to east along the A8 corridor, including the name of each site, its NMRS reference where applicable, and the type of site. The location of all sites is shown in Figures 7.1a-e.

Table 7.4 List of Cultural Heritage Sites

Name of Site	NMRS Reference	Type of Site	Details
Monkland Canal	NS66NE59.2 NS66NE59.3 NS66SE134.0	Canal Basin	Unscheduled/unlisted
Netherhouse Bridge	NS66SE86	Bridge	Unscheduled/unlisted
Bargeddie Brickworks	NS66SE103	Industrial; Works	Unscheduled/unlisted
Mainhill Road Farmstead	NS66SE68	Farmstead	Unscheduled/unlisted
Braehead Brickworks	NS76SW131	Industrial; Brickworks	Unscheduled/unlisted
Tannochside Branch Railway Bridge	NS76SW34	Railway viaduct; Railway Bridge	Unscheduled/unlisted
Bredisholm Bridge	NS76SW35	Mineral Railway; Railway Bridge	Unscheduled/unlisted
Luggie Bridge Forges	N/A	Forge; Building	Unscheduled/unlisted
Coathouse Pilgrims Stone	NS76SW4	Stone	Unscheduled/unlisted
Old Monkland Cemetery	NS76SW2	Church; Graveyard	Unscheduled/unlisted
Rosehall Estate	NS76SW150	Estate Offices	Unscheduled/unlisted
Bankhead Cists	NS76SW1	Cists	Unscheduled/unlisted
Rosehall Brickworks	NS76SW132	Industrial; Brickworks	Unscheduled/unlisted
Glen Mine: coal mine	NS76SW32	Industrial; Coal mine	Unscheduled/unlisted
The Mount	NS76SW27	'Earthwork'	Unscheduled/unlisted
Woodhall House	NS76SE17	Country House	Scheduled Ancient Monument
Woodhall Designed Landscape	N/A	Designed Landscape	Unscheduled/unlisted
O Wood Plantation: curling pond	N/A	Curling Pond	Unscheduled/unlisted
O Wood Row Building	N/A	Building	Unscheduled/unlisted
Lauchope House	NS76SE9	Tower-house; House	Unscheduled/unlisted
Parkneuk Farmstead	N/A	Farmstead	Unscheduled/unlisted

7.3.4 Statutorily Designated Sites

Scheduled Ancient Monuments (SAMs)

SAMs are nationally important sites and monuments that are legally protected under the Ancient Monuments and Archaeological Areas Act 1979. There are around 19,000

entries (covering 35,000 sites) on the 'schedule' ranging from prehistoric standing stones and burial mounds, through the many types of medieval site, to the more recent results of human activities such as collieries and wartime pillboxes.

The site of Woodhall House is a SAM that is situated just over 100m north of the A8. The house and its associated outhouses (including pavilions and lodges) are no longer standing, thus the designation refers to the site, foundations and other surface remains.

Woodhall House SAM will not be affected by the proposed road upgrade options.

Conservation Areas and Historic Designed Landscapes

There are no Conservation Areas on or immediately adjacent to the proposed route alignment options.

However, the existing route of the A8 crosses Woodhall House Designed Landscape as shown on Figure 7.1d. Often, though not exclusively, large designed gardens and landscapes were formed as a setting for important buildings, or for recreation. Many of the buildings for which these landscapes were formed are afforded statutory protection, and the landscapes themselves are safeguarded through structure/local planning policies. This Designed Landscape does not have any specific development planning policy protection due to its current state of neglect and absence of important features.

Listed Buildings

Listed buildings are those buildings of special architectural or historic interest that help enrich cultural history. The list of buildings in Scotland is aimed at safeguarding the built heritage and promoting its understanding and is compiled and maintained by Historic Scotland on behalf of the Scottish Ministers, in accordance with the Planning (Listed Buildings and Conservation Areas) (Scotland) Act 1997. The listings are divided into three categories (A, B and C(S)) based on different levels of interest or importance.

Consultation confirmed that there are no listed buildings within the vicinity of the proposed scheme.

7.3.5 Unscheduled/unlisted Sites

Numerous sites of archaeological interest and value have been recorded across Scotland that are not specifically designated on the above listings. Many of these have been uncovered as the result of aerial surveys, geophysics and through ongoing development planning and are recorded in the National Monuments Record Scotland (NMRS) and/or the relevant regional Sites and Monuments Record (SMR). Within the survey area a number of such sites have been recorded as shown on Figures 7.1a-e and detailed in Table 7.4 above.

7.3.6 Importance of Sites Identified

The importance and, where applicable, status of the archaeological sites described above has been determined through consultation with Historic Scotland and reference to the criteria in Table 7.1. Woodhall House, being a SAM, is therefore categorised as of national value, and all other recorded sites are considered to be of negligible value.

7.3.7 Potential for Unrecorded Sites

It is anticipated that the study area may be of limited interest, when considering previous disturbance associated with industrial activity, road development and agricultural land use, which is likely to have removed existing upstanding remains and buried features. However, there may be remains of previously unrecorded sub-surface features present and therefore a general programme of archaeological sampling may be required.

7.4 Predicted Impacts

7.4.1 Introduction

The assessment of potential impacts has been undertaken based on the alignment of the preferred scheme. National policy and guidance emphasises the need to take into account the effects of development on both designated and undesignated sites, as well as known and unknown remains. At this stage, potential impacts have therefore been assessed based on the footprint of the proposed scheme and the consequential direct or indirect effects on the sites identified in Table 7.4.

Potential adverse impacts associated with road development on recorded and previously unrecorded archaeological resources may include:

- physical loss or damage;
- severance;
- disturbance due to vibration, compaction or subsidence; and
- effects on setting and loss of amenity.

Such effects apply equally to all road construction activity and ancillary works which cause ground disturbance. This includes construction of the new road carriageway itself, all side roads and accesses, material storage areas, temporary site accesses, and any mining consolidation or landscaping plans beyond the road margins, particularly those involving earthmoving and tree planting.

7.4.2 Physical Damage/Loss/Severance of Sites or Remains

Physical loss or damage to identified archaeological sites/features may occur as a result of land take required to accommodate the footprint of the scheme and any ancillary works such as temporary access routes and storage compounds.

Potential adverse impacts on known features of cultural heritage interest have primarily been avoided by careful scheme alignment so as not to directly impact on the location of known sites of cultural heritage.

This being the case, the route corridor does not affect any scheduled features of cultural heritage value. It does, however, impinge on two unscheduled sites of negligible value at Woodhall Designed Landscape and O Wood Row Building. No further details are available in relation to these sites, however it seems likely that both will have been affected by previous mining and road construction activities. The impacts to these sites are slight and major adverse, of **negligible** and **slight significance** respectively.

There is also a potential for unrecorded features to be present within the vicinity of the existing road. These features may be disturbed/damaged/lost by road widening, construction of the off-line section of new road and the new farm access track and by temporary land take associated with construction site storage site compound(s). As the value of any such features cannot be predicted at this stage, the magnitude and significance of any impacts cannot be determined. However, given the local/negligible significance of features already identified, the impacts are not anticipated to be significant.

Additionally, new sites may be uncovered as a consequence of the route re-alignment, which may be potentially beneficial in the long-term. If sites are uncovered, their value and any potential impacts will be assessed on a case-by-case basis in discussion with HS.

The location of construction site storage site compound(s) has not been determined at this stage, but it is assumed that these will be positioned so as not to affect any known cultural heritage features.

7.4.3 Disturbance due to Compaction, Vibration and Subsidence

Potential indirect effects may occur as a result of vehicular access to the site during the construction period and certain activities such as piling, which could cause damage due to the movement of heavy vehicles within the working corridor and the vibration of construction equipment. This could result in compaction of ground features immediately adjacent to the works with potential disturbance or damage to sites situated close by. Settlement (or subsidence) may also occur, should areas of groundwater be affected within the working corridor, which has the potential to destabilise the ground beneath sites and possibly result in erosion of the site. However, given the local/negligible value of these sites and/or their location in relation to the scheme options, **no significant effect** is predicted.

Although areas of shallow groundwater will be encountered within the working corridor, appropriate methods will be employed to ensure that water levels are not detrimentally affected (locally lowered or raised) during the construction period. It is therefore anticipated that effects of settlement and subsidence would be unlikely to occur and are therefore assessed to be of negligible magnitude and significance.

7.4.4 Effects on Setting and Amenity

In terms of visual intrusion on the archaeological sites or features identified affecting their setting during operation, all types of site have been taken into account.

The effect of the development on the setting on locally/negligibly important sites in the vicinity of the scheme options have been assessed as being of **negligible** magnitude and of **no overall significance**.

There may be slight effects on the visual setting of sites in the immediate vicinity of the working corridor during the construction period, however, this will be temporary and is not predicted to be significant. Although the Woodhall House SAM is situated within approximately 100m of the proposed scheme, this site has been demolished and no upstanding remains are present. As a result it is anticipated that there will be no impact on the setting of this SAM during construction or operation of the improved road.

Potential visual implications of the scheme as a whole are assessed in Chapter 11. Although Woodhall House Designed Landscape is situated adjacent to the proposed road alignment, its current neglected condition and existing presence of the A8 suggests that no adverse effects on the setting of the Designed Landscape will occur.

None of the sites identified within the footprint of the proposed scheme are specifically accessed by members of the public and therefore no effects on amenity are predicted.

7.5 Mitigation

Slight significant impacts have been identified with regard to the development of the scheme in relation to the loss of O Wood Row Building, an unlisted/unscheduled feature of negligible value. No specific mitigation measures are required.

Although no further significant effects are predicted, based on current available information, the possibility exists that further sites may be unrecorded and may be disturbed during construction. Therefore, during site clearance and construction, the Contractor will be made aware of the possibility of unrecorded finds and careful construction techniques will be employed. If the Contractor uncovers any features during excavation works that may be of cultural heritage significance, works should be halted to enable Historic Scotland to determine whether any archaeological recording or removal is required.

7.6 Residual Impacts

Subject to the implementation of the mitigation measures described above, no significant impacts are anticipated to the known cultural heritage resource in relation to the Scheme. Historic Scotland has confirmed that no specific mitigation measures are required.

Potential implications relating to the disturbance of unrecorded sites may occur and this may require further consideration if archaeological sites are uncovered. However, due to the value of sites identified in the area to date, significant effects are thought to be

unlikely. No residual impacts on the cultural heritage resource are predicted with the development of the preferred scheme.

7.7 References

AOC Scotland Ltd (1995) Report of the Archaeological Evaluation (Mitigation Phase) for the M8 Baillieston to Newhouse Roads Project. Historic Scotland.

AOC Scotland Ltd (1995) Report of the Archaeological Evaluation (Mitigation Phase) for the M8 Baillieston to Newhouse Roads Project – Woodhall House Designed Landscape Assessment. Historic Scotland.

Design Manual for Roads and Bridges (DMRB) Volume 11 Environmental Assessment (1993, amended and updated 2003), The Highways Agency, The Scottish Executive Development Department, The National Assembly of Wales and The Department of the Environment for Northern Ireland.

Gallagher, D.B. (1993) M8 Baillieston to Newhouse – A Desktop Assessment of Historic Sites and Buildings. Historic Scotland.

National Monuments Record of Scotland (data provided by West of Scotland Archaeology Service).

North Lanarkshire Council, (2001), North Lanarkshire Southern Area Local Plan - Finalised Draft (Modified June 2001).

North Lanarkshire Council, (2003) Northern Corridor Local Plan.

Scottish Office, National Planning Policy Guidance (NPPG) 5 - Archaeology and Planning, (1994).

Scottish Office, National Planning Policy Guidance (NPPG) 18 - Planning and the Historic Environment, (1999).

Scottish Office, Planning Advice Note (PAN) 42 - The Planning Process and Scheduled Ancient Monuments.

West of Scotland Sites and Monuments Record (data provided by West of Scotland Archaeology Service).

8 Land Use

8.1 Introduction

This section examines the likely effects on land use of the proposed upgrading to motorway standard of the A8 trunk road between Baillieston and Newhouse. The objective is to identify and assess potential constraints and opportunities associated with land take implications of the preferred scheme described in Chapter 2.

The study area for consideration of Land Use effects is a flexible corridor broadly based on the line of the proposed route. It has no precisely defined boundary but encompasses key areas of land which may be influenced by the scheme as indicated on Figures 8.1a to 8.2e.

This assessment considers the permanent effects of the scheme in the context of demolition of property and associated land take, loss of agricultural land, loss of development land, and loss of land used by the community.

8.2 Baseline and Impact Assessment Methods

The assessment has been prepared in accordance with the principles and techniques outlined in Chapter 4 and with the provisions of DMRB Volume 11 (Environmental Assessment), Section 3 Environmental Assessment Techniques, Part 6 - Land Use. A desk study was undertaken which comprised the review of relevant plans and other published documents listed in Section 8.7 of this Chapter, including previous assessment reports. Walkover site surveys were undertaken aimed primarily at verifying or updating information collated during the desk study. Consultation with the Local Authorities and statutory agencies has also taken place

Baseline land use information is presented principally by means of drawing based records which form an integral part of the assessment report. Figures 8.1a - 8.1e refer to development and community land; agricultural land is covered in Figures 8.2a - 8.2e. In each case the schematic outline of the proposed route is overdrawn in order to illustrate the effects on land within the study area. Figures 8.2a - 8.2e (Land Capability for Agriculture) also show the boundaries of land expected to be taken to facilitate construction of the scheme, including drainage, accommodation works, and mitigation measures. It incorporates land already owned by the Scottish Ministers, some of which may not now be required to implement the preferred scheme.

8.3 Baseline Conditions

8.3.1 Private Property

Due to the proximity of built development there is extensive residential and commercial property in the vicinity of the proposed scheme. Even where the scheme is essentially an on-line widening of the existing A8, very few are immediately adjacent to the route corridor, and the proposed works directly affects only one group of farm buildings. Residential properties to the south of the A8 east of Bargeddie Junction would have been affected but have recently been demolished.

The proposed site for the construction of the Swinton roundabout sits next to numerous residential properties to the north and south-west and additionally with retail property to the west.

8.3.2 Community Land

In Scotland land used by the public (Community Land) is defined in DMRB as being 'Common', including town or village greens, and 'Open Space' which is land laid out as public parks or used for the purpose of public recreation or which is a disused burial ground. Land in these categories which could be lost to road construction is subject to legal restrictions requiring suitable exchange land to be provided. Land used as public footpaths or for other public access is considered in Chapter 13 (Pedestrians, Cyclists, Equestrians & Community Effects).

North Lanarkshire Council does not maintain records of land used by the community in the designated categories listed above and reliable determination has not therefore been possible. At the suggestion of the Local Authority, areas shown as Community Land in Figures 8.1a - 8.1e constitute land which is in public ownership and which, by implication or observation, is deemed to fall within one of the designated categories.

8.3.3 Development Land

The study area is substantially covered by two approved development plans: the North Lanarkshire (Monklands District) Local Plan 1991 (Finalised First Alterations A, B, C September 1996); and the North Lanarkshire Southern Area Local Plan Finalised Draft (Modified2005). The City of Glasgow, Glasgow City Plan (adopted August 2003) is of marginal interest at the western extremity of the scheme as the area around Baillieston falls within Glasgow City Council jurisdiction. Local Authority development planning designations are shown in Figures 8.1a - 8.1e.

The North Lanarkshire (Monklands District) Local Plan in particular is significantly out of date and fails to provide a realistic basis of consideration. North Lanarkshire Council (NLC) is currently drafting a new single Local Plan for the entire North Lanarkshire area which will update and amalgamate the various more localised documents which apply to individual districts within North Lanarkshire at present. In the meantime, NLC's M8/A8 Corridor Interim Land Use Strategy document, which relates to both the north and south divisions of the Authority, provides useful guidance with regard to anticipated policy changes and has been taken into account for the purposes of this assessment.

The Interim Strategy aims to strike a balance between investment in economic development and protection of environmental resources, which are seen as being mutually supportive. A number of emerging development opportunities of varying planning status are identified as part of the Strategy for locations which are contrary to designations shown in the adopted development plans, notably defined Green Belt. The area known as the Douglas Support Estate, south of the A8 between Bargeddie and Shawhead, is a particularly significant example where there has been an application for a business park development in the Green Belt. The application is currently withdrawn and

the site is therefore not shown on Figures 8.1a - 8.1e (Development and Community Land).

Improvement of the A8 is a central theme of the Interim Strategy and it seems likely that the revised North Lanarkshire Local Plan will ensure that major transport infrastructure is not constrained by other development designations. The North Lanarkshire Southern Area Local Plan already designates a protected motorway route through its policy for development of strategic routes (Policy TR5).

At present the adopted statutory development plans remain the baseline circumstance. Relevant land use planning policy falls broadly into three groups: Transportation as described above; Business and Industry; and the Environment. There are various existing and proposed commercial use designations within the route corridor including the development opportunities described above, as shown on Figures 8.1a to 8.1e. Environmental land use designations include extensive Green Belt as well as environmentally sensitive designations such as Protected Urban Woodland, Protected Open Space, Tree Preservation Orders and Sites of Importance for Nature Conservation as shown on Figures 8.1a - 8.1e.

A corridor of land west of Bargeddie and to the south of the A8 between Bargeddie Junction and the Carnbroe access road is subject to a gas pipeline safety zone; some is also subject to landfill gas monitoring restrictions. Leisure designations have minor relevance and relate to a proposed golf course east of Chapelhall.

8.3.4 Agricultural Land

The A8/M8 corridor is subject to substantial development pressures leading to an increasing prevalence of urban fringe characteristics. In turn there is a decline in the viability and importance of agriculture as a land use in the study area. Nevertheless, there are substantial areas of agricultural land south of the existing A8 in the western section of the proposed scheme and to the north at the eastern end of the scheme.

In the Glasgow and Clyde Valley Landscape Assessment prepared by Scottish Natural Heritage (SNH), the M8 study area falls within the regional character area described as Clyde Basin Farmlands, but only some 46% of classified agricultural land affected by the scheme is estimated to be productive farmland. Farming practice reflects the descriptions of the three landscape types in the study area described by SNH: Plateau Farmland; Fragmented Farmland; and Incised River Valley. On the eastern fringe of the study area plateau farmland consists predominantly of pasture, which is mostly grazed by sheep and arranged in large farm units having individual fields which also tend to be large and are enclosed by fences rather than hedgerows. Typically, the incised river valley of the North Calder Water is heavily wooded and steep in places making access difficult and preventing effective farming use in these areas. The overall impression of the study area is that of the fragmented farmland type, where the discontinuous remains of agricultural land are located close to the built urban edge and are interspersed with widespread evidence of former industrial activity including derelict sites and disused railways and, more recently, commercial developments. Surviving farmland is both pastoral and arable in use but frequently includes unfarmed or under farmed land. Fields are generally small

and farm woodlands and hedgerows are numerous, although often in deteriorating condition.

In Scotland agricultural land is classified by the Macaulay Land Use Research Institute (MLURI) according to its capability for crop production. The system provides for seven grades of land quality with a number of sub-divisions, each capable of producing specified crops to an acceptable yield standard. The defined categories can be further modified by sub-class limitations of climate, gradient, soil, wetness, or erosion. Grades 1, 2 and 3.1 are recognised as being the best and most versatile agricultural land and are collectively known as Prime Quality Land. Land around urban areas is often not classified by MLURI whether or not it is in agricultural use.

Due to their urban nature, several parts of the study area, particularly north of the A8, are unclassified by the MLURI Land Capability for Agriculture Classification. An updated survey would be likely to increase the extent of unclassified land. As shown in Figures 8.2a to 8.2e, the majority of classified land is Grade 3.2 (average production of a moderate range of crops), although some Grade 3.1 land is affected. On higher ground around and to the east of Newhouse, between Eurocentral and Chapelhall, and in small pockets within the Douglas Support Estate, land is classified as Grade 4.2 (primarily grassland with limited potential for production of a narrow range of crops). The immediate valley of the North Calder Water is classified as Grade 5.2 (improved grassland but having maintenance problems). All categories of classified agricultural capability are downgraded by application of sub class limitations as shown on Figure 8.2a - 8.2e (Land Capability for Agriculture).

The Scottish Executive Environmental and Rural Affairs Department (SEERAD) can designate agricultural land as an Environmentally Sensitive Area (ESA) where it has special landscape, wildlife or historic interest which can be protected or enhanced by supporting specific agricultural practices. There are no designated ESAs or other non statutory agricultural designations within the study area.

8.4 Predicted Effects

8.4.1 Demolition of Property

The only property which would require demolition to facilitate construction of the preferred route is the farmhouse and outbuildings at Braehead Farm. All of the associated curtilage land would also be taken.

Minor land take is required at Carnbroe Mains Farm and at Orchard Farm, which is currently vacant and partially derelict. Similarly small areas on the periphery of commercial sites at Eurocentral and Newhouse Industrial Estates, and a small car wash at Chapelhall, would be subject to land take.

Essential demolition of occupied premises involves only Braehead Farm. The overall direct effect of the scheme on private property can therefore be considered to be slight.

8.4.2 Community Land

Within the limitations of identification criteria as described at 8.3.2 above, it is apparent that the proposed scheme would have very little effect on land used by the public as defined in Figures 8.1a to 8.1e. The only site affected is the football ground adjoining Woodhall Mill Road on the southern approach to Calderbank. The effect is marginal, requiring only provision of new access which will have no adverse impact on the sports pitches themselves.

The effects on land used as public footpaths are described in Chapter 13, Pedestrians, Cyclists, Equestrians & Community Effects. Narrow strips of greenbelt which run parallel to the A8 and the M8 will be used for the creation of new footpath and cycleway links as part of the scheme.

The scheme will involve land take within greenbelt land, including the land around Swinton roundabout. Here, access to the wooded greenbelt area will become more restricted to the local community (who may have previously have used it for informal recreation) due to the construction of the new roads.

8.4.3 Development Land

Consideration of development effects is an interactive process which examines how the scheme might affect Local Planning Authority development designations and, conversely, how restrictive planning designations might affect the scheme proposal.

In general terms development effects will be positive in that the scheme becomes an enabling mechanism for the realisation of development potential.

The scheme broadly accords with Local Plan designations and has particular effects in terms of transportation, industrial and business, and environment policy areas as described below.

Figures 8.1a - 8.1e (Development and Community Land), show the strategic roads policy designation (Policy TR5) taken from the North Lanarkshire Southern Area plan which provides for an M8 route, but it has no statutory basis as yet in the North Lanarkshire Northern Area where the Monklands plan is still applicable.

A substantial part of the land required for the proposed scheme is designated Green Belt and, in the absence of an adopted development plan revision, the status of that designation is effectively compromised.

Less extensive effects of land loss in the environmental context are scheduled in Table 8.1. They include adverse impacts on designated Tree Preservation Order sites east of the Shawhead junction, Protected Open Space designations at Eurocentral and Chapelhall, the Protected Urban Woodland designation at Chapelhall, Ancient Woodland in the North Calder Water Valley, and various designated Sites of Importance for Nature Conservation involving a total area of some 33 hectares of designated land. The loss of

habitat associated with these designations is addressed in Chapter 10 (Ecology and Nature Conservation).

Table 8.1 Loss of Designated Land (ha)

Designated Landscape Areas	Area (ha)
Tree Preservation Orders	1.08 ha
Protected Open Space	22.88 ha
Protected Urban Woodland	0.04 ha
Ancient Woodland	1.36 ha
Sites of Importance for Nature Conservation	7.57 ha

There are positive environmental effects relating to the potential reclamation of derelict land east of Shawhead (Monklands Local Plan, ENV 4/56; Fig.8.1c) and the anticipated landscape upgrading associated with the scheme, which is a general policy commitment in the route corridor. (Monklands Local Plan, Policy LI1; Interim Land Use Strategy).

Industrial and Business designations at Shawhead, Eurocentral and Chapelhall are affected by modest land take requirements, as are the identified potential development sites at Bargeddie, Carnbroe Mains (Faskine Estate), Dunalistair and Newhouse, although the latter have no statutory basis. (Figures 8.1a - 8.1e). Identified development possibilities at Bankhead Farm and Chapelhall Junction would be unlikely to remain viable. Similarly land take requirements would prejudice re-emergence of the Douglas Support Estate Business Park proposal in its previous form.

Other development effects which need to be considered are the impact of the scheme on the long distance footpath designation on the line of a disused railway east of Shawhead and the impact on the leisure designation between Chapelhall and Newhouse, as described at 8.3.3 and shown on Figures 8.1c and 8.1e respectively.

A further transportation effect concerns the impact on the proposed diversion of National Cycle Route NCN 75 Edinburgh to Glasgow, east of the Bargeddie Junction which, in common with the strategic roads designation, is shown on the North Lanarkshire Southern Area plan but has no statutory basis as yet in the Northern Area. The location as indicated on Figure 8.1b coincides with a public right of way, the effect upon which is discussed in Chapter 13, Pedestrians, Cyclists, Equestrians & Community Effects.

The scheme is also constrained by proposed routing through the designated gas pipeline safety zone between Bargeddie Junction and Eurocentral Junction and through areas of landfill gas monitoring designated in the same location.

There are moderately adverse effects on development land particularly where environmental planning designations apply, but this is outweighed by the potentially

extensive economic development and landscape enhancement benefits which the scheme is expected to promote.

Development land will accommodate new sections of east-west footpath/cycleway which form part of the scheme, and are described more fully in Chapter 13. The footpath/cycleways will occasionally pass through development land and require small strips of land although in places will use existing path networks within such areas.

8.4.4 Agricultural Land

The approximate total area of land expected to be utilised for the scheme at construction is 344ha, of which approximately 229ha is already owned by Scottish Ministers. That part, which is classified as being capable of agricultural production, as shown on Figures 8.2a to 8.2e, amounts to some 185ha. It should be noted however, that this includes woodland and unused or inaccessible land; a substantially reduced area of land in active agricultural use would be required, estimated on site at 85ha.

As listed in Table 8.2, approximately 19ha of proposed land take is classified by MLURI as prime quality land (best and most versatile agricultural land; Grades 1, 2 and 3.1). Non-prime land take consists of approximately 122ha of Grade 3.2 with smaller areas of Grades 4.2 and 5.2 (approximately 108ha and 2.5ha respectively).

Table 8.2 Loss of Classified Agricultural Land

Classified Agricultural Land	Area (ha)
Prime	
Grade 3.1	19.11
Non Prime	
Grade 3.2	121.97ha
Grade 4.2	108ha
Grade 5.2	2.47ha
Unclassified	89.08ha

As classified prime agricultural land and more than 10ha of classified non-prime agricultural land would be lost, SEERAD as a statutory consultee has been notified in accordance with DMRB requirements. The Department has confirmed that the national agricultural interest would not be adversely affected by the Scheme.

Precise details of present farming patterns and boundaries of holdings are not available and therefore the specific effects of the scheme on individual farm units cannot be fully assessed. However, it is apparent that where the route involves online widening, there would be reductions in adjacent field sizes and a consequent need for boundary adjustments affecting Woodhall Estate, Fairy Bank and Sandyford Farms. In the off-line

section of the scheme issues of fragmentation, severance and inaccessibility arise. Land assumed to form part of the holdings associated with Braehead Farm, Bankhead Farm, Shawhead Farm, Carnbroe Mains Farm and Orchard Farm would all be affected to varying degrees.

It is unlikely that the types of husbandry would change but it is conceivable that continued farming use would not be viable in some cases. Substantial parts of the farmed land are already owned by the Scottish Ministers, especially in the off-line section of the route. Tenancies are understood to be of a renewable short-term nature or merely informal agreements allowing casual use by non-resident occupiers, which promote an absence of effective management commitment. Agricultural land severance occurs between the proposed motorway and the existing A8 and also to the south of the proposed motorway but tenancy arrangements may mean that adequate mitigation measures are perceived as uneconomic.

The construction of the new roundabout at Swinton to the west of Baillieston junction will involve the construction of a new road layout, the alteration of existing roads and loss of woodland planting and grassland.

A significant part of the route corridor occupies land which is classified as capable of agricultural production; further areas would be subject to fragmentation and severance. Nevertheless, much of it is currently under farmed or not in active farming use. National interest would not be adversely affected by its loss. In circumstances where the viability of farming is perceived as being already marginal the negative land take and operational disturbance effects of the Scheme are considered to have only moderately adverse implications for agricultural land use.

8.5 Mitigation Measures

8.5.1 Private Property

Owners of the one private property adversely affected by the Scheme will be eligible for compensation agreements relating to demolition, land loss, fragmentation or severance.

8.5.2 Community Land

Land loss at Calderbank football ground is not significant enough to justify identification of exchange land. Mitigation is proposed through remedial soft landscape work, boundary fencing and possible upgrading of disturbed land drainage.

At Swinton roundabout there will be a loss of green belt land, which may be used by the local community for informal recreational use. The loss of landscaped features is compensated by the enhancement of the landscape and nature conservation interest through new planting and seeding introduced for reasons of visual screening and amenity. The mitigation of the development of Swinton Roundabout and its associated land take can be seen on Figure 20.1, Sheet 1, Mitigation Strategy, and in Table 8.3 below. These benefits of mitigation are discussed further and in more detail in Chapter 11, Landscape Effects.

The scheme design incorporates footpaths and cycleway access mitigation (described in Chapter 13), including new sections improving east-west links and the designated regional and national (NCN75) cycle routes, and provides an alternative to the North Calder Water route for the designated Local Plan long distance footpath via the agricultural access track to Carnbroe Mains Farm. The route includes safe road crossings of the proposed motorway, the widened A725, and the realigned A8 at Orchard Farm.

8.5.3 Development Land

On balance the scheme has a beneficial effect on land designated for future development and is itself a mitigating influence on development constraints.

Land take from sites designated for built development is restricted to the minimum necessary for construction of the scheme and ancillary works.

Loss of green belt and protected landscape features is compensated by enhancement of landscape and nature conservation interest through new planting and seeding introduced for reasons of visual screening and amenity benefit as well as biodiversity, all as shown on Figures 20.1a to 20.1g and in Table 8.3. These benefits are further discussed in Chapter 11 (Landscape Effects).

Table 8.3 Compensatory Landscape Planting

Landscape Planting Type	Area (ha)
Semi-natural Woodland	34.90 ha
Wet Woodland/Scrub	7.31 ha
Native Shrub/Scrub	9.86 ha
Mixed Species Hedgerow	20,254 linear m
Ornamental Shrub	2.34 ha
Specimen Trees	441 no.

The scheme design incorporates the designated regional and national (NCN75) cycle routes, and provides an alternative to the North Calder Water route for the designated Local Plan long distance footpath via the agricultural access track to Carnbroe Mains Farm. The latter route includes safe road crossings of the proposed motorway, the widened A725, and the realigned A8 at Orchard Farm.

8.5.4 Agricultural Land

Actual loss of agricultural land cannot be mitigated but is minimised through careful route alignment and confining new land take to that considered essential for construction of the scheme with associated drainage and landscape work.

Access to buildings or operational land severed by the scheme is restored, and in some cases improved. Wherever possible new agricultural access is also aimed at mitigation of public footpath and rights of way severance as illustrated on Figures 20.1a – 20.1g and described in more detail in Chapter 13 (Pedestrians, Equestrians, Cyclists & Community Effects).

Agricultural severance mitigation includes accommodation bridges at Braehead/Bargeddie (Bredisholm Road), also serving Ellismuir via the existing M73 overbridge, Bankhead Farm, Shawhead Farm and Carnbroe Mains Farm. The bridge at Shawhead Farm includes grass surfacing to encourage use by mammals and avoid the need for a dedicated wildlife crossing at this point.

A new accommodation track between Shawhead and Bankhead provides improved agricultural access south of the proposed motorway as well as a continuous safe recreation route linking the A725 and A752. The new drainage maintenance track south of the railway at Bredisholm Road offers an agricultural and recreational access alternative to the existing restricted width railway underbridge adjacent to Cutty Sark.

Reorganisation of land holdings, field sizes and field boundaries including fences, gates and hedgerows will be undertaken as part of measures to mitigate operational disruption or fragmentation of farm units.

Regrading of cutting slopes east of Bankhead Farm is proposed to reduce visual impact of the earthworks. Gradients will permit preparation of the land for return to agricultural use by agreement. Similar handing back of surplus land in Scottish Ministers' ownership will be considered as a means of encouraging commitment to a reversal of the decline in environmental management which is apparent.

Some isolated areas not viable for agriculture or alternative development or not economically accessible, are proposed for landscape planting enhancement and may support visual mitigation objectives (Figures 20.1a – 20.1g).

8.6 Residual Effects

8.6.1 Community Land

The scheme has very little effect on land used by the public as defined in Section 8.3.2 above. Apart from marginal encroachment into the football ground at Calderbank, and reductions to informal use of land around the proposed new roundabout at Swinton, there would be minimal change in the baseline circumstance following construction.

Residual severance will be avoided due to the proposed accommodation of tracks and bridges which will also have consequential benefits for local and regional recreational access routes. Additional provision for east-west cycleways and footpaths does not adversely affect private property, community land or development land, and enhances overall agricultural / recreational access within the scheme corridor. The overall strategy of recreational route enhancement throughout the scheme is of significant benefit

8.6.2 Development Land

The scheme supports the key objectives of Local Planning Authority environmental and economic development policies for the A8/M8 corridor, which are reflected in land use planning designations shown on adopted and emerging development plans.

There would be some reduction in land designated for industrial or business use but not a significant effect on development planning. A review of identified opportunities for future development in the Green Belt would be necessary.

Construction of the proposed scheme would lead to loss of Green Belt land. Confirmation of a preferred route for the motorway will assist the planned review of the sustainability and integrity of the Green Belt.

In the longer term, a positive effect of the scheme would be to increase the attractiveness and marketability of the A8/M8 corridor as a development location through improved accessibility and associated landscape restoration.

8.6.3 Agricultural Land

There would be some loss of land capable of agricultural production, predominantly land classified as Grade 3.2. Realistic loss of agricultural land would be less than at first apparent since large parts of the classified areas are not currently in active agricultural use.

Loss of agricultural land would be compounded by the effects of operational disturbance due to fragmentation, severance and overall reduction in size of holdings.

Residual severance will be avoided due to the mitigating effects of proposed accommodation tracks and bridges, which will also have consequential benefits for local and regional recreational routes.

At Swinton roundabout there would be loss of land capable of agricultural production, Grade 3.1, although land lost would be predominantly unclassified land. However, it is important to note that large parts of the classified agricultural land are currently not in active agricultural use.

Construction of the scheme is likely to promote a change in the farming pattern in any event but, if reorganisation of farm holdings is impracticable and new access arrangements prove to be neither feasible nor economic, agricultural land use may no longer be viable in some parts of the scheme area.

8.7 References

A8 Trunk Road Baillieston to Newhouse Major Maintenance Environmental Statement, Environmental Resource Management, August 2001.

Design Manual for Roads and Bridges Volume 11 Environmental Assessment (1993, amended and updated 2003), The Highways Agency, The Scottish Executive Development Department, The National Assembly of Wales and The Department of the Environment for Northern Ireland.

Glasgow Finalised Draft City Plan (Parts One, Two and Three.) Glasgow City Council 2000

Glasgow and Clyde Valley Landscape Assessment. Scottish Natural Heritage Review No 116 (1999)

M8/A8 Interim Land Use Strategy, North Lanarkshire Council (October 1997)

Macaulay Land Use Research Institute Land Capability Classification for Agriculture. Sheets 64 and 65.

North Lanarkshire (Monkland District) Local Plan, North Lanarkshire Council Planning and Environment Department, 1991 (Finalised First Alteration September 1996)

North Lanarkshire, Southern Area Local Plan Finalised Draft, North Lanarkshire Council Planning and Environment Department, (Modified June 2001).

9 Disruption Due to Construction

9.1 Introduction

This section presents the assessment undertaken to determine the potential disruption to the environmental parameters discussed in Chapters 6 - 16 as a result of construction activities, using the guidelines set out in Volume 11 of the DMRB (1993 and amendments).

'Disruption due to construction' is a term that covers the effects on people and on the natural environment that can occur between the commencement of pre-construction works and the end of the contract maintenance period. At this stage in the road design process the construction period is estimated at 30 months and the maintenance period is likely to be up to 5 years for landscape elements. Disruption due to construction is usually a localised phenomenon. However, some impacts can create effects over a wider area.

This assessment takes into account nuisance related impacts on local residents, workers, vehicle and non-vehicle travellers arising from noise, vibration, dust, changes in journey times and loss of amenity associated with the operation of equipment or from the movement of heavy construction traffic. Construction activities can impact routes utilised by different types of user including pedestrians and cyclists. There is also the potential for impacts on the natural environment through disturbance associated with drainage, accidental spillage and dust generation, noise, lighting as well as effects on ecology and cultural heritage.

The assessment of disruption due to construction is based on the conceptual design described in Chapter 3. The detailed construction programme and methods will be finalised by the Contractor as part of the specimen design and will be subject to further consultation and refinement. .

9.2 Methods

This assessment has been carried out using the guidelines set out in Volume 11, Section 3, Part 3 of the DMRB (1993 and amendments). Site visits during the assessment of the various topic areas were used to identify the location of properties and features which may be sensitive to disruption.

Resource quality and sensitivity criteria applied in the assessment of construction phase impacts are as stipulated within the appropriate chapters of the report.

9.3 Baseline Conditions

DMRB Volume 11 states that studies have shown that at least half of the people living within 50 m either side of a site boundary were seriously bothered by construction nuisance in one form or another, but that beyond 100 m less than 20% of people affected were seriously bothered. In accordance with the DMRB, the study area for the

assessment of disruption due to construction comprises a corridor 100 m either side of the proposed scheme.

Chapter 3 (The Preferred Scheme) describes the key elements of the Scheme. It is anticipated that conventional methods of construction will be used with the precise nature of works being determined by the Contractor commissioned to complete the works and agreed with the appropriate authorities. Baseline conditions are discussed in detail in the appropriate chapters of this report.

Table 9.1 shows the approximate number of properties present within 100 m each side of the route. It should be noted that these figures have been developed in relation to the road line, but do not incorporate other associated areas of potential disruption, such as site compounds, the exact locations for which have not yet been confirmed.

Table 9.1 Approximate Numbers of Properties and Distances from the Proposed Road.

	Number of Properties and Distance from Road		
	0 – 50 m	**50 – 100 m**	**Total Number**
Scheme	133	285	**418**

9.4 Predicted Impacts

Disruption impacts considered under the following headings are generally those that are considered likely to be temporary in nature, although it is recognised that certain impacts arising during the (temporary) construction period may be permanent. Potential impacts relating to specific topic area are discussed, along with the mitigation that will be set in place. Impacts are also considered in detail in the relevant topic chapters, as they may persist through the operational phase of the scheme.

In addition to specific mitigation measures outlined, the potential construction-related impacts of the scheme will be controlled through the Employer's Requirements and an Environmental Management Plan (EMP). The contractor will be required to develop and implement the EMP prior to the commencement of work on site.

Construction operations that, without mitigation, could cause significant local impacts include:

- stripping and storage of topsoil and sub-soils;
- land take for ancillary works including site compounds;
- traffic and other access diversions affecting traffic flows in the vicinity of the junction and potentially across the wider network;
- noise, vibration, vehicle emissions and dust generation during earthmoving and operation of vehicles and plant on-site along with the passage of construction vehicles along the road network;

- dewatering of excavation areas, creation of site runoff management features and temporary alterations to local drainage;
- landscape and visual changes caused by construction activities, earthworks, vegetation removal and presence of construction plant and temporary compounds; and,
- temporary lighting and night-time working.

9.4.1 Earthworks and Major Structures

There are many construction activities that have the potential to cause varying degrees of disruption during the construction period. These include the movement of construction materials to the site, the movement of materials within the site, general construction activities and the removal of material to licensed sites off-site as necessary.

The most concentrated activities will tend to be at significant obstacles and centres of construction effort, such as at bridge sites. The structures proposed at Braehead Railway Bridge, A725 Overbridge (at Shawhead) and the North Calder Water Crossing are particularly notable in size; however they are some distance from large built-up residential areas.

The position of the Contractor's compounds has not yet been confirmed, but it is likely that there will be several given the length of the scheme. At the large bridge sites, set down areas may also be required for the fabrication of major structural elements. The opportunity for these remote sites will be limited to land made available to the contractor at the outset of the scheme and it will be up to the contractor to ensure that the construction and traffic management programme makes appropriate allowance.

The principal activity to be considered in this section is the proposed earthworks operations. The site investigations and assessment work undertaken at this time indicate that much of the material to be excavated to form the route of the new motorway and link roads will require further processing to allow it to be utilised in the construction of the embankments that support the roads in areas. Aside from the normal volumes of construction-related traffic, it is probable that additional plant movements will be necessary as a result of a deficit of reusable materials in the overall earthworks balance. This deficit will be addressed in one of two ways: either suitable earthworks material will be imported from quarries/other sites, or the excavated soils will be treated in such a way to render them useful (lime/cement stabilisation or modification). Additional off-site plant movements associated with the former option (importation) are likely to be substantially in excess of those required to bring in lime and cement treatment materials.

Importing large quantities of bulk material is undesirable in environmental terms and is unlikely to prove economic on such a scale. It is envisaged that the Contractor will make significant efforts to utilise the locally won materials from excavations within the site or possibly to identify opportunities to source recycled materials from developments in the wider area.

Notwithstanding the likelihood that treatment measures will be preferred, it is anticipated that there may be some requirement for importing geotechnically acceptable soils for embankment and capping construction purposes. These will most probably be won from existing stockpiles such as colliery spoil tips. The West Lothian oil shale tips have supplied large volumes of material in the past for central Scotland road schemes due to its easy availability and geotechnical properties. The shale (burnt blaes) is classified as an all-weather, granular material and, although stocks are now dwindling, this is expected to be the most probable source of off-site fill. Closer sources of fill may be identified but these will depend on other construction activity which may be taking place at the appropriate time. Also, the condition of these alternative materials and certainty of supply will be less able to be guaranteed. Dedicated borrow-pits on or close to the scheme are improbable since the known geology of the area does not suggest any nearby source of higher quality materials. Clean sands and gravels would command a premium price and therefore would be unlikely to be considered for general fill.

Landfill tax costs make it probable that off-site disposal of waste materials is an increasingly unattractive option. It is expected that almost all of the soils will be used on site, and that where these cannot be made acceptable as engineering fill, they will be put to productive use in landscape and environmental features such as earth bunds. Hence, it is anticipated that off-site tipping areas and export traffic will be reduced to a minimum.

9.4.2 Haul Routes and Construction Traffic

Haul routes will wherever possible be restricted to land within the site. This will require the Contractor to identify and construct a temporary route within the site boundary to transport material from one location to the other. This may also require the erection of temporary structures to cross major obstacles such as the A725 and the North Calder Water. The necessity to haul material within the confines of the site will also concentrate activity on permanent structure sites such as the North Calder Water to enable excavated earthworks material to be transported from west to east. The local importance of the North Calder Water as a Site of Interest for Nature Conservation (SINC) and wildlife corridor means that work within the watercourse itself should be avoided wherever possible, minimising disturbance also to bankside habitats. The temporary crossing is proposed to take the form of a Bailey bridge or similar, placed from above to protect the natural bed and banks of the watercourse.

Access points to the construction site from the local road network will be stipulated within the Employer's Requirements and will be determined on the basis of safety, proximity to the site boundary from the A8 and other local roads and to minimise disruption.

Assuming that a typical road-going haulage vehicle has a load carrying capacity of 10 m^3, earthmoving activities could generate approximately 472,818 (2 way) vehicle movements within the site (Table 3.1 estimated Summary of Earthworks Quantities). In addition the requirement to import material (currently estimated at 576,260m^3) will generate approximately 113,452 (2 way) trips on the surrounding road network. Off-site disposal of material (although to be kept to a minimum) is currently estimated to be 444,320m^3 which will generate approximately 88,864 (2 way) trips on the road network.

The earthworks operations on a construction site are influenced by the weather and the principal season for these activities is generally accepted as between the months of May and September. It is anticipated that the bulk earthworks operations will extend into 2 earthwork seasons. However, assuming as the worst case that the import of material is likely to happen in one season, this results in a 5-month period where earthworks construction traffic may contribute to an increase in traffic flows. If the import of material extends beyond the 5-month period assumed then the hourly impact would generally be experienced over a longer period of time but with fewer lorries per hour.

This import of material is most likely to be concentrated in the following sections of the scheme:

- Mossend to Eurocentral;
- Eurocentral to Chapelhall; and
- Chapelhall to east of Newhouse.

The construction of the road pavement will also require the import of the various constituent materials. It is estimated that approximately 345,000 m^3 of these materials will be required. The potential to place these materials also has restrictions in terms of weather conditions at a particular point on the day, however in general it remains possible to undertake pavement operations throughout the year. This activity can also only be undertaken when earthworks and drainage works have been undertaken. Assuming up to 18 months of the programme are available for blacktop operations this indicates an impact of less than 100 vehicles per day.

Remaining operations, such as import of concrete to structure sites or delivery of materials are less intensive and restricted to relatively short periods of time and to isolated sites within the site. Their impacts also therefore are unlikely to be discernible in the context of existing levels of traffic on the surrounding network.

9.4.3 Disruption to Traffic

Traffic management to enable the construction of the Scheme will have disruption impacts on existing road users, and local and regional traffic movements will inevitably experience some disruption due to construction of the Scheme, the extent of which cannot be determined until a more detailed site works programme has been prepared. It is anticipated that two-lane running will be maintained along the A8 during the course of construction to minimise traffic disruption.

Off-line working, where this is practicable, will reduce disruption to vehicle travellers and also to pedestrians and cyclists using the footpath/cycleway network. It has been assumed that temporary local diversions and/or land closures will be required where construction activity intersects with existing roads, for example at junctions.

HGV movements will result from construction activities as described above. Most construction traffic is expected to use the A8 and other main network routes – already strategic routes carrying high traffic flows. Heavy vehicles would be expected to avoid

the local network of minor roads, hence reducing the potential level of disturbance to residents.

9.4.4 Air Quality

Construction of the new road and associated structures and junctions may have a temporary effect on local air quality during construction. Earth-moving works and the storage of aggregates at site pose the highest risk with respect to the occurrence of 'nuisance dust'. These activities increase the risk of dust entrainment and possible nuisance occurrence from increased deposition to surrounding surfaces and potential effects on receptors, such as residential property in the vicinity. Chapter 6, Air Quality discusses construction-related impacts in more detail, and a summary of potential impacts and mitigation is provided below.

Construction and demolition are sources of particulate matter that can dominate particulate emissions locally over the period of specific activity, and therefore have the potential to have an adverse effect on the local environment both in terms of creating nuisance and in having an impact on health.

Construction of the proposed road improvement scheme is likely to involve a series of distinct operations, some of which may have an impact on air quality. These include:

- land clearing, ground excavation, site preparation and laying of foundations;
- material handling e.g. cut and fill, earth moving using bulldozers and scrapers, compacting;
- vehicle movements on unpaved surfaces. This is usually the greatest source of dust at construction sites;
- bund creation using topsoil and subsoil. Proximity to off-site sensitive locations can be significant;
- storage of aggregate materials in open stockpiles and resulting wind blow, with re-entrainment of settled particles (secondary emissions, often off-site due to dust exported on vehicle wheels). Proximity to off-site sensitive locations can be significant; and
- direct emissions from cutting, drilling, mixing etc. and vehicle exhausts.

At construction sites, it is acknowledged that the most significant potential dust emission sources are mechanical handling operations and haulage of material on unsurfaced site roads. However, wind blow from stockpiles can also generate significant levels of dust because this can occur on a 24-hour basis, whereas mechanical handling and vehicular haulage take place only during the working day.

During construction, consideration needs to be given to the passage of vehicles entering and leaving the site, re-suspended dust, and the operation of site vehicles, and possible

temporary traffic diversions. The BRE9 publication 'Control of dust from construction and demolition activities' sets out a simple method for undertaking a risk assessment to identify intended construction activities which are potential generators of dust and PM_{10}. This method uses checklists to determine which site activities are likely to be the largest component sources of PM_{10} emissions at the site. This type of approach can facilitate project planning and enable priorities for the control of on site particle emissions to be drawn up at an early stage.

The contractor will be required to apply best management practices and produce a method statement as part of the EMP to minimise dust and vehicle emissions during the course of the works.

In practice, many of the emissions are controlled by sensible operational procedures and good site practices, for example watering of haulage routes, therefore minimising the likelihood of a negative impact on the local air quality. There are a number of mitigation measures that can be employed which comply with good practice at construction sites, and are as follows:

- haul routes to be located away from off-site sensitive properties and to be watered regularly (wet suppression of dust);
- all site vehicles and plant to have upward-facing exhausts to minimise surface dust re-suspension;
- bunds or screens may be constructed as wind breaks, to reduce wind speeds. Earth bunds should be seeded as soon as possible, prior to which they are to be maintained damp;
- the aggregate stocking area should be located away from sensitive areas and residential properties;
- stockpiles should also be watered and water curtains may additionally be used at the site boundaries near sensitive properties;
- off-site vehicles to be sheeted, their wheels and bodies to be cleaned and the access road to be hard-surfaced and maintained damp;
- early paving of permanent roads;
- minimisation of drop heights, and the use of chutes to discharge material close to where it is required;
- vehicle wheel and chassis cleaning;
- imposition of speed limits, to reduce dust emissions from ground surfaces; and
- watering of haul road surfaces and restricting haulage vehicle speeds, these measures are recognised to reduce dust emission rates by about 70-80%.

[9] Buildings Research Establishment, 2003 'Control of Dust from Construction and Demolition Activities, BRE Garston

It may be concluded that there are no significant air quality constraints (slight adverse impact) to the proposed road improvements, although dust generation due to construction activities should be controlled through the use of standard mitigation measures and best practice employed during construction. A Method Statement for the construction phase will be drawn up by the contractors, to include the mitigation measures listed above. This will ensure that air quality impacts occurring during the construction phase are minimised.

9.4.5 Cultural Heritage

Consultation with Historic Scotland confirmed that there would be no direct effect on any known cultural heritage features. Detailed archaeological fieldwork has not been undertaken for the proposed scheme and Historic Scotland has stated that neither a formal Phase 1 archaeological desk study nor a Phase 2 archaeological field evaluation are required. Historic Scotland's initial desktop assessment of existing archaeological records is considered sufficient to indicate that cultural heritage constraints will not be a significant issue in relation to the proposed scheme.

Areas of new land take will be required for the scheme, potentially encompassing areas where archaeological features may remain undetected. Should unanticipated artefacts/remains be encountered during construction, these will be dealt with in accordance with current procedures and within Historic Scotland's Special Requirements. The methods used will be agreed with Historic Scotland, West of Scotland Archaeological Services and the Scottish Executive as appropriate.

9.4.6 Ecology and Nature Conservation

Impacts on ecology and nature conservation arising during the construction phase may often persist through the operation of the scheme. In view of this, construction and disruption related impacts are addressed in detail in Chapter 10 Ecology and Nature Conservation. A discussion of suitable mitigation measures in relation to ecology and water quality and drainage is contained in Chapters 10 and 15 respectively, but it should be noted that mitigation measures for these two topic areas frequently overlap and interlink to a degree. A summary of the required measures is set out as follows:

- a water quality protection plan to minimise risks to receiving waters;
- detailed procedures for minimising impacts on amphibians and fish to be agreed with SNH and SEPA. Water bodies to be drained and infilled at a suitable time of year to minimise detrimental impact to wildlife.
- protected species surveys, including for otters, kingfishers, bats, badgers, water vole (especially on Kennel Burn) and great crested newt, to be undertaken in the correct survey season prior to the commencement of works on site;
- pre-construction surveys to identify the extent of stands of non-native invasive plants, and required control and/or removal measures. A watching brief for fresh germination of giant hogweed in the area where it was formerly present to the south of the existing A8;

- licences to be obtained to provide artificial otter holts and an artificial badger sett prior to the loss of holts and setts along the alignment;
- where operations are to occur close to a known holt or sett, but not so close as to need licensing, a "people and machinery exclusion zone" extending to a 30 m radius around the holt or sett to be fenced off;
- implementation of good construction site management to avoid/minimise generation of excessive litter, dust, noise and vibration;
- topsoil handling, storage and re-use plan to be implemented by the Contractor to maintain viability of soils and preserve soil microfauna and flora;
- location of storage and construction compounds agreed in consultation with an ecologist to protect habitats or species of nature conservation value;
- working areas, including temporary access tracks, kept to a practical minimum through areas of vegetated habitat, and their boundaries clearly delineated at the commencement of works;
- existing vegetation to be retained as far as practicable;
- stands of invasive species or other sensitive areas such as ditches, defined in the EMP as requiring protection from accidental damage or disturbance, to be securely fenced prior to the commencement of site clearance; and
- nests, eggs and young of all species of wild bird to be protected from deliberate damage during the breeding season (generally March to August inclusive). To minimise the potential for such damage, vegetation likely to be used by breeding birds within working areas to be removed out with the breeding season;

During construction the Contractor will be required to prepare an Environmental Management Plan and work in accordance with SEPA's Special Requirements and Pollution Prevention Guidance (PPGs). The Contractor will also be required through Contact Documents to produce and implement Method Statements prior to the commencement of work on the site.

9.4.7 Pedestrians, Equestrians, Cyclists and Community Effects

Pedestrians and cyclists using non-motorised user (NMU) routes across the existing A8 and the line of the proposed motorway will experience temporary severance or diversion during the construction period. This is likely to be in the immediate vicinity of work on or around the Scheme. Such diversions may mean longer journeys and some loss of amenity for pedestrians and cyclists while they occur.

Diversions to other roads and associated pavements/footpaths and cycleways will be avoided where possible, but may have an indirect effect on traffic on the wider network, in particular where new roads are connected at intersections to the existing network. Likewise, road closures may cause temporary disruption to local residents and businesses without mitigation. Mitigation measures will be determined when the construction programme and phasing has been confirmed and agreed with the Local Authority and the Scottish Executive as appropriate. Given the relatively low level of use

of the routes affected during the construction phase and the fact that temporary diversions will be agreed with the Local Authority where required, no significant adverse impacts are anticipated on non-motorised users.

9.4.8 Landscape and Visual Effects

Excavation and construction processes, temporary accommodation works and the use of vehicles and machinery will result in some temporary adverse visual impact to both occupiers of properties with views across the Scheme (particularly those properties within 100m of the Scheme) and road users who would normally experience largely open views of the surrounding countryside to the south of the A8. The use of temporary floodlighting and security lighting at night (if required) would also cause visual intrusion. It is anticipated that the most intrusive activities will relate to:

- vehicles and machinery, including HGVs, excavators and cranes;
- earthworks;
- vegetation removal, soil stripping and excavation;
- the creation of temporary spoil mounds, material storage areas and compounds; and
- transient features such as fencing, lighting and signage.

Visual impacts arising from these changes will affect both road users and local residents and non-motorised users (NMU) crossing the road network (generally pedestrians and cyclists). The works will generally be highly visible to road travellers where the construction takes place alongside the existing A8 between Eurocentral and Newhouse, however this section has fewer residential receptors.

The Contractor will be required to implement the following mitigation measures in accordance with an agreed Method Statement to minimise potential landscape and visual impacts:

- retaining existing vegetation where possible to provide screening during works;
- limiting the size and extent of working and storage areas. Timing and phasing works to minimise the duration of impacts at any one location/set of visual receptors. Use of fencing to define the working areas;
- good housekeeping of the construction site and storage areas, keeping the site tidy and free of litter and debris so far as is possible;
- use of temporary floodlighting only when strictly necessary; lighting and night-time working to be in line with Local Authority requirements;
- careful selection and placement of site compounds, material storage areas and spoil heaps to minimise detriment to the landscape and to visual receptors;
- using spoil to create temporary screening of working areas; and

- early planting of trees, shrubs and grassed areas as well as new ponds and wetland creation to establish the structure of the longer-term visual and landscape mitigation.

Taking into account the above mitigation measures, visual impacts are anticipated to remain adverse with respect to both nearby properties and road users, but will be temporary in nature and potentially lessened throughout the construction period by the phasing of activities.

9.4.9 Land Use

The predicted temporary impacts during construction concern land-take for works and storage areas and disruption to existing land usage and local access. The majority of land required for the scheme is already in the ownership of Scottish Ministers; however there will be a need to purchase additional land. Land take from sites designated for built development is restricted to the minimum necessary for construction of the scheme and ancillary works. Disruption to the use of and access to farmland during the construction phase will be temporary in nature although, if not adequately managed, potential impacts could cause significant inconvenience.

The proposed scheme would have very little effect on land used by the public as defined in Chapter 8 (Figures 8.1a to 8.1e). Work adjacent to the football ground adjoining Woodhall Mill Road on the southern approach to Calderbank will require suitable temporary, and then permanent, access which will have no adverse impact on the sports pitches.

As much of the scheme will be constructed on a new alignment to the south of the existing A8, through traffic will be able to proceed for a substantial part of the construction period. Two-lane running in both directions will be maintained on the A8 during the construction period.

Although some degree of disruption to land use during construction of the scheme will be unavoidable, the Contractor will be required to provide the following mitigation measures:

- maintain continued communication with affected landowners, local residents and businesses;
- restrict land take from sites designated for built development to the minimum necessary for construction of the scheme and ancillary works;
- provide designated temporary access points where accessibility and severance may pose a temporary problem;
- access arrangements to properties to be fully considered prior to works on site and necessary facilities constructed before any works that may cause disruption are undertaken; and

9.4.10 Noise and Vibration

Noise and some degree of localised vibration in the vicinity of working areas will be unavoidable, arising from the movement and loading/unloading of vehicles and

machinery, earthworks and construction. However, much of the working activity will be at distances greater than 100m from residential areas. Without mitigation it is likely that pedestrians and cyclists and, to a lesser extent, vehicle travellers travelling around the road network will experience elevated noise levels. Current roads-dominated background noise will however tend to dominate much of the construction-related noise where residential areas lie close to the existing A8, A725 and other heavily-trafficked roads. Evening and night-time working would be likely to increase short-term noise impacts on local residents.

Many of the structures proposed for the Scheme will require piled foundations. This will require a contractor to work within agreed times of the day to limit noise impacts. These limits will be detailed within the Employer's Requirements and will be agreed in consultation with the relevant Local Authority to mitigate these impacts.

Noise mitigation will follow statutory guidance and requirements agreed and set in place with the Scottish Executive and relevant local authorities. These may include restrictions on workings hours, avoidance of unsocial hours where working closest to residential areas, and use of noise screening.

9.4.11 Vehicle Travellers

Views from the road will be adversely affected where there are views of earthworks, vegetation and soil stripping. This is discussed further in Section 9.4.8.

During the construction phase driver stress may increase for a temporary period where localised traffic management is set in place, although this is likely to be primarily where new junctions are constructed on the motorway and the APR. Traffic management may cause slower traffic flows, increase driver uncertainty with regard to journey times and heighten fears of vehicle break-down or accidents. However, much of the construction activity will take place off-line and during the construction phase there will be relatively low levels of disruption as vehicles continue to use the existing A8 where two-lane running is to be maintained.

Mitigation measures will aim to reduce adverse impacts on driver views through careful positioning and screening of site compounds and storage areas and other measures as described in Section 9.4.8. Driver stress arising from local disruption and traffic management measures will be alleviated through clear signage and road markings.

9.4.12 Water Quality and Drainage

A full discussion of suitable measures in relation to water quality and drainage is contained in Chapter 15. Water quality and drainage management and ecological mitigation measures (Chapter 10) overlap and interlink to a degree.

Impacts on the hydrological characteristics and water quality of the North Calder Water, tributaries within the scheme corridor and associated catchment areas may result during the construction phase. This may occur due to the following:

- temporary disruption to hydrological flows during construction (i.e. through proposed works upstream/culverts);
- accidental spillage/mobilisation of sediments into local watercourses;
- accidental spillage of liquid contaminants into local watercourses; and/or
- inputs of leachate derived from on-site stored construction materials.

Certain effects are also applicable to the operational stage of the Scheme and these aspects are discussed in Chapter 15.

Works within or in close proximity to watercourses and wetlands crossing or near to the Scheme, such as the North Calder Water, will require particular attention. Watercourse diversion works (temporary and permanent) will also require careful controls to minimise potential impacts upon the aquatic environment. Works affecting watercourses will be subject to consultation in advance and will generally require a licence from SEPA under the Controlled Activities Regulations (CAR) in advance of any activity on site.

Overall potential construction phase impacts upon surface water resources are assessed as low adverse with mitigation in place. Potential impacts upon groundwater are anticipated to be negligible.

In order to safeguard against potentially adverse impacts upon water quality and drainage, all works during the construction phase will be carried out in line with best practice guidelines, including SEPA's Special Requirements and Pollution Prevention Guidelines. An appropriate drainage system will be constructed and implemented during the construction phase, as indicated in Chapter 15. This will be further developed by the Contractor and agreed with SEPA well in advance of any works on site.

The early establishment of temporary drainage facilities in line with standard construction good practice will avoid the majority of potential problems during construction. Temporary watercourse crossings (Kennel Burn and Luggie Burn) will use bottomless arch, large diameter, culverts to retain natural bed and maintain free passage of fish and other wildlife. The temporary crossing of the North Calder Water will be a bailey bridge, constructed so as to minimise, as far as possible, disturbance to the banks and bed of the watercourse.

Diversion of the Baillieston Surface Water Sewer will be carried out in consultation with the appropriate authority and using standard good practice measures to prevent the risk of accidental spills.

It is assumed for the purpose of assessment that construction operations would adopt standard practices in line with guidance provided by SEPA including Pollution Prevention Guidelines (PPGs) and supported by consultation with the local SEPA Environmental Protection Team. PPGs relevant to this project are likely to include:

- PPG 1: General Guide to the Prevention of Water Pollution;
- PPG 2: Above Ground Oil Storage Tanks;

- PPG 5: Works in, near or liable to affect watercourses; and
- PPG 6: Working at Construction and Demolition Sites.

Mitigation measures (to be incorporated into Contract requirements) will include:

- safe storage of on-site materials such as oils, fuels, concrete and cement products, to prevent potentially contaminating spillage events. Bunded storage areas to be established for oil and fuel storage away from watercourses, water bodies, ditches and drains. No batching or mixing of concrete, or refuelling, to be carried out near to watercourses, ditches or ponds;
- provision of erosion control measures, cut-off ditches, silt traps, containment bunds and storage reservoirs of appropriate size in line with SEPA requirements, in order to intercept runoff and prevent sediments entering local watercourses and to minimise soil erosion;
- the provision of clearly defined 'no access' areas indicated on site plans and on site adjacent to sensitive watercourses, and the installation of protective fencing to prevent unauthorised staff, plant and machinery access;
- runoff interception and control measures for grouting operations (where required) to include settlement ponds and provision for the removal and safe disposal of settled material off site as necessary; and
- contingency procedures in case of emergencies/unforeseen events to be set in place by the Contractor as part of the Environmental Management Plan (EMP).

9.4.13 Geology and Soils

The proposed Scheme will require the excavation of approximately 2,364,090m^3 (Cut) and 2,487,030m^3 of Fill material (Chapter 3, Section 3.8). These estimates are indicative, and earthwork volumes are being considered in more detail to provide a balanced approach, such that embankments are constructed with acceptable material excavated from cuttings.

Within these amounts, approximately 1,563,340m^3 of excavated material can be re-utilised within the embankments, although a proportion will require treatment to enable classification as general fill or capping. The treatment envisaged would be lime/cement stabilisation. This form of treatment requires traditional excavation and placement of 'marginal' material, with subsequent spreading and mixing of the lime/cement undertaken by typical agricultural type plant. The material is then left for a period of time, several hours typically, prior to compaction by standard construction plant.

This treatment of 'marginal' material results in the requirement to import approximately 567,260 m^3 to the site for engineering fill. The balance of the excavated material within the site is likely to be suitable for use as part of the landscape mitigation strategy and for noise mitigation earthworks where required, thereby reducing the need to transport off-site and dispose. The importing of bulk earthworks will therefore be kept to a minimum.

It is preferable that the bulk quantities should be moved the least distance within the confines of the site to minimise disruption from the earthworks activities. An assessment has been undertaken to identify where material is excavated, the condition it may be expected to be in and where it can be placed. This has involved considering the site in several sections. The sections have typically been identified by constraints that exist which prevent straightforward access from west to east through the site.

- Section 1 - Baillieston to Glasgow Whifflet railway;
- Section 2 – Glasgow Whifflet railway to A752;
- Section 3 – A752 to A725;
- Section 4 – A725 to North Calder Water;
- Section 5 – North Calder Water to Mossend Railway;
- Section 6 – Mossend to Eurocentral;
- Section 7 – Eurocentral to Chapelhall; and
- Section 8 – Chapelhall to east of Newhouse.

A summary of the quantities within these sections is tabulated in Chapter 3, Table 3.6.

Where a surplus at a particular location is shown, this material may be used to account for a deficit elsewhere within the site. The assumption is that the Contractor will minimise haulage distances within the site. The result is that material from Section 1 may be utilised in Section 2, the balance will be combined with the surplus from Sections 2, 3, 4 and 5 and could be used in Sections 6 and partially within Section 7. The remaining material to construct embankments within the site would be imported to Sections 7 and 8.

It is anticipated that excavated soils will be temporarily stored on site prior to replacement as fill material for embankments. The extent of works and the exposure of soils during the construction phase are considered to have an impact magnitude of moderate, resulting in an overall slight adverse impact (insignificant).

Disturbance to the geological and soil attributes of the study area during scheme construction will be minimised through the adoption of the following mitigation measures:

- limitation of the extent and location of working and storage areas;
- implementation of erosion and sediment controls;
- appropriate handling and storage of spoil;
- re-use of excavated materials as part of the scheme landscaping strategy wherever possible; and
- removal of surplus material off-site to a suitable disposal facility.

9.5 General Mitigation

This section describes general mitigation ‘good practice’ measures applicable to the whole Scheme. Specific mitigation measures as described above and in the relevant

topic chapters will be set in place during the construction phase to reduce adverse effects on sensitive receptors. Disruption at any individual construction location will be reduced as far as possible through a combination of good practice measures, agreed as necessary with SNH, SEPA and the relevant Local Authority.

The potential impacts of the proposed scheme will be controlled through the development and implementation of an Environmental Management Plan (EMP) and through Construction Method Statements. The Contractor will be required to implement the EMP prior to the commencement of work on site.

Further measures should be taken during the construction period to ensure that the contractors follow the recommendations contained within the above guidelines. Specific measures will be required of the Contractor as part of the specimen design and Environmental Management Plan (EMP) for appropriate and adequate pollution mitigation with regards to the type of facilities required and the methodology adopted.

General mitigation measures will include:

- minimising land take by defining a specific working corridor during construction and protecting sensitive receptors through signage, fencing and specific instruction of site staff;
- programming work to reduce impacts from construction activities, and in particular to avoid cumulative or repetitive disruption to local communities and road users;
- working practices and hours agreed in advance with the appropriate Local Authorities. Site operation hours to be restricted as required, especially where site activity could cause disruption to adjacent sensitive properties;
- the Local Authority maximum allowable noise levels on working sites written into contract documents;
- the contractor required to apply best management practices and produce a method statement as part of the EMP to minimise dust and vehicle emissions during the course of the works;
- Network Rail consulted on works planned close to railways;
- work on Sundays generally restricted to “quiet” operations, although some work may have to be undertaken on Sundays to minimise disruption to traffic during the rest of the week. Night-time working only undertaken where it is not practicable to undertake work during normal site hours;
- rights of way redirected and kept open (unless specific circumstances necessitate short periods of closure, e.g. for safety reasons) so as to limit disturbance to pedestrians, equestrians and cyclists;
- road closures and temporary diversions, should they occur, kept to a minimum and, if necessary, phased to minimise inconvenience and delays to road users and occupiers;

- safety fencing and warning signs used to safeguard the public, redirect NMUs temporarily and prevent unauthorised access to working areas; and
- physical control measures implemented as part of good working practices, including runoff control, damping down haul roads and washing vehicles before entry onto the public highway, selection of low noise/vibration equipment, fencing as appropriate and minimise floodlighting at night.

9.6 Residual Impacts

Impacts caused during the construction phase of the proposed scheme are typically short-term or temporary in nature. When coupled with the implementation of mitigation measures specified in the Environmental Management Plan (EMP) and Method Statements prepared by the Contractor prior to commencement of works on site, many of these impacts can be successfully avoided or reduced. As such, most residual construction phase impacts are assessed as being slight/low adverse with the exception of landscape impacts and impacts upon driver views and driver stress, which are assessed as moderate adverse during the construction period.

With mitigation measures in place, construction will still cause direct and indirect disruption at and around the main intersections and stretches of new road linking to the existing network. Construction traffic using the existing network, including heavy equipment movements, will also cause intermittent disruption.

Providing the mitigation measures are put in place then most properties within 100 m are likely to experience intermittent low to moderate adverse impacts. However, properties closer to proposed working areas (within 50m) are likely to experience moderate to high impacts at certain times during the construction period.

It is not possible to eliminate airborne emissions or noise entirely from construction sites, but the residual impact upon receptors is assessed as not significant for this scheme.

With the implementation of generally accepted good practice measures and appropriate mitigation measures the residual impact of construction activity on ecology is likely to be reduced. Impact severity will depend on the location of particular working areas in relation to identified sensitive ecological receptors. While much of the construction activity will affect ecological receptors of relatively low importance and sensitivity; the risk of significant adverse impacts will be increased for those receptors within or near to statutory designated sites. At most, impacts are likely to be slight adverse and of no significance.

10 Ecology and Nature Conservation

10.1 Introduction

This chapter provides an Ecological Impact Assessment of the preferred road improvement scheme for the M8 Baillieston to Newhouse. It presents information on baseline conditions and the nature conservation value of the area with the potential to be affected by the proposals. It then outlines the nature and significance of the potential impacts on flora and fauna within and adjacent to the route alignment. Mitigation measures are proposed to avoid, minimise or compensate for potential adverse effects, and enhancement measures to maximise the biodiversity value of new habitats created by the improvement scheme are set out. The chapter concludes with an assessment of the residual impacts of the proposed scheme on ecology and nature conservation.

The scope and area of surveys in the study area were determined through an ongoing process of liaison with Scottish Natural Heritage (SNH) and North Lanarkshire Council.

10.2 Methods

The methodology followed for this Ecological Impact Assessment (EcIA) is as described for a Stage 3 assessment in the DMRB Volume 11, Section 3, Part 4 Ecology and Nature Conservation, Chapter 7.

10.2.1 Consultations and Desk Study

A Stage 2 DMRB Environmental Impact Assessment Report was submitted to the Scottish Executive in November 2004, and updated in 2005 (MF JV, 2005). As part of the Stage 2 assessment, comprehensive consultations had been carried out with relevant statutory and non-statutory organisations in February 2004 to provide an understanding of the study area's ecological interest and to elicit the views of consultees on the potential ecological impacts of the proposed options. Key consultees, SNH and North Lanarkshire Council, were then further consulted through meetings and correspondence during the Stage 3 DMRB assessment, to ensure that their views on impacts and preferred mitigation options and enhancement opportunities were taken fully into consideration in the specimen design proposals.

The nature conservation organisations consulted with respect to the Stage 3 DMRB assessment and their responses are presented in Table 5.1 in Chapter 5.

In addition to consultations and review of the Stage 2 assessment, the desk study for the current Stage 3 DMRB assessment included review of the following sources of information:

- http://www.jncc.gov - for statutory European sites;
- http://www.scottishwildlifetrust.org.uk - for non-statutory wildlife sites;
- http://www.sepa.org.uk - for salmonid fisheries information;

- http://www.northlan.gov.uk - planning/biodiversity for North Lanarkshire;
- http://www.searchnbn.net - for species records;
- http://www.scotland.gov.uk - for Scotland's Biodiversity Strategy;
- http://www.ukbap.org.uk - for both the Glasgow City and the North Lanarkshire Council Local Biodiversity Action Plans (LBAPs); and
- http://www.wildlifeglasgow.gov.uk.

10.2.2 Field Survey

Extended Phase 1 Habitat Survey

The study area boundary is as shown in Figures 10.1 a – e and 10.2 a – e. This area was subject to an extended Phase 1 habitat survey in the period May to July 2004, focussing primarily on semi-natural and other vegetated land up to approximately 500 m either side and at each end of the scheme. Phase 1 habitat survey is a standardised method of recording habitat types and characteristic vegetation, as set out in the "Handbook for Phase 1 Habitat Survey – a technique for Environmental Audit" (JNCC, 1993). This habitat survey method was extended in accordance with the "Guidelines for Baseline Ecological Assessment" (IEA, 1995) through the additional recording of specific features indicating the presence, or likely presence, of protected species or other species of nature conservation significance. Descriptive "target notes" (shown as red numbered circles in Figure 10.2 and referred to throughout this Chapter as **TN**s), were recorded to provide details of characteristic habitats, features of ecological interest, or any other features which required note to aid ecologically sensitive design or mitigation.

Whilst not a full botanical or protected species survey, the extended Phase 1 method of survey enables suitably trained and experienced ecologists to obtain an understanding of the ecology of a site such that it is possible either:

1. to confirm the conservation significance of the site and assess the potential for impacts on habitats/species likely to represent a material consideration in planning terms; or
2. to establish the scope and extent of any additional specialist ecological surveys that will be required before such confirmation can be made.

Additional Specialist Surveys

It was concluded during the Stage 2 DMRB assessment that a number of issues would require further specialist survey in order to obtain a more detailed understanding of baseline conditions for the Stage 3 DMRB assessment. The specialist surveys listed in Table 10.1 were therefore carried out.

Table 10.1 Specialist Ecological Surveys Carried Out, 2004 - 2006

Species	Status	Survey Date(s)
Flora of designated "SINCs"	Non-statutory designated local nature conservation sites	May to July 2004
River Corridor and Otter Survey	Non-statutory designated local nature conservation site with European Protected Species	June 2005 Update surveys May 2006 and January 2007
Bats	European Protected Species	July 2004 (Stage 2 DMRB) September 2005 (walkover) September 2006 (activity surveys at selected locations)
Great crested newt	European Protected Species	July 2004 - Stage 2 DMRB April and May 2005 (Stage 3 DMRB)
Kingfisher	Great Britain specially protected bird species	July and October 2005
Badger	Great Britain protected species	Feb/March 2005 (walkover survey) March 2005 (bait-marking survey) Update survey May and June 2006
Water vole	Great Britain protected species	June 2005 Update survey May and June 2006 as part of RCS and otter surveys.

Further information about the specialist survey methods used is provided in the relevant Technical Appendices in Volume 2 of this Environmental Statement, as follows:

- Appendix 10.1 Extended Phase 1 Habitat Survey;
- Appendix 10.2a National Vegetation Classification Survey of SINCs;
- Appendix 10.2b Young's helleborine update survey;
- Appendix 10.3a River Corridor and Otter Survey of North Calder Water;
- Appendix 10.3b Update Otter Survey 2007;
- Appendix 10.4 Bat Survey and Assessment;
- Appendix 10.5a-c Great Crested Newt Survey Reports, 2004, 2005, 2006;
- Appendix 10.6 Kingfisher Assessment of the North Calder Water; and
- Confidential Annex Badger Survey and Assessment

10.3 Data Limitations

As the extended Phase 1 habitat survey was conducted in May to July, some early - flowering species may not have been visible at the time of the survey. However, experienced botanical surveyors carried out the extended Phase 1 survey and it is considered that the survey results are representative of the flora of the study area, and include all the dominant and characteristic species.

In addition to permanent ponds, there are records from a recent report (HEL, 2003) relating to part of the study area to the west of the Shawhead Junction, known as the "Douglas Support Estate", of temporary/seasonal water bodies being present at times. Not all of the temporary ponds recorded by HEL were in evidence during the amphibian surveys of 2004 and 2005, but as they had been surveyed in 2003, their not being surveyed in 2004/2005 is not considered to represent a significant limitation to this EcIA. However, it is similarly possible that during wet seasons there may be other temporary ponds/pools elsewhere within the study area which have not been surveyed for amphibians. Although temporary ponds may be suitable for use by amphibians for breeding, this limitation is considered not to be significant in terms of assessing the amphibian status of the area.

Dense scrub vegetation and steep banks along parts of the North Calder Water restricted complete access to parts of the study area, however these areas were surveyed from as close as possible and the access limitations are considered to be minor. It is the professional opinion of the experienced surveyors that additional survey of the site would not materially alter the conclusions drawn from the survey work or the recommendations made in respect of mitigation measures.

10.4 Impact Assessment Methods

In addition to the requirements of DMRB Volume 11, the EcIA has been completed with reference to the methodology set out below, which has taken into account a range of suggestions contained in current guidance and best practice, including the following publications:

- National Planning Policy Guideline (NPPG) 14, Natural Heritage. Scottish Office Development Department, 1999;
- Planning Advice Note (PAN) 60; Planning and Natural Heritage. Scottish Executive Development Department, 2000;
- Circular 15/99 Environmental Impact Assessment (Scotland) Regulations, 1999;
- Nature of Scotland. A Policy Statement. Scottish Executive, 2001;
- Handbook on Environmental Impact Assessment. Scottish Natural Heritage, 2002;
- The Biodiversity sub-objective of Transport Analysis Guidance (TAG), Department for Transport, 2004; and

- Guidelines for Ecological Impact Assessment. The Institute of Ecology and Environmental Management (IEEM), June 2006.

Several stages of evaluation and application of significance criteria are involved in the process of EcIA. The approach adopted for the EcIA in this case is set out below.

10.4.1 Evaluation

Criteria are applied to assess the nature conservation value of the habitats and species/populations that the site supports. As there is rarely comprehensive quantitative data on the habitat or species population resource, particularly at the Regional to Local level, the nature conservation evaluation process necessarily also involves a qualitative component. This requires a suitably trained and experienced ecologist to make a professional judgement based upon a combination of published sources, consultation responses and knowledge of both the site and the wider area. The categories of nature conservation value used in this Chapter are as follows:

- International – sites, habitats and species/populations of significance in a European context;
- UK - sites, habitats and species/populations of significance in the context of the UK;
- National – sites, habitats and species/populations of significance in the context of Scotland;
- Regional – habitats/species/populations of significance in the context of the Clyde Valley;
- Local – sites, habitats and species/populations of significance in the context of either the Glasgow City or the North Lanarkshire Council areas;
- Low – habitats and species/populations of less than Local significance, but of some value; and
- Negligible – less than low conservation value.

10.4.2 Impact Magnitude

The magnitude of an impact depends upon the nature and sensitivity of a receptor and the range of potential effects arising from the implementation and operation of a proposed development. In assessing the likely magnitude of an effect, it is necessary to have as great an understanding as possible of its timing, intensity, frequency, duration and reversibility. For the purposes of this assessment, the nature of the effects on specific receptors is described in the Impacts section, and then the magnitude of these combined effects is summarised as being in one of the categories “imperceptible”, “low”, “medium” or “high”, depending upon the extent of the area or population deemed likely to be affected by the development.

Table 10.2 below provides an indication of the terms in which the magnitude of ecological impacts is considered in this Chapter. The following definitions have been applied in respect of timescales:

- "immediate" within approximately 12 months;
- "short-term" within approximately 1 to 5 years;
- "medium-term" within approximately 6 to 15 years;
- "long-term" 16 years or more.

Table 10.2 Levels of Impact Magnitude

Magnitude	Description
Imperceptible	Not expected to affect the conservation status of the site, habitat or species under consideration in any way, therefore no noticeable effects on the ecological resource, even in the short-term.
Low	Noticeable effects, but either of sufficiently small scale or short duration to cause no harm to the conservation status of the site, habitat or species. Detectable in short- but not in medium-term.
Medium	Significant effect on the nature conservation status of the site, habitat or species, but would not threaten the long-term integrity of the system. Detectable in short- and medium-term.
High	Significant effect on the nature conservation status of the site, habitat or species, likely to threaten the long-term integrity of the system. Detectable in short-, medium- and long-term.

10.4.3 Significance of Impacts

The determination of impact significance involves the interaction of both the nature conservation value of the site, habitat or species concerned, together with the magnitude of the various impacts upon it. The more ecologically valuable a site and the greater the magnitude of the impact, the higher the significance of that impact is likely to be.

Table 10.3 shows in general terms the way in which the significance of ecological impacts is considered in this Chapter. It is important to appreciate that this does not represent a rigid framework for assessment - there are gradations between different categories of site and impact, and on occasion the significance of a particular impact may not accord precisely with the categories shown below. Impacts identified as minor are considered not to be significant for the purposes of this EcIA.

Table 10.3 Generalised Impact Significance Matrix

Nature Conservation **Value**	**Magnitude of Potential Impact**			
	High	**Medium**	**Low**	**Imperceptible**
International	Exceptional	Major	Moderate	Minor
National – Including both UK and Scotland	Exceptional	Major	Moderate	Minor
Regional – Clyde Valley	Major	Moderate	Minor	Minor
Local – Glasgow City and North Lanarkshire	Moderate	Minor	Minor	Negligible
Low – less than Local	Minor	Negligible	Negligible	Negligible
Negligible	Negligible	Negligible	Negligible	Negligible

10.5 Baseline Conditions

Background information on the legislative and planning policy context that underpins this EcIA is provided in Chapter 17 Policies and Plans.

10.5.1 Statutory Nature Conservation Designations

There are no statutory Local Nature Reserves or statutory designated sites of international or national nature conservation value within or adjacent to the Scheme. The nearest statutory designated Sites of Special Scientific Interest (SSSI) are the Hamilton Low Parks SSSI and Woodend Loch SSSI. Two further SSSIs (Tailend Moss and Milburn) are discussed in Chapter 6, Air Quality, with respect to the potential impacts on vegetation of changes in air quality due to the proposed scheme[10]. The assessment concludes that the Scheme will have a slight beneficial impact, in terms of air quality, at both of these latter two sites. Other potential impacts on the ecology of these SSSIs are not considered further in this Chapter due to their distance from the Scheme.

[10] In accordance with Interim Advice Note 61/05, all SACs, SPAs, cSPAs, Ramsar or SSSI sites within 200m of any road on which there are potentially significant changes in traffic flows were identified. Of the four SSSIs: Hamilton Low Parks, Woodend Loch, Milburn and Tailend Moss, Hamilton Low Parks and Woodend Loch were scoped out of the air quality assessment.

Hamilton Low Parks SSSI, which lies immediately to the west of the M73 approximately 3 km to the south of Baillieston Interchange, is designated for its wetland and ornithological interest. Woodend Loch SSSI is also designated on account of its interest as a wetland bird site, and lies approximately 1 km north of the Baillieston Interchange. Both of these SSSIs are sufficiently far from the Scheme for there to be no direct or indirect impact upon them as a result of the proposed scheme. These sites are therefore not considered further in this Chapter.

10.5.2 Non-statutory Nature Conservation Designations

Sites of Interest for Nature Conservation (SINCs)

Glasgow City and North Lanarkshire Councils confirmed that there are 19 Sites of Interest for Nature Conservation (SINCs), a non-statutory designation applied by the local planning authority to sites considered to be of local ecological importance, within the study area. These sites are listed (from west to east, approximately) in Table 10.4 below, and their locations and a brief summary of the vegetation communities that characterise each is shown in Figures 10.1 a – e. Further details are provided in Appendix 10.2. SINCs are afforded a degree of protection under planning policy guidance in NPPG14 and PAN 60, which are implemented through Glasgow City Local Plan policy ENV 5 and North Lanarkshire Local Plan[11] policy ENV 14.

There are seven SINCs, highlighted with an asterisk in Table 10.4, which will be directly affected by the proposed improvements.

[11] North Lanarkshire Council (June 2001). Southern Area Local Plan Finalised Draft (Modified June 2001) Written Statement.

Table 10.4 Non-statutory Sites of Nature Conservation Interest

Site Name	Closest Distance from M8 Improvement Scheme	Designating Authority	Known Features of Interest
Greenwells SINC	460 m	Glasgow City Council	Hawthorn scrub.
North Calder Water : Newlands Glen – Ravel Burn SINC	270 m	North Lanarkshire Council	Block of Ancient Woodland and wetland habitats. UK and Local BAP priority wet and ash woodland habitat. European protected species – otter.
North Calder Water : Braehead/Aitkenhead (west section) SINC	70 m	North Lanarkshire Council	UK and Local BAP wet woodland priority woodland habitat. European protected species – otter.
North Calder Water : Braehead / Aitkenhead (east section) SINC	190 m	North Lanarkshire Council	UK and Local BAP priority ash woodland habitat. European protected species – otter.
Luggie Glen SINC	400 m	North Lanarkshire Council	Stream habitat with ravine woodland, including wet woodland UK and Local BAP priority habitat. European protected species – otter. This site also benefits from designation as a Scottish Wildlife Trust Wildlife Site.
North Calder Water : Bankhead to Viewpark Glen SINC	30 m	North Lanarkshire Council	Ancient mixed woodland including UK and Local BAP priority ash woodland habitat. European protected species – otter.
Crowflat Pond SINC*	Lies directly on new M8 alignment	North Lanarkshire Council	Wet woodland, swamp and open water, including UK and Local BAP priority habitat.

North Calder Water : The Wilderness – Rosehall Bridge SINC	70 m	North Lanarkshire Council	West Section - Ancient Woodland site, replanted. European protected species – otter.
			East Section - Long-established, mixed plantation. European protected species – otter.
North Calder Wood SINC*	Lies directly on new M8 alignment	North Lanarkshire Council	UK and Local BAP wet woodland priority habitat.
North Calder Water: the Wilderness – Rosehall Bridge SINC*	Partly affected by SuDs facility at Shawhead	North Lanarkshire Council	Mainly Plantation Woodland, part Ancient Woodland
North Calder Water : Rosehall Bridge – Carnbroe Mains SINC*	This linear site is crossed by the new M8 alignment	North Lanarkshire Council	Ancient Woodland, including UK and Local BAP ash woodland priority habitat. European protected species – otter.
North Calder Water : Carnbroe Mains – Greenend SINC	220 m	North Lanarkshire Council	UK and Local BAP ash woodland priority habitat. European protected species – otter.
South Carnbroe Wood SINC	170 m	North Lanarkshire Council	Woodland, including wet woodland UK and Local BAP priority habitat. A pond on this site had been recently drained when surveyed during 2004.
Orchard Farm Pool SINC*	Directly adjacent to existing A8 highway boundary.	North Lanarkshire Council	Transition from open water, through swamp and tall-herb fen to rush-pasture and wet woodland. UK and Local BAP priority habitats. This site also benefits from designation as a Scottish Wildlife Trust Wildlife Site.
Faskine Estate Woodland and Pond SINC*	Mixed plantation directly affected by Eurocentral Junction. Pond 120 m away.	North Lanarkshire Council	Mixed woodland and wetland habitats, including open water, small reed bed and wet woodland UK and Local BAP habitat.

Greenend to Maggieshaugh SINC	290 m	North Lanarkshire Council	Mixed plantation woodland.
Blacklands Plantation* and Roundel Pond SINC	Corner of broadleaved plantation only, directly affected by slip road embankments. Pond 350 m away.	North Lanarkshire Council	Block of broadleaved and mixed plantation woodland, and a nearby pond with transition habitats from open water through swamp and wet woodland UK and Local BAP habitat.
North Calder Water : Maggieshaugh – Calderbank SINC	10 m	North Lanarkshire Council	Ancient Woodland, replanted. UK and Local BAP wet and ash woodland priority habitat. European protected species – otter.
O Wood SINC	20 m	North Lanarkshire Council	Broadleaved and mixed plantation, including young stands. Small fragment of rush-pasture and stand of swamp marking site of late successional pond.
Shotts Burn SINC*	Directly crossed by existing A8 where on-line improvements proposed.	North Lanarkshire Council	Stream habitat with ravine woodland and a mixture of habitats in area subject to historic disturbance from industrial activity. European protected species – otter.

Scottish Wildlife Trust "Wildlife Sites"

Two of the above SINCs, Luggie Glen and Orchard Farm Pool, are additionally recognised by the Scottish Wildlife Trust (SWT) as Wildlife Sites (WSs); sites of local importance, of which there are approximately 200 in North Lanarkshire, and the planning framework for which is also set out in NPPG14. There are no further WSs in the study area. As the dual SINC/WS designation makes no material difference to the manner in which this EcIA is carried out, for ease of reference Luggie Glen and Orchard Farm Pool will be referred to hereafter only as SINCs.

Corridors of Wildlife and Landscape Importance

As well as SINCs, Glasgow City Council has designated corridors of wildlife and landscape importance (Local Planning Policy ENV7). Desk study indicates that the road system and verges of Baillieston Interchange (including the Coatbridge to Airdrie electrified rail line) and the northern riparian zone of the North Calder Water at the very western margin of the study area is designated as a corridor of wildlife and landscape

importance. Such sites do not have as high a conservation priority as SINCs in planning terms. There is no automatic presumption against development in the Local Plan, but the principal aim of the policy is to maintain the connectivity of important wildlife corridors through careful mitigation of any development that could affect them.

Ancient and Long-established Woodland

SNH provided the locations of areas within the survey corridor that are included in its Inventory of Ancient Woodland sites. Ancient Woodland is not a formal designation as such, but in Scotland is a term applied to sites whose documented history shows them to have been continuously wooded since approximately 1750, and which are by extension considered likely to have been continuously wooded since the last Ice Age. Long-established woodlands are secondary woodland with a documented history extending back from 100 – 250 years. Ancient Woodland sites and their mature soils are considerably more complex and biodiverse ecosystems than secondarily wooded sites, and long-established woodland more complex than recent plantings. Ancient and long-established woodlands therefore represent environmental capital that should be considered to be a finite resource, as it is not renewable in a human timescale.

All of the Ancient Woodland and long-established woodland within the study area lies within designated SINCs, concentrated towards the western end of the corridor of the North Calder Water, where it consists of both riparian and ravine woodland.

10.5.3 Habitats and Vegetation Communities

Figures 10.2 a - e show the Phase 1 habitat types recorded within the study area, and it also shows the location of target noted (red circles with a corresponding description number - **TN**) sites. Target note numbered descriptions can be found in the technical report at Appendix 10.1.

The following habitats, listed in conventional order used in the Phase 1 manual rather than in order of abundance, are present within the study corridor:

- Semi-natural broad-leaved woodland;
- Broadleaved plantation woodland;
- Mixed plantation woodland;
- Conifer plantation;
- Dense scrub;
- Scattered scrub;
- Scattered trees;
- Unimproved neutral grassland;
- Semi-improved neutral grassland;
- Improved grassland ;

- Marshy grassland;
- Species-poor semi-improved grassland;
- Tall ruderal;
- Swamp;
- Standing water;
- Running water;
- Arable;
- Amenity grassland;
- Hedgerow;
- Built up areas/hardstanding; and
- Bare ground.

A summary description of these habitats, including an assessment of their nature conservation value, is provided below. This is based upon data that are provided in full at Appendix 10.1 (extended Phase 1 habitat survey of study area) and Appendix 10.2a (NVC survey of SINCs).

In this Chapter, habitats are discussed in order of abundance within the study area, starting with those that are most common. Where appropriate, habitats have been grouped.

Man-made Habitats – Built-up Areas and Bare Ground, Improved Grassland and Arable

The study area surrounding the proposed scheme is dominated by managed habitat, consisting mainly of intensive agricultural land supporting improved grassland and arable cultivation, or of built-up areas devoted to industrial or retail use, with some housing. All bare ground habitat within the study area was recorded on sites that had been cleared for, or were in the process of, construction at the time of survey (2004).

All of these non-natural habitats are common and widespread, both in the local area and more widely throughout Scotland and the rest of the UK and, although they support a range of flora and fauna, their intrinsic nature conservation value is assessed as being negligible.

Other Grassland Habitats

Although the majority of agricultural grassland within the study area is classified as improved, substantial areas of semi-improved grassland are also present. This grassland is also under intensive agricultural use throughout most of the study area, but a variety of less intensively managed types are also represented, especially in association with woodlands along the North Calder Water. Marshy grassland is limited to small areas towards the eastern end of the Scheme. The semi-improved, unimproved and marshy grasslands of the study area are mainly neutral in character and are typically rank and of

low botanical diversity. The overwhelming majority of the grassland habitat within the study area, even those areas included within the boundaries of the various SINCs, is not botanically diverse and the communities are of types that are common and widespread both locally and throughout the UK.

Whilst the intrinsic interest of the grassland habitats described above is negligible in botanical terms, they do support a range of faunal species, including farmland birds that are of conservation interest. For this reason, these commonly-occurring semi-improved and unimproved grassland habitats are assessed across the study area as being of some, low, nature conservation value. The grassland habitats in close juxtaposition to woodland, especially along the corridor of the North Calder Water, are considered to contribute to the value of the adjacent woodland SINCs in terms of functional ecology, i.e. faunal species that are resident in the woodlands are likely to forage in adjacent fields.

Woodland Habitats

Wooded habitats in the study area include semi-natural and plantation broadleaved woodland, mixed plantation woodland and a very small amount of commercial conifer plantation (e.g. **TN 82**). Almost all of the woodland within the North Lanarkshire part of the study area has been included within designated SINCs, but surveys of the SINCs found that the ecological quality of these woodlands varies.

The majority of broadleaved semi-natural woodland is concentrated within the corridor of the North Calder Water, and therefore concentrated in the western half of the scheme where the river flows sub-parallel with the proposed scheme. A significant proportion of this woodland is listed by SNH as either Ancient Woodland (e.g. **TNs 8** and **40**) or Long-established Woodland (e.g. **TN 43**), and a proportion shows affinity with National Vegetation Classification (NVC) communities W1 *Salix cinerea – Galium palustre* woodland (e.g. **TN 52**) and W6 *Alnus glutinosa – Urtica dioica* woodland that are included in UK and North Lanarkshire Local Biodiversity Action Plans (BAPs) priority wet woodland habitat. Almost all of these broadleaved semi-natural woodlands have a diverse canopy, scrub layer and ground layer of woodland plants and they generally have good age structure.

The drier woodland on the valley sides predominantly support stands with affinities to the W10 *Quercus robur – Pteridium aquilinum – Rubus fruticosus* oak woodland and W9 *Fraxinus excelsior – Sorbus aucuparia – Mercurialis perennis* ash woodland communities. The undisturbed/unmodified W9 ash woods on the steep sides of the North Calder Water Valley are also a UK and North Lanarkshire BAP priority habitat. Within these woodlands bluebell *Hyacinthoides non-scripta* (often known as wild hyacinth in Scotland) is generally abundant, especially in the riparian zone. The native bluebell is a BAP species in the North Lanarkshire BAP and there is a Species Action Plan (SAP) specifically for it. One of the main threats to populations of this species comes from its being subject to hybridisation if it comes into contact with the non-native Spanish bluebell *H. hispanica*, which is a garden escape now well established in the wild, including in parts of the North Calder Water Valley.

All of these semi-natural woodlands, some of which contain specialist woodland ground flora species such as moschatel *Adoxa moschatellina* and primrose *Primula vulgaris* (**TN 90**) are assessed as being of intrinsic nature conservation value in a local context, and this finding is in accordance with their designation as SINCs.

Plantation woodland, some of which is also classified as long-established (e.g. **TN 3**, **16**, **53**, **76**, **79**, **80** and **81**), is concentrated along the central part of the Scheme, where it occurs both north and south of the existing A8. These habitats are generally unremarkable in a local and national context, and are therefore assessed as ranging from only low to local nature conservation value in their own right. However, most are closely associated with other, functionally complementary, semi-natural habitats, and may support protected or other species of conservation significance. As such, even when of relatively low intrinsic interest, the long-established woodland in particular has been assessed as contributing substantively to the local interest of designated SINCs (e.g. **TN 76**).

Small and fragmented areas of younger plantation, such as that at **TNs 1** (Baillieston Interchange), **83** and **87**, is considered to be of negligible conservation value.

Aquatic, Marginal and Swamp Habitats

There are a number of different aquatic habitats within the survey corridor including a significant river - the North Calder Water - and associated smaller tributaries, together with limited standing water and swamp.

The study area is dominated by the river valley of the North Calder Water, which runs in a meandering course from east to west through the study area. The catchments and the names of the watercourses that form tributaries of the North Calder Water are shown in Figures 15.1 and 15.2 respectively, and further information on water quality and flows is provided in Chapter 15 on Water Quality and Drainage.

In terms of aquatic habitat, the main river is a meandering lowland river in a natural channel approximately 15 – 20 m wide, with fast shallow sections of riffle interspersed with deeper slacks and pools. Water quality is assessed according to the SEPA River Classification as being Class “B” (fair quality). The riverbanks are mainly composed of alluvial silt and sand. They vary from steep eroded cliffs to banks that gently slope to the water’s edge. The substrate of the river channel is typified by fine sand and silt. Short sections of rapids are due to the river cutting through bedrock and boulders. Only short sections of gorge-like valley are present (such as Newlands Glen at the southwest edge of the section) and most of the valley floor is flood plain. In part of the valley, river terraces are evident 10-20m above the level of the river. Invasive plant species are relatively common throughout the riparian zone of the western section of the North Calder Water.

Several tributaries join the North Calder Water flowing into it along steep sided, narrow valleys. The Luggie Burn is the only tributary of the North Calder Water that feeds into it from the north (**TN 23**), where it emerges from a long culvert beneath the A8 at

Bargeddie Junction. The water quality of the burn is Class "C" (poor quality) and the other tributary watercourses; Red Burn (Grade "D"), Shirrel Burn (Grade "B") and Kennel Burn (Grade "C") are of variable quality. However, poor water quality does not preclude these sites from having ecological value, as evidenced by the fact that Kennel Burn is of special ecological significance in that it supports a population of water vole.

River and streams are both a UK BAP and a North Lanarkshire BAP priority habitat. Consequently the North Lanarkshire BAP features a priority Habitat Action Plan for rivers and streams as they are regarded as being of local nature conservation value and several BAP species are intimately associated with them (e.g. otter and water vole). The North Lanarkshire Local BAP specifically refers to the ecological importance of the North Calder Water river valley and its woodland habitats in the context of the Council area.

Standing open water is also recognised as being of nature conservation value in the North Lanarkshire BAP. There are at least 34 areas of standing open water within the study area of varying size (*e.g.* **TNs 15**, **39**, **46**, **47**, **48**, **54**, **60**, **68**, **73**, **74**, **75**, **76**, **81**, **89**, **101**, **103**, **107** and **111**). Most of the natural ponds of the area are present in the vicinity of the North Calder Water river valley as a result of the subsidence of old mine workings or migration of meanders . However, artificial ponds are present in the vicinity of the Eurocentral and Newhouse industrial areas. A high proportion of the larger ponds of the survey area form an important ecological aspect of SINC sites, e.g. Crowflat Pond (**TN 48**), Orchard Farm Pool (**TN 73**) and Faskine Estate Pond (**TN 76**). These larger ponds are of value for their ornithological interest and many are also of importance for amphibians.

Other Habitats – Scrub, Tall Ruderals and Species-poor Hedgerow

The remaining small areas of other semi-natural vegetation, mainly dense and scattered scrub (e.g. **TN 68**), occasional stands of tall ruderals (e.g. **TNs 39** and **41**) and a small amount of discontinuous, species-poor hedgerow (**TNs 103** and **105**), represent elements of structural and species diversity in the context of surrounding agricultural land. These other habitats are generally of negligible intrinsic conservation value. However, the location and extent of those along the valley of the North Calder Water is such that they can be considered to be of slightly more value as they may contribute to the integrity of the east-west riparian corridor by providing functional/physical links between blocks of designated woodland (e.g. **TNs 22** and **67**).

10.5.4 Flora

Species of Conservation Interest

Part of the North Calder Wood SINC (**TNs 56** and **57**) includes long-disused industrial land with spoil heaps. The Botanical Society of the British Isles (BSBI) provided recent records of 6 to 10 plants of Young's helleborine *Epipactis youngiana* in the OS 1 km grid square NS7262, in the vicinity of the electricity power line that runs through the area to

the north of the proposed scheme. The most recent national census[12] reported Young's helleborine as being known from only nine sites in Great Britain, making it a Nationally Rare species. It is a member of the orchid family that is typically found under light woodland cover on heavy, often heavy metal polluted, soils (Wiggington, 1999). The main UK locations for it are associated with old spoil-bings to the east of the Glasgow area (Dickson, 1991; Dickson *et al*, 2000).

Young's helleborine is a UK and North Lanarkshire BAP species, and in accordance with its UK SAP, genetic research has been undertaken to investigate the status of known populations. Consequently, the most recent publication on the species status of vascular plants in Great Britain (Cheffings & Farrell *et al.*, 2005) has placed Young's helleborine in the "parking list", meaning that it has been excluded from the Red Data list on the basis that the emerging genetic evidence indicates that it is within the range of broad-leaved helleborine *Epipactis helleborine*, i.e. evidence is suggesting that it does not constitute a separate species. However, Young's helleborine remains listed on Schedule 8 of the Wildlife and Countryside Act 1981, as amended, which affords it statutory protection. The colony could not be found during surveys in 2004, but it is considered more likely that it has been overlooked than that it has become extinct, so for the purpose of the assessment it was assumed to be potentially present in suitable habitat at or around **TNs 56** and **57**.

Woodland and scrub habitat lying within the potentially affected vicinity of the road scheme (along the line of the proposed route and land north to the A8 at or around TNs 56 and 57), was surveyed in July 2006 (Appendix 10.2b) by an experienced botanist for the presence of Young's helleborine and other helleborine species, e.g. broad-leaved helleborine (*Epipactis helleborine*) and narrow-lipped helleborine (*Epipactis leptochila*). The survey focussed particularly on woodland and scrub habitats that have developed on the site of spoil heaps, of which the main area is the 'rectangular-shaped' area of woodland and scrub habitat through which the road scheme is located.

No plants of Young's helleborine were found to be present within the area surveyed, although approximately 100 narrow-lipped and 12 broad-leaved helleborines were found within the 'rectangular-shaped' woodland and scrub that lies close to the road corridor and the power line, and to the south of the previously recorded site of Young's helleborine.

Also of significance is the presence of common twayblade *Listera ovata* in the secondary woodland of the North Calder Wood SINC (**TN 57**). Common twayblade is an orchid species that is frequent in a variety of habitats throughout the UK, and is listed as a species of "least concern" in the Red Data list. However, its presence within the study area is considered to be of local conservation significance, as this is the first record of this species in the local area (referring to Dickson *et al.*, 2000). Similarly, the BSBI provided a record of the only known location of common fleabane *Pulicaria dysenterica* in North

[12] Preston *et al*, (2002). New Atlas of the British and Irish Flora. Oxford University Press.

Lanarkshire from an area described as being between the disused railway line and the western boundary of the Orchard Farm Pool SINC. This is another species that is frequent in a variety of habitats throughout the UK, and is listed as a species of "least concern" in the Red Data list, but whose presence within the study area is considered to be of local conservation significance.

The extended Phase 1 survey included recording of higher plant species that could be identified during summer 2004. No other higher plant species of nature conservation significance was found, but given the specialised flora often associated with slag heaps, the possibility of other, for instance early-flowering, species of conservation significance being present at **TN 56** and/or **57** cannot be entirely ruled out.

The Phase 1 habitat survey confirmed that water dock *Rumex hydrolapathum* is present in the tall herb fen at the edge of the pond at Faskine Estate Woodland and Pond SINC (**TN 76**). The species, also one of "least concern" on the Red Data list, is reported by the North Lanarkshire Ecologist as being known from only two sites in the Council area, but is also reported (HEL, 2003) to be present in similar wetland habitat in three ponds at the North Calder Water: Wilderness – Rosehall Bridge SINC (shown in Figure 10.1 b). The populations of this species in the North Calder Water: Wilderness – Rosehall Bridge SINC and Faskine Estate Woodland and Pond SINC are features of local nature conservation value.

Consultation with the BSBI also indicates that there is the record of a rarely encountered, introduced herb species, common fiddleneck *Amsinkia micrantha*, in kilometre grid square NS7063, which includes a large open area of neutral grassland. A more precise grid reference was not available from the BSBI, and the species was not encountered during the extended Phase 1 survey. This species is a notable recently introduced species that is increasingly found in the UK as a casual species in arable land (Stace, 1997), but is uncommon in western areas and as such it is assessed as being a feature of some, low, interest.

The remainder of the study area supported vegetation communities typical of those associated with the habitats present, as described in section 10.5.3 above, which are generally well represented across this part of lowland Scotland and more widely across Great Britain. They are of negligible to low botanical value.

Invasive Species

The extended Phase 1 survey was not a formal survey to document the extent of invasive plant species, but evidence of the presence of species listed on Schedule 9 of the Wildlife and Countryside Act 1981, as amended, was noted. Other species that are increasingly recognised as being particularly invasive were also noted.

The invasive alien Japanese knotweed *Fallopia japonica* was recorded at **TNs 9**, **14**, **21**, **28**, **31** and **95**, i.e. at points throughout the study area. Japanese knotweed is a highly invasive alien species that is listed in Schedule 9 of the Wildlife and Countryside Act 1981, as amended. Under the terms of this legislation, it is an offence to introduce it to a

site or cause it to spread in the wild, which means it represents a form of biological contamination that requires specialist treatment as a waste management issue during construction projects.

Another Schedule 9 species, giant hogweed *Heracleum mantegazzianum*, appears to have been successfully removed by major maintenance works in 2003/4 from a site to the south of the A8 near Bargeddie where it was previously reported to be present (ERM, 2001). However, this plant sheds seed prolifically and it is likely to be represented in the seed bank locally to this area, so its recurrence in the future cannot be ruled out.

Other invasive plant species are present in the western section of the North Calder Water valley, as follows:

- Himalayan balsam *Impatiens glandulifera* at **TNs 3**, **13**, **21**, **23**, **28** and **39**;
- pick-a-back plant *Tolmiea menziesii* in the riparian zone at **TNs 3**, **13** and **63**; and
- Algerian ivy *Hedera algeriensis* in the North Calder Water woodland at **TN 53**.

None of these three species is currently subject to control under the Wildlife and Countryside Act 1981, as amended, or any other legislation. The presence of these species does, however, detract from the nature conservation value of the areas of woodland in which they have established.

10.5.5 Terrestrial Fauna

Otter[13]

The western part of the North Calder Water, with its extensive woodlands, forms a major east-west corridor of riparian habitat along the length of the study area. Consultations indicate that following industrial pollution of the river during the 1960s to 1980s, otters have recolonised this part of the North Calder Water since the early 1990s (R. Green, *pers. comm*.). There were no records of otters being road casualties on the existing A8, or any other adjoining roads in the study area at the time of preparing the original Environmental Statement for the M8 Baillieston to Newhouse in March 2006. Subsequently an otter casualty was recorded on the A8 at Coatbridge (SNH Gail Foster *pers comm*.) in August 2006.

[13] Otters *Lutra lutra* are protected as "European protected species" through inclusion on Schedule 2 of The Conservation (Natural Habitat, &c.) Regulations 1994, and the species is also protected through listing on Schedule 5 of the Wildlife and Countryside Act 1981, as amended. The otter is also the subject of UK and North Lanarkshire Local Species Action Plans (SAPs).

The extended Phase 1 survey and River Corridor Survey of the study area and surveys for otter (see Appendices 10.3a and 10.3b) recorded signs of otter activity throughout the corridor of the North Calder Water, with the presence of regular spraint sites (e.g. **TNs 6**, **21**, **24** and **35**) and two holt sites beneath the exposed root system of a large lime tree on the west side of the river (in the vicinity of **TN 64**) at Shawhead. A further holt site, assessed as being disused in both 2004 and 2005, is present in an eroding section of river bank close to the confluence of the North Calder Water and the Luggie Burn (**TN 26**), and crevices at the base of a sandstone cliff in this area were also considered to offer potential refuge sites for otter. A further potential holt was recorded at **TN 6** in 2004. None of the above holt sites was assessed as being likely to be used for breeding, as all were easily visible, close to the banks of the main river with sprainting activity at them or nearby. Those at **TNs 26** and **64** are both situated close to busy main roads; the A8 and A725 respectively. The HEL (2003) report on the Douglas Support Estate indicated both a holt and a resting up site close to **TN 41** in 2003, but in 2004 this area was heavily disturbed by use of off-road vehicles and no sign of use by otter was in evidence at this locality. Evidence of active holts along the North Calder Water was confirmed in the vicinity of Shawhead Junction during survey in January 2007

The extended Phase 1 survey found no indications of otter on the eastern section of the North Calder Water where it lies north of the A8, nor were there any signs of otter activity on any of the tributaries of the North Calder Water or ponds in the study area, but the species' range in the area is nevertheless considered likely to include all watercourses and water bodies in proximity to the main river.

Consultations and survey suggest that the study area does not as yet support a substantial population of otters, but this aspect of the study area's ecology is assessed as being of high local conservation value at the present time, and also contributes significantly to the nature conservation value of the North Calder Water Valley as a whole. As otters are known to be recolonising the area, it is reasonable for the purposes of this assessment to assume that individuals may currently range along all of the rivers and tributary burns within the study area. Furthermore, it is likely that they will increasingly do so as conditions continue to favour the expansion of populations using the area, such that in the medium- to long-term the population in this area will increase.

Bats[14]

The only recent records of bats in the study area were those presented in the report on the Douglas Support Estate by HEL (2003), confirming the presence of small numbers of

[14] All species of British bat and their roosts are protected as "European protected species" through inclusion on Schedule 2 of The Conservation (Natural Habitat, &c.) Regulations 1994. They are also protected under the Wildlife and Countryside Act 1981, as amended. Six bat species, one of which (common pipistrelle *Pipistrellus pipistrellus*) occurs in North Lanarkshire are also UK BAP priority species, and both common and soprano pipistrelle *P. pygmaeus* and Daubenton's bat *Myotis daubentonii* have SAPs under the North Lanarkshire BAP.

foraging soprano pipistrelle bats *Pipistrellus pygmaeus* in and around the Crowflat Pond and North Calder Wood SINCs (**TNs 42, 50** and **56**) and along the nearby stretches of the North Calder Water, and of Daubenton's bat *Myotis daubentonii* foraging along the North Calder Water for a distance of approximately 650 m downstream from Rosehall Bridge (i.e. from where the river flows beneath the A725). No roosts were identified during that survey and no further records of bat roosts or foraging activity were held for the study area by consultees.

The findings of the 2005 bat survey are provided at Appendix 10.4. The entire North Calder Water corridor represents high quality bat habitat, with many mature trees offering potential roost sites in the woodland canopy along the river (e.g. **TNs 18**, **19, 32**, **34**, **38**, **65** and **67**), in addition to which there are several bridges and old railway abutments throughout the area with crevices (e.g. **TNs 18**, **20**, **23**, **27** and **45**) and caves and crevices in riverside rock exposures (e.g. **TNs 30** and **86**), all of which are potentially suitable as bat roost sites. The two tunnels under Woodhall Mill Road (**TN 84**) were assessed as being in good repair, with only limited potential for use as a bat roost site.

The woodlands, scrub and grassland associated with the North Calder Water, and the river itself, are all habitats that support good densities of invertebrates that bat species feed upon. This mixture of habitats, especially where complex mosaics are present – such as at the Douglas Support Estate - also provides extensive areas of "edge" habitat, where sheltered conditions occur in the lee of taller vegetation and thus produce ideal conditions for bats to feed on swarming insects or commute between roosting and foraging areas. A small number of both soprano and common pipistrelles *P. pipistrellus* were observed foraging along the woodland edge in the vicinity of the new proposed crossing when the site was surveyed for bat activity in September 2005.

Towards the eastern end of the route, the plantation woodlands between the North Calder Water and the Chapelhall Junction are also areas where trees with features suitable for roosting bats exist in close proximity to habitats that represent good quality foraging habitat.

Bat roosts in trees are recognised as being very difficult to detect, especially in extensive high quality habitat with a multitude of potentially suitable roost sites, and health and safety considerations precluded detailed inspection and emergence surveys at all of the structures with potential to support roosting bats. Activity surveys carried out in 2006 at selected woodland locations, notably along the North Calder Water at Shawhead, were not able to confirm any roost locations, although bat foraging activity was in evidence. For these reasons, it is considered appropriate in this case to assess the potential status of the bat population of the study area using a habitat-based evaluation, rather than requiring evidence of roosts. On the basis of the large number and variety of potential roost sites present within trees and structures along the North Calder Water, and the high quality foraging habitat represented by the mosaic of aquatic, woodland, scrub, wetland and semi-improved grassland along the river valley and extending south towards the Chapelhall Junction, it is considered highly likely that a maternity roost or other roost(s) of local nature conservation value will be present within the study area.

The disused Bankhead Farm on the north side of the river valley (**TN 36**) and other agricultural premises within the study area also represent potential bat roosting habitat, as do the modern housing developments, especially to the south east (Bellshill), but also 1 km to the north east of Shawhead Junction.

An external survey of the only buildings scheduled for demolition, a house and barn at Braehead Farm, found no sign of bats accessing the property although the construction of the house in particular was considered to be suitable for use by a range of species. However, the likelihood of Braehead Farm being used by bats was assessed as low, owing to the exposed nature of this (hilltop) site and a lack of features such as hedgerows or lines of trees to act as sheltered flight lines between it and the nearest suitable foraging habitat, approximately 100 m to the south.

Great Crested Newt[15]

Reports on great crested newt *Triturus cristatus* surveys carried out during 2004, 2005 and 2006 are provided in Appendices 10.5a, b and c.

The results of presence/absence level amphibian surveys, carried out on a total of 20 mainly temporary, and permanent, water bodies within the Douglas Support Estate (HEL, 2003), were reviewed at the desk study stage and found to have confirmed the presence of good populations of common frog *Rana temporaria* and common toad *Bufo bufo*, and low populations of smooth newt *Triturus vulgaris* and palmate newt *T. helveticus,* in this part of the study area. Those surveys, which included the permanent ponds shown in Figure 10.2 b as **TNs 39**, **48** (Crowflat Pond SINC) **54** and **60**, found no evidence of great crested newts. In order to establish whether this species was present and likely to be affected by the proposed scheme in other parts of the study area, 14 previously unsurveyed water bodies within 500 m[16] of the alignment had been identified in early 2004. Following an initial scoping assessment of these 14 ponds in May 2004 as part of the Stage 2 DMRB assessment, great crested newt surveys were carried out on eight ponds in July 2004 (**TNs 73**, **75**, **76**, **81**, **107**, **111**, **Roundel Pond SINC** and a **SUDS pond** at the Chunghwa Industrial Estate just south of the Eurocentral Junction). No great crested newts or eggs were found.

[15] Great crested newts *Triturus cristatus* are protected as "European protected species" through inclusion on Schedule 2 of The Conservation (Natural Habitat, &c.) Regulations 1994. This species is also listed on Schedule 5 of the Wildlife and Countryside Act 1981, as amended, and is listed as a priority species under both the UK and North Lanarkshire Local BAPs.

[16] The statutory agency for nature conservation, Scottish Natural Heritage, pays regard to guidance on GCN survey methods, published by the English statutory agency English Nature, which recommends surveys of ponds up to approximately 500 metres beyond the boundary of a planning application site.

Combinations of common frog, common toad, smooth newt and palmate newt (all classified as low populations) were present in six of the eight ponds surveyed[17] in 2004. For the current Stage 3 DMRB assessment, a further round of surveys of the four ponds in which amphibians had been recorded at Stage 2 (**TNs 75**, **81**, **107** and **111**) was carried out during April and May 2005, the optimal survey season for detection of great crested newts. Permission to access the SUDS pond at the Chunghwa Industrial Estate had been withdrawn part way through the 2004 surveys and was not forthcoming in 2005, but an extract of a report on a survey undertaken in April 2005 connected with development proposals on this site (Wildlife Partnership, 2005) was made available for review. Again, no evidence of great crested newts or eggs was found in any of the surveys.

From the surveys, although it is not scientifically possible to prove a negative (i.e. to prove that great crested newts are not present) it is nevertheless reasonable to conclude for the purposes of this assessment that the species is absent and the study area therefore of negligible value for this species.

Water Vole[18]

Water vole surveys were carried out on all suitable aquatic habitat within the study area in tandem with the extended Phase 1 habitat and River Corridor/Otter surveys in summer 2004, spring 2005 with a follow-up survey in spring 2006.

Glasgow (10 km grid square NS66) is reported to contain an important population of water vole *Arvicola terrestris* that is flourishing, expanding and active (R. Green, 2004, *pers. comm*.), but the habitat fragmentation and barriers represented by the road complex at the Baillieston Interchange means that it is highly unlikely that water voles from that centre of population range into the study area. A wet ditch that runs alongside the Glasgow-Airdrie rail line just west of the Baillieston Interchange (**TN 4**) provides optimal habitat for water vole, but no evidence of the species was found during survey in 2004.

Similarly, the 2004, 2005 and 2006 surveys found no evidence of water vole along the North Calder Water, and consultations confirmed that no new water vole records exist for this section of the study area (R. Green, 2004, *pers. comm*.). The River Corridor Survey of sections of river affected by the proposed scheme (see Appendix 10.3) found no evidence of the presence of water voles.

[17] Common frog, common toad, smooth newt and palmate newt are all listed on Schedule 5 of the Wildlife and Countryside Act 1981, as amended, but are only subject to limited protection.

[18] Water voles *Arvicola terrestris* are partially protected through inclusion on Schedule 5 of the Wildlife and Countryside Act 1981, as amended. The water vole is also the subject of UK and both Glasgow and North Lanarkshire Local Species Action Plans (SAPs).

The Kennel Burn to the west of the local road to Calderbank (**TN 90**) was found during the extended Phase 1 survey to support a population of water vole. The eastern part of the burn (just to the west of the B799 at Chapelhall) is meandering with soft banks composed of silt and mud, vegetated with rank grassland and bordered by scattered scrub and semi-natural woodland. This represents high quality water vole habitat, and the presence of several burrows and latrines provided evidence to confirm the presence of what appears to be a small population in this stretch of the watercourse.

Large-scale fly tipping is prevalent on this part of the burn, but this appears not to have adversely affected the vole population. The western end of the Kennel Burn is culverted where it passes under the B802 and it is considered unlikely that water voles could currently travel to and from the burn to the North Calder Water downstream. The 10 km grid square within which this record was made (NS76) has not been subject to systematic survey as part of the National Water Vole Survey, but recent records were known for a locality approximately 2 km north of the present A8 and the local recorder advised that voles have been found at most sites investigated (R. Green, 2004, *pers. comm*.). The presence of the colony at Kennel Burn represents a feature that is assessed as being of local nature conservation value.

Badger[19]

The findings of badger surveys carried out during 2004, 2005, updated in 2006 and 2007 are provided in a Confidential Annex that is held by the Scottish Executive and SNH.

Badger surveys indicate two discrete clusters of badger activity within the study area. One focus of activity is associated with the western part of the North Calder Water valley, where the combination of steep slopes with dense vegetative cover suitable for excavating setts is found in close proximity to a range of agricultural grasslands that represent good foraging habitat. There is evidence suggesting persecution of badgers in this area, with main setts abandoned and showing signs of human interference. A small number of small setts, in areas to either side of the proposed scheme, showed signs of activity in 2005. In general, levels of badger activity in this area were less in 2004/5 than they had been when the site had been surveyed by the Scottish Wildlife Trust in the 1990s.

The second focus of badger activity within the study area is towards the eastern end of the scheme where, again, the habitat consists of densely vegetated areas containing relatively small setts surrounded by agricultural grassland. Unlike the situation further to the west, in this eastern part of the site there is more than one badger social group present and territory is being defended. Consultations indicated a number of instances of badgers having been reported dead on the existing A8 and other roads close to the Newhouse Junction, but this was assessed as being due to chance movements across

[19] Badgers *Meles meles* and their setts are protected under the Protection of Badgers Act 1992, and through listing on Schedule 5 of the Wildlife and Countryside Act 1981, as amended.

roads by individual animals rather than as a consequence of frequent/regular badger crossings at set points.

Badgers are a common and widespread species across North Lanarkshire, and thus the presence of badgers at two points within the study area is assessed as being a feature of some, low (i.e. less than local), nature conservation value.

10.5.6 Birds

Specially protected species of wild bird[20] reported to have been recorded within the study area during the Stage 2 DMRB assessment were kingfisher *Alcedo atthis*, barn owl *Tyto alba* and red kite *Milvus milvus*. Records for red kite indicate that this species only rarely passes through the survey area and has no breeding territories. The status of the other two species within the study area was unknown. Through consultation with the statutory agency SNH, and with the Royal Society for the Protection of Birds (RSPB), it was determined that a formal breeding bird survey would not be required, but that survey should consist of a site walkover and assessment for the presence of specially protected species.

Kingfisher

Appendix 10.6 presents the findings of the kingfisher survey carried out in 2005. There is at least one breeding territory of kingfisher in the western section of the North Calder Water and this is testament to its good ecological state and the presence of suitable nesting sites in stretches of the river with steep, fine sandy riverbanks. Kingfishers were observed to be present approximately 500 m up and downstream of the confluence of Luggie Burn and the North Calder Water, and are known to use the whole of the valley. They were not observed during any of the survey visits to the part of the watercourse where the new North Calder Water bridge is proposed, despite there being suitable habitat for nesting and feeding.

Barn Owl

A barn owl was recorded close to the west of the Baillieston Interchange in December 2003. The owl was noted flying to the north into dense young plantation woodland (**TN 1**), which provides potentially good hunting habitat. In the western part of the North Calder Water Valley, HEL (2003) reported the presence of barn owl pellets in an outbuilding of Shawhead Farm (NS723627), but the assessment of the site was that it was only used as an occasional roost and there was no evidence for it being a breeding site in 2003. No further records of this species were received from consultees or made

[20] Most common species of bird, their nests and eggs benefit from a degree of protection under Section 1 of the Wildlife and Countryside Act 1981, as amended. However, certain species of wild bird, benefit from a higher level of "special" protection through inclusion on Schedule 1 of The Wildlife and Countryside Act 1981, as amended. These species are often referred to as "Schedule 1 birds".

during field surveys, despite checks of suitable nesting habitat in barns and outbuildings during the 2004 extended Phase 1 habitat survey and the 2005 bat survey.

Other Breeding Birds

It was determined through consultation with SNH and the RSPB that an assessment of the breeding bird interest of the study area would be based upon species data gathered during the course of walkover surveys, which were undertaken during spring and summer 2004, supplemented with additional records that were gathered during the course of other survey visits in 2005 and reliable records received from consultees. Subsequently a breeding bird survey was conducted at key locations along the road corridor in 2006. A full list is provided in Appendix 10.1.

Table 10.5 Summary of Key Bird Species Recorded within the M8 Study Area, 2003 - 2006

Common name	Species	Statutory protected	UK BAP species	Local BAP species	Population status *
Barn owl	*Tyto alba*	x		x	A
Bullfinch	*Pyrrhula pyrrhula*		x		R
Dunnock	*Prunella modularis*		x		A
Goldcrest	*Regulus regulus*				A
Grey wagtail	*Motacilla cinerea*				A
Kingfisher	*Alcedo atthis*	x			A
Grasshopper Warbler	*Locustella naevia*		x		R
Grey partridge	*Perdix perdix*		x	x	R
Kestrel	*Falco tinnunculus*				A
Lapwing	*Vanellus vanellus*			x	A
Lesser black-backed gull	*Larus fuscus*				A
Linnet	*Carduelis cannabina*		x		R
Meadow pipit	*Anthus pratensis*				A
Mute swan	*Cygnus olor*				A
Oystercatcher	*Haematopus ostralegus*				A
Reed bunting	*Emberiza schoeniclus*		x		R
Ringed plover	*Charadrius hiaticulata*				A
Skylark	*Alauda arvensis*		x	x	R
Song thrush	*Turdus philomelos*		x		R
Spotted Flycatcher	*Muscicapa striata*		x		R

Common name	Species	Statutory protected	UK BAP species	Local BAP species	Population status *
Starling	*Sturnus vulgaris*		x		R
Swift	*Apus apus*		x	x	
Sand martin	*Riparia riparia*				A
Swallow	*Hirundo rustica*				A
Willow warbler	*Phylloscopus trochilus*				A
Woodcock	*Scolopax rusticola*				A
Yellowhammer	*Emberiza citrinella*		x		R

*R – RSPB Birds of Conservation Concern: 2002-2007- red list species

*A – RSPB Birds of Conservation Concern: 2002-2007 - amber list species

The study area contains a range of semi-natural habitats, which are unsurprisingly, capable of supporting a good range of bird species.

Noteworthy is one of only two known sand martin colonies in North Lanarkshire (**TN10**). Consultations with "Concern for Swifts" indicated that the Douglas Support Estate contains important hirundine foraging areas (mainly open habitats such as grassland at the woodland margins), with nesting swifts in suburban Kirkshaws. Swallows nest in the buildings of the disused Bankhead Farm on the north side of the river valley (**TN 36**).

Common species of breeding woodland birds are present in good numbers throughout the North Calder Water valley, and wetland birds are also commonly found associated with the river. To the east of the A725, improved pasture is commonplace with fields divided by wire fences and, rarely, hedges. Breeding populations of farmland birds here include skylark and yellowhammer, and breeding skylark are also present in the neutral grassland area that lies at the western edge of Bargeddie (**TN 29**).

The range of habitats means that a good range of bird species are present across the study area, with sighting of a barn owl (not breeding), kingfisher and a further 56 species, including 5 UK BAP and red list bird of conservation concern (BoCC) species, a further 2 red listed BoCC and 14 amber listed BoCC. The bird fauna of the study area as a whole can be considered to represent a nature conservation resource of local value.

Reptiles

No reptiles were observed during the baseline surveys, and no records of reptiles were available for the study area through consultation. It is considered unlikely that reptiles are a significant ecological issue for the purposes of this assessment.

10.5.7 Aquatic Fauna

The study area falls within the catchment of the North Calder Water, which does not specifically benefit from a nature conservation designation for particular fisheries or other aquatic interest.

Consultation with the Clyde River Foundation revealed that there are minimal technical data available regarding the presence of fish species in the River Clyde and its tributaries. Although it appears that there are no formally designated fisheries along the North Calder Water, the Shirrel Burn or the Kennel Burn, it is possible that migratory species from the River Clyde may utilise the North Calder Water during their life cycle.

The Clyde River Foundation received a grant to carry out survey works on the River Clyde tributaries, one of which is the North Calder Water. More detailed information regarding the North Calder Water may therefore be available for consideration during future detailed design by the Contractor, and subsequent implementation of the scheme.

10.5.8 Assessment of Nature Conservation Value

Table 10.6 summarises the nature conservation value given to the key habitats and species assessed as being of significance within the study area.

Table 10.5 Summary of Features of Nature Conservation Value

Ecological Feature	Nature Conservation Value
North Calder Water Valley – regionally important river corridor with adjacent complex of woodlands, scrub, grassland and wetland. The part of this corridor in the study area comprises 8 named "North Calder Water" SINCs, together with 2 adjoining non-statutory designated sites. Collectively have UK and Local BAP habitats, including ancient and long-established broadleaved woodland, and rivers and burns, plus a range of protected and other species of conservation value. 7 SINCs directly affected by or adjacent to the scheme, several of which are part of North Calder Water Valley regional value corridor.	Each SINC site of Local value; collectively contribute substantively to longer corridor of North Calder Water Valley – a feature of regional nature conservation value
Otter – holt likely to be affected	International- European Protected Species
Bats – foraging areas and potential for undetected roosts	International – European protected Species
Kingfisher – present within river corridor year round	National Protected Species
Water vole – small population on Kennel Burn (not directly affected)	National Protected Species
Breeding birds – presence of a range of species	Local
Badger – two centres of activity – setts affected	National Protected Species
Young's helleborine – protected rare plant close to new road.	National Protected Species
Other habitats and species	Low
Japanese knotweed – close to road alignment	Invasive alien plant

It is these features of the site and surrounding area that the EcIA of the scheme will address in this section.

10.6 Predicted Impacts

10.6.1 General Effects

All potential ecological impacts relating to the Scheme are identified below. These mainly relate to construction activities and the associated disturbance caused by these activities but also include operational impacts, where relevant to ecology. Although general impacts during the construction period are considered under Disruption due to Construction (Chapter 9), ecological impacts arising during construction often have implications post construction during scheme operation. For this reason such impacts are discussed in this Chapter. Section 10.7 then goes on to discuss mitigation and section 10.8 identifies the residual impacts, post-mitigation.

10.6.2 Do-minimum Scenario

In this scenario, there is no new road construction and the existing baseline conditions will remain. These would however alter over time due to:

- natural ecological succession if the habitats are left undisturbed by human activity;
- other influences and impacts arising from new development in the surrounding area in the future; and
- through continued human disturbance, such as fly tipping.

Overall, the predicted impacts from a do-minimum scenario will be negligible for all ecological receptors and **not significant**.

10.6.3 Site Clearance/Construction Stage

There are five principal categories of ecological impact identified for the site clearance and construction stages, as follows:

- habitat loss;
- habitat fragmentation/barriers;
- direct physical damage to wildlife;
- disturbance due to human activity and noise, vibration, dust and light; and
- effects on water flows and quality, especially related to the North Calder Water.

Habitat Loss

In accordance with best practice, the scheme has passed through a number of design iterations over the course of the Stage 2 and Stage 3 DMRB assessments, during which the loss of significant ecological features of the study area has been minimised. The majority of vegetated habitat that will be lost as a direct result of the scheme is of **negligible to low nature conservation value**, and is outside of designated areas. The

collective loss of small areas of these undesignated, common and widespread habitats including an isolated 230 m stretch of drainage ditch/un-named burn that will be culverted, is an impact of **low magnitude** and therefore considered to be **no impact** for the purposes of this EcIA.

The revised roundabout layout at Swinton, developed subsequent to the 2006 Environmental Statement for the M8 Baillieston to Newhouse, does not impact upon any nationally or locally designated sites. There will be additional woodland vegetation lost due to the altered footprint for the roundabout, and an increase in the degree of fragmentation of the woodland affected. The woodland in question is described in Appendix 10.1, TN1 as a "large block of young mixed plantation". Species present include downy birch, willow and pine. Common woodland birds nest in the plantation. The ecological impacts arising from the proposed changes to the design of the roundabout are of **low magnitude** and negligible overall, i.e. **not significant**.

Loss of designated habitat that is assessed as being of local nature conservation value will occur at eight separate points along the scheme.

The North Calder Water Valley will be subject to habitat loss at three of its SINCs, namely Crowflat Pond, North Calder Wood and Rosehall Bridge – Carnbroe Mains.

The Crowflat Pond SINC (see SINC 7 on Figure 10.1 b) will be substantially affected by the proposed scheme, with the loss of approximately 4.2 ha of rush-pasture and 0.1 ha of swamp and open water. Swamp is not present in significant quantities anywhere else in the North Calder Water Valley, and nor does rush-pasture occur widely within the study area. These habitats are not integral to the ecological function of the wider North Calder Water Valley, but they do complement the other habitats, and provide breeding habitat for amphibians and foraging habitat for bats. In the absence of mitigation, this loss of terrestrial and aquatic habitats of **local value** at the Crowflat Pond SINC would be assessed as an impact of **high magnitude** and thus a **moderate**, i.e. significant impact.

North Calder Wood SINC (see SINC 9 on Figure 10.1 b) will be subject to habitat loss amounting to approximately 0.06 ha of rush-pasture, 0.6 ha of UK and North Lanarkshire priority BAP wet woodland and 0.6 ha of broadleaved plantation. Wet woodland of the particular W6 *Alnus glutinosa – Urtica dioica* NVC community type present does not occur widely within the study area over all, and the twayblade contained within the site is not recorded elsewhere locally, but the particular block affected by the scheme alignment is outside of the immediate corridor of the main North Calder Water Valley, and no species of more than local significance have been recorded there. The loss of the majority of woodland habitat from this SINC site of **local value** is an impact of **high magnitude** and would constitute a **moderate** , i.e. significant impact.

North Calder Water: Rosehall Bridge – Carnbroe Mains SINC (see SINC 10 on Figure 10.1 c) will be subject to permanent habitat loss amounting to approximately 1 ha of broadleaved semi-natural woodland (UK and North Lanarkshire BAP ash woodland), most of which (0.9 ha) is indicated as ancient on the Ancient Woodland Inventory, and associated scrub, together with less than 0.5 ha of broadleaved plantation. The complex

of roads that make up the improved Shawhead Junction in this area will also include over-bridging of approximately 120 m of the main North Calder Water, although there will be no permanent loss of aquatic habitat as the main river channel will be bridged rather than culverted. However, at the construction stage, the project will also include additional woodland loss (amount and location to be determined by the Contractor) for the installation of a second, temporary, crossing of the North Calder Water on a bailey bridge to provide a haul route into the motorway bridge construction site. Collectively, these losses of a significant proportion of broadleaved woodland habitat from the North Calder Water: Rosehall Bridge – Carnbroe Mains SINC of **local value** are considered to constitute an impact of **high magnitude**, and on this basis the impact is assessed to be **moderate**, i.e. significant.

When the collective impact of the loss of habitat at the above three SINCs on the wider North Calder Water Valley corridor, assessed as being of **regional value**, is considered, the impact is of **low magnitude** and thus **minor**, i.e. not significant in terms of this EcIA.

The southernmost tip of the Faskine Estate Woodland and Pond SINC (see Figure 10.1 d) will lose land to the Eurocentral Junction, comprising approximately 0.41 ha of mixed plantation woodland. No individual flora or faunal species of note were recorded in the area of habitat that will be lost, and the conservation status of the SINC is highly unlikely to be compromised, even in the absence of mitigation. Habitat loss at this SINC, which is a feature of **local value**, will be an impact of **low magnitude**, and thus predicted to be **minor** and not significant in the context of this EcIA.

The north-eastern corner of the Blacklands Plantation SINC (see Figure 10.1 d) will be encroached upon by one of the slip roads on the improved Chapelhall Junction, involving the loss of approximately 0.04 ha of broadleaved plantation woodland. No individual flora or faunal species of note were recorded in the area of habitat that will be lost, and the integrity of the SINC will not be compromised, even in the absence of mitigation. Habitat loss at this SINC, which is a feature of **local value**, will be an impact of **low magnitude**, and thus predicted to be **minor** and therefore of no significance in the context of this EcIA.

The re-alignment of a SUDs pond south of Shawhead junction, subsequent to the publication of the 2006 M8 Baillieston to Newhouse Environmental Statement, affects part of SINC 8 at Shawhead, known as North Calder Water: the Wilderness – Rosehall Bridge. The NVC survey (Appendix 10.2a) carried out for all of the SINC's along the line of the scheme reports that:

"The SINC is predominantly plantation woodland. These woodlands have been created by extensive underplanting with conifer species that include Scot's pine *Pinus sylvatica* and yew *Taxus baccata*. Mature mixed plantation is present at the western end of the site (NS719620 to NS722621) and north of an avenue of common lime *Tilia x vulgaris* (NS724624 to NS727624). Non-native broad-leaved tree species have also been underplanted in woodland compartments of the SINC. The most common planted species are common lime, beech, Norway maple *Acer plantanoides* and, less common, horse chestnut *Aesculus hippocastanum*, cherry *Prunus* and poplar *Populus* species.

Invasive tree/shrub species comprising sycamore; rhododendron and invasive herbaceous species, e.g. pick-a-back-plant and Algerian ivy *Hedera algeriensis* are commonplace throughout the site. Mature beech plantation is present at a small outlying part of the SINC at NS723623 and covers a sizeable section of the western part of Easter Wood (NS726623 to 728622). Throughout most of the SINC, ground layer vegetation is not particularly diverse and woodland herbs that typify semi-natural woodland, e.g. lesser celandine, are either locally rare or absent. However, there are small stands of bluebell within the mostly grass, e.g. creeping soft-grass, or tall ruderal, e.g. common nettle and creeping thistle dominated ground layer vegetation, and the hybrid bluebell is as common as native bluebell in most of the site. In general the artificial nature of the woodlands within the SINC makes NVC analysis inappropriate".

Part of the area affected is also designated as ancient woodland (SNH Inventory of Ancient Woodland) and the land take comprises approximately 1.36ha. It should be noted that the two areas of land take (SINC and ancient woodland) partially overlap. The impact is considered to be similar to that set out for the North Calder Water: Rosehall Bridge – Carnbroe Mains SINC in that the impact is high magnitude due to the designation and is assessed to be **moderate**, and **significant** without mitigation in place. Loss of ancient woodland habitat cannot be mitigated by new planting, however preservation and reuse of the woodland soils, and the associated microflora and fauna, is recommended.

The new location for the pond is considered to have a greater magnitude of adverse impact in ecological terms than the original 2006 location further to the south because it directly impacts a designated SINC and involves some loss of designated ancient woodland.

The relocated pond also lies closer to the North Calder Water, which has identified otter interest (Appendix 10.3a). Otter sprainting sites have been recorded either side of the A725 bridge. The proposed works will not however impinge upon the watercourse and banks other than for the creation of a SUDs outfall.

Although not within the footprint of the scheme, the colony of the statutory protected Young's helleborine that is reported to be present within the boundary of the CPO plots to the west of Shawhead Junction, could potentially be lost if it is not protected from accidental damage during the construction phase. As this colony has been provisionally assessed as a feature of **national value**, accidental damage causing it to be lost would constitute a **high magnitude** impact, meaning that in the absence of mitigation there is potential for an indirect off-site impact of **exceptional significance,** although, no specimens of this species were recorded during survey (Appendic 10.2b).

The effects of habitat loss on faunal species of interest listed in Table 10.6 are considered under other impact categories below.

Fragmentation

The easternmost part of the scheme is largely limited to on-line improvements within or immediately adjacent to the existing A8 highway boundary, which will entail **no additional fragmentation or barrier effects** by comparison with the existing situation.

There will be limited and localised fragmentation associated with the junction improvements at Swinton, Baillieston Interchange, Eurocentral and Newhouse. The fragmentation impacts in these cases will be of **low magnitude** and limited to un-designated areas of unremarkable habitat with no evidence of use by species of nature conservation significance, i.e. of **negligible to low value**. In the absence of mitigation fragmentation effects at these junctions would be assessed as being of **no impact** for the purposes of this EcIA.

The junction improvements at Chapelhall involve loss of broadleaved plantation woodland that is within the Blacklands Plantation SINC, as well as further small areas of undesignated broadleaved and mixed roadside plantation woodland (**TN 82**) along the A8 and existing junction. These plantings currently provide a habitat link that is broken only by the carriageway of the existing A8 between the O Wood SINC and Blacklands Plantation SINC to the south and the semi-natural woodland and associated habitats at the North Calder Water: Maggieshaugh – Calderbank SINC to the north. The impact of this is dealt with in terms of habitat loss above, but during the construction stage this habitat loss also results in a greater degree of habitat fragmentation than was previously the case given that the existing dual carriageway is to be replaced by a new road layout with three new slip roads and a wider carriageway than at present. In fragmentation terms these junction improvements represent an impact of **low magnitude** on habitats of no more than **local value**, which in the absence of mitigation represents an impact that is **minor**, i.e. not assessed as significant.

Fragmentation impacts are of greatest relevance to the western portion of off-line improvements, around the Bargeddie and Shawhead Junctions. In this section, the scheme alignment fragments the existing intensively managed agricultural habitat and introduces a new barrier to the free movement of flora and fauna, from north to south (and vice versa). These impacts during construction will be assessed below by considering the key ecological features listed in Table 10.6.

Fragmentation of habitat by the introduction of a barrier, in the form of a new carriageway, has an effect on species whose movement through, and use of, their normal range is thereby disrupted. In the case of the proposed scheme, the main species of relevance are otter and other wildlife strongly associated with river corridors; bat species that utilise river corridors and edge habitats as flight lines; badgers that forage on both sides of the proposed scheme and, potentially, amphibian populations that range through terrestrial habitat surrounding ponds where this will be intersected by the works.

During construction, species such as otter, badger, amphibians and bat species that utilise sheltered flight lines may be discouraged from ranging along their usual routes due to removal of vegetative cover. These fragmentation effects will increase in severity as construction proceeds, and elements of built development replace the bare ground of

recently cleared areas. As all of the species of significance are active at night, when construction activity will not be taking place, the predicted impacts are lower during construction than would be anticipated during the operational stage.

Amphibians, being the least mobile, may be affected differently than the other species as fragmented populations are more prone to localised chance extinctions. On the basis of a population of **low value** (i.e. no great crested newts) the fragmentation impact of construction could prevent amphibians utilising terrestrial habitat between the existing A8 and the new road, from accessing breeding ponds that are all situated to the south of the new road. In the absence of water bodies to the north of the new road, any population of amphibians remaining on the northern side of the road to the west of Shawhead Junction would be unlikely to persist in the medium- to long-term. This would, however, be assessed as an impact of **low magnitude** when considered in terms of the amphibian population (which in this area is centred on parts of the Douglas Support Estate to the south of the proposed scheme) and this is considered to be **no impact** in terms of this EcIA.

For otter and bats, which are European Protected Species and therefore of International value, the construction site would not necessarily represent an immediate or impermeable barrier to free movement, even in the vicinity of the proposed temporary and permanent crossings of the North Calder Water at Shawhead Junction.

For otters the impact would be expected to start off as **imperceptible, rising in magnitude to low** as site clearance and construction proceeds and approaches completion. By that time, the corridor available for movement of otters along watercourses would be at its final minimum, at the same time as vegetative cover would also be at its lowest density before new planting/regeneration gets underway. The worst case scenario in terms of habitat fragmentation for otters during construction would be under these circumstances towards the end of the construction stage, especially if/when either the construction site or the surrounding roads were floodlit. However, whilst otters are secretive, they are known to be capable of crossing exposed and apparently unsuitable habitats, even including built up areas, and it is therefore considered unlikely that the construction stage would result in a barrier to the north-south movement of otters across the study area along the valleys of the North Calder Water and its tributaries. The significance of the impacts would thus **rise during the construction phase, from no impact initially, through to minor (i.e. not significant),** in the absence of mitigation.

Bats, as flying mammals that may routinely travel kilometres from their roosts to forage, are likely to be less restricted in their choice of road corridor crossing points than the otters described above. Even in the absence of mitigation, bats will not be prevented from travelling north-south along the North Calder Water Valley during the construction phase, as the open span of the proposed new bridge and the use of a bailey bridge for the temporary haul route will ensure that flight lines along the river and overhanging low level woodland edge will be maintained relatively intact during construction. The pipistrelle bats recorded during the surveys as using high level flight lines and/or foraging along the upper edge of the valley woodland will experience some disruption to their routes and feeding habitat. However, it is anticipated that the break in the woodland

edge where the new bridge crosses the North Calder Water will not necessarily function as a significant barrier, although it may have a deterrent influence, depending upon the significance of the area to the bats using it, and the availability of alternative high level routes and foraging habitat. In terms of habitat fragmentation, the construction stage (without mitigation) is anticipated to be an impact of **low magnitude** which would constitute a **moderate** impact, i.e. would be considered significant in terms of this EcIA.

Disturbance/Damage to Wildlife and Areas used for Breeding/Shelter

It is unavoidable that site clearance activities will involve disturbance of, or damage to, wildlife that is present in the habitats that are being cleared. The species and groups discussed below all benefit from varying degrees of statutory protection from damage , so it should be stressed that the concept of an impact in the absence of any mitigation (as assessed below) is purely theoretical, as mitigation measures – including under licence where appropriate – will be a legal requirement of the construction phase.

The construction of the new carriageway at Shawhead Junction will entail the loss of two otter holts, assessed not to be used or suitable for breeding but nevertheless active when surveyed, which are beneath the exposed roots of a large lime tree (close to **TN 64**), which is almost directly on the midline of the new carriageway. The disused holt (**TN 26**) at Luggie Burn and the potential refuge sites at the base of the cliff on the opposite side of the watercourse are all in an area that will be affected by construction activity associated with the diversion of the burn. At the level of the individual holt at a specific location, the impact is **high** and **significant**. In a wider context, as the population is assessed as being of high **local value**, the impact of the scheme overall is estimated to be of **medium magnitude** (otters ranging over large stretches of watercourse and there being other habitat suitable for establishing holt sites elsewhere along these stretches). In the absence of mitigation this would be a **minor** impact, and therefore not significant.

The works proposed at the Kennel Burn are not proposed to affect the area that supported water voles in 2004, and water voles will not be affected by the scheme.

There will also be a loss of two badger setts as a consequence of works in the vicinity of Luggie Burn, as described in the Confidential Annex. Neither of the setts to be lost is a main sett; one consists of two holes that were active in 2005, and the other is a nearby artificial sett that appeared not to be being used by badgers when visited in both 2004 and 2005. As the presence of badgers is assessed as being a feature of **low nature conservation value**, and the impact is estimated as no more than **medium magnitude** (the setts not being main active setts and there being a wealth of other habitat suitable for excavating setts locally), in the absence of mitigation the loss of these setts would be categorised as **negligible to low impact**.

The potential for disturbance to bats or loss of roost(s) as a consequence of woodland clearance associated in particular with works at Shawhead Junction and, to a lesser extent, the Eurocentral and Chapelhall Junctions, cannot be entirely ruled out until the very detailed survey of individual trees that can only be undertaken at the detailed design/pre-clearance stage when it is clear exactly which trees will be lost. However,

what can be concluded at this stage is that the woodland in the relatively small areas that will be lost is not significantly different from woodland elsewhere throughout the North Calder Water valley, and it is considered unlikely that the areas lost will contain features of particular significance in terms of maintaining local bat populations. Assuming the "worst case" presence of a bat roost that could not be retained through amendment to the design, the impact would be of **medium magnitude** (there being other habitat nearby suitable for providing roost sites for the three relatively common and widespread species known to be present in this part of North Lanarkshire), so the impact in the absence of mitigation would be predicted as having the **possibility of a moderate/major** (i.e. significant) impact not being able to be completely ruled out given that bats have International protection. In view of the precipitously steep slopes which have precluded close inspection of trees in the high quality habitat of the North Calder Water, it is unavoidable that there is a degree of uncertainty about this particular element.

A range of common amphibian species will be affected during construction, with impacts particularly associated with works affecting ponds and their immediate terrestrial surroundings. Where the new scheme entails on-line improvements, the effect on amphibians is classified as **negligible impact**, as the areas of habitat affected are terrestrial, limited in extent and of sub-optimal quality as foraging/hibernation habitat.

Where the scheme involves off-line improvements, larger areas of both terrestrial and aquatic habitat will be affected, including areas that represent good quality habitats for amphibian populations, especially in the vicinity of Crowflat Pond (**TN 48**) and North Calder Wood (**TNs 56** and **57**). In light of survey findings that great crested newts do not seem to be present, the amphibian populations of the area represent a feature of **low value**, and in the absence of mitigation a **medium – high magnitude** (given the loss of water bodies and surrounding wetland), would be **minor at most**, i.e. not significant.

A range of breeding birds, including species of conservation concern, will also be present in the areas affected by clearance works, especially in wooded areas, but also elsewhere. Although the variety and quality of semi-natural habitats present within the study area means that a wide range of species is present, and some in good numbers, most of the ornithological interest of the study area is focussed on the semi-natural habitats in and around the river corridor that will for the most part be unaffected by site clearance works. With the exception of kingfisher, none of the species or populations with potential to be affected by site clearance is assessed as being of more than **low value**, and with impacts of **low magnitude**, even in the absence of mitigation this would be classified as **negligible impact**.

The proposed clearance works will not directly affect any habitat currently assessed as being used for breeding by kingfishers, but habitats suitable for nest sites (not all of which could be surveyed in detail due to access limitations, so had to be checked using binoculars, often from the opposite bank) and fishing perches, does exist within the vicinity of the works at the North Calder Water crossing. The presence of kingfishers on the North Calder Water is a feature of **local value**, and the potential impact of damage to this species and its breeding sites is assessed as being **imperceptible**, hence there is **negligible impact** predicted.

Disturbance due to Human Activity, Noise, Dust and Light

The presence of humans and vehicular activity within and adjacent to the construction working corridor will have the effect of deterring use of the area by certain species, particularly during working hours. The main species likely to be affected are breeding birds, particularly ground-nesting species on surrounding fields affected by the off-line improvements in the western half of the study area. Birds are likely to be deterred from establishing nest sites close to the main centres of human presence and construction activity, but away from these will often become habituated to movements of construction vehicles along the haul route. The **low magnitude** impact of temporary disturbance on what is considered to be a general breeding bird assemblage along the road alignment of **low value** is predicted to constitute **negligible impact** in population terms.

The presence of construction vehicles and human activity in the vicinity of Luggie Burn is predicted to have **negligible impact** on kingfishers, during either summer or winter, as this part of the river corridor is unsuitable for breeding sites and Luggie Burn suffers from poor water quality (low visibility in the water) and therefore represents suboptimal feeding habitat by comparison with habitats further up- and downstream. The habitats at the North Calder Water crossing are ideal for kingfishers, and are likely to be used by this species in both summer and winter. They are not, however, unique or unusual habitats by comparison with neighbouring stretches of river corridor, both up- and downstream. Whilst it is likely that any construction activity immediately above the river could deter kingfishers from feeding within close proximity of the works, most of the riverside habitat will be shielded from views of construction activity due to the meandering habit of the river and the woodland canopy along the riverside. The magnitude of this potential disturbance effect on a receptor of **local value** is anticipated to be **imperceptible** and thus **negligible impact** is predicted.

The larger mammals, such as otter and badger, will be less affected by the daytime presence of people and machinery than the birds, as they are largely nocturnal. Other than the setts and holts that will be lost (considered above), there are no areas that either species uses for daytime shelter in the vicinity of the proposed works. There are thus **negligible impacts** on either otters or badgers predicted from this aspect of disturbance.

The above site clearance and construction activities are commonly associated with noise and vibration disturbance. With the exception of some of the common songbirds that breed within the site, none of the ecological receptors listed in Table 10.6 and likely to be present in areas subject to daytime construction noise is particularly sensitive to the predicted level of noise disturbance. The songbird populations along the proposed alignment are evaluated as being of **low value**. The behaviour of these songbirds will already be adjusted to background noise because of proximity to the existing A8 and other main roads. Additional noise resulting from site clearance and construction will be limited to the times of the day when the construction site is active, which means that they will not coincide with main periods of dawn and dusk singing activity. The generation of additional noise would be assessed as an effect of **imperceptible magnitude**, and therefore **negligible impact** is predicted.

During dry weather, wind and/or the use of vehicles on exposed substrates may cause dust clouds to rise up and settle on adjacent vegetation. Measures to suppress dust generation for the benefit of construction site and other workers/residents/motorists is addressed in Chapter 6 Air Quality and Chapter 9 Disruption Due to Construction, and will be addressed as part of the construction Environmental Management Plan (EMP) and will also have an incidental effect of providing a degree of protection for the ecology of the site. However, even in the absence of such mitigation, dust deposition will represent **negligible impact** in respect of the kind of habitats present in the vicinity of the works, principally because the kind of vegetation most likely to be adversely affected by dust, e.g. rich bryophyte assemblages, is **not present**.

While it is likely that some additional illumination may be required at certain locations at either end of the working day during the construction phase, the ecological receptors listed in Table 10.6 that are active during those parts of the working day are not particularly sensitive to light pollution. During the winter, working hours when lighting will be required may overlap slightly with periods when otters, badgers and possibly bats on occasion will be actively foraging. In the absence of mitigation, it is conceivable that insensitive lighting could contribute towards disturbing the regular movements of these mammals, although **negligible impacts** are predicted from this source of disturbance in isolation.

Potential Pollution to Watercourses

The North Calder Water will be crossed by the Scheme on a new North Calder Water Bridge, close to Shawhead Junction, and there will be an extension to the existing A725 Bridge in the same area. There is also an additional requirement for a temporary haul route, which will be aligned alongside the main crossing point. In addition to these, there will also be a requirement for new culverts at a variety of points along the route, as set out in Chapter 15, Water Quality and Drainage, which will also entail works in/close to aquatic habitats.

In the absence of mitigation, the construction of bridges and culverts is likely to cause significant disturbance to aquatic and riparian habitat along the river/stream corridors and adjacent bankside areas. Construction work is likely to result in the release of sediment and/or otherwise polluted runoff into watercourses near to and/or downstream of working areas, or cause the spread of invasive non-native plant species. There is a legislative requirement for works to the watercourses to be subject to licence, and this in turn requires that strict environmental protection measures will be implemented during both construction and operational phases of the proposed development. Further details on this aspect are given in Chapter 15.

The potential for impacts on these aquatic habitats and the species they support in the event of an accidental release of pollutants during construction cannot be entirely ruled out, although in the tightly regulated and well-managed operation of a major trunk road construction site, the risk of such an accident is likely to be low and will be covered by contingency plans included within the EMP.

As any such incident would be a result of an accidental release (with a low probability of occurring), it is not possible to be definitive about the nature, scale or duration of potential impacts. However, should such an incident occur the impact would be likely to be of **imperceptible - low magnitude** and highly localised in extent and affecting aquatic invertebrate and fish communities that consultations suggest are likely to be of **low to local conservation value**, and therefore result in a **minor** impact, i.e. one of no significance.

10.6.4 Post Construction/Scheme Operation

There are five main categories of impact identified for the operational stage, which are listed below:

- habitat fragmentation/barriers;
- wildlife mortality;
- wildlife disturbance;
- effects on water flows and quality; and
- biodiversity enhancement through habitat creation.

Habitat Fragmentation/Barriers

The easternmost part of the scheme is largely limited to on-line improvements within or immediately adjacent to the existing A8 highway boundary, which during operation will entail **no additional fragmentation or barrier effects** by comparison with the existing situation.

There will be limited and localised fragmentation associated with the junction improvements at Swinton, Baillieston Interchange, Eurocentral and Newhouse. The operational fragmentation impacts in these cases will be of **low magnitude** and limited to un-designated areas of unremarkable habitat with no evidence of use by species of nature conservation significance, i.e. of **negligible to low value**. In the absence of mitigation fragmentation effects at these junctions would be classified as **negligible impact**.

The junction improvements at Chapelhall involve minor loss of broadleaved plantation woodland that is within and around the Blacklands Plantation SINC. The impact of this is dealt with in terms of construction habitat loss above. In fragmentation terms these junction improvements represent an impact of **low magnitude** on habitats of no more than **local value**, which in the absence of mitigation represents an impact that is **minor**, i.e. not assessed as significant.

As with construction, operational fragmentation impacts are of greatest relevance to the western portion of off-line improvements, around the Bargeddie and Shawhead Junctions. In this section, the new road will fragment the existing intensively managed agricultural habitat and introduce a new barrier to the free movement of flora and fauna, from north to south and vice versa.

The main species of relevance during the operational phase are otter and other wildlife strongly associated with river corridors, bat and bird species that utilise river corridors and edge habitats as flight lines, and badgers that forage on both sides of the proposed scheme. During operation, in the absence of mitigation, elements of the built development will represent new barriers to the free movement of these species, forcing those that are able to try and cross the new carriageway, with consequent risk of being in a collision with traffic. Other than the additional risk of wildlife mortality due to traffic collisions (covered below), in the absence of mitigation, the operational fragmentation impacts of the new road on various species/groups is as described above for the end of construction stage.

Wildlife Mortality

New carriageways and slip roads, combined with increased speeds along sections of the existing road network, may result in higher levels of wildlife casualties in the absence of mitigation, i.e. where provision for wildlife crossing points is not made. The impact of the scheme on the general fauna (non protected species) in the study area, which is of **negligible to low value**, over and above the existing risk to wildlife along the scheme from the current road network, is considered to be of **low magnitude** and so constitutes **negligible impact** in terms of this EcIA.

However, for otters assessed as a feature of **high local value**, the impacts of loss of a single animal may constitute an impact of **medium magnitude**. In circumstances where an area is still in the process of re-colonisation by a European protected species (such as is believed to be occurring on this part of the North Calder Water) it is considered that a medium magnitude impact should be assessed as a **moderate**, i.e. significant, impact. In the absence of mitigation, the risk of otter road casualties will be particularly associated with the corridor of the North Calder Water and the Luggie Burn.

Badgers, a **nationally protected species**, will be at risk (and will also represent a potential hazard to drivers) in the new section of off-line motorway to the west of Shawhead Junction. As the population in the North Calder Water valley appears to be small and isolated, and its range will be fragmented by the new road, there is potential for an impact of **high magnitude** as a consequence of the loss of a relatively small number of animals. As the loss of this social group of badgers would result in a substantial retraction in the species range within this part of North Lanarkshire, it is considered appropriate in this case to assign this a **moderate**, i.e. significant, impact.

Badgers will also continue to be at the same level of risk as at present to the east of Newhouse Junction, i.e. **negligible impact**, where road casualties have been recorded along the existing A8.

Wildlife Disturbance

There is likely to be increased disturbance to more sensitive species (for example certain breeding birds) or effects on species behaviour in areas near to the motorway due to increased levels of human activity, noise and lighting alongside roads, roundabouts, motorway junctions and slip roads. While for the majority of species, the potential for

impacts of significance due to these aspects of disturbance is minimal, there is the potential for introduction of illumination to disturb nocturnal species of conservation significance. In the absence of mitigation, otters, badgers, bats and birds could experience impacts of **imperceptible to low magnitude** as a result of night time illumination, resulting in impacts of **minor significance** at most, i.e. not significant in the context of this EcIA.

Water Flows and Quality

In the absence of mitigation, potential impacts on the water resources within the study area may result through the increased volume of surface water runoff into receiving waters, and from accidental spillage of contaminants, which may enter nearby watercourses. This has the potential to release particulate matter, materials derived from rubber tyres and fuel and other contaminants into the watercourse and cause disturbance to aquatic life, including migratory fish and aquatic invertebrates.

Increases in run-off and containment of contaminants will be mitigated by a managed road drainage scheme, with attenuation and treatment of drainage which is an integral part of the scheme design (see Chapter 15, Water Quality and Drainage) and would be a statutory requirement as drainage discharges are subject to a statutory regulatory regime. The magnitude of the effects on water quality in receiving waters such as the North Calder Water, which is of **local value**, is predicted to be of **imperceptible magnitude** and therefore assessed as **negligible impact**.

Biodiversity Enhancement Through Habitat Creation

Infrastructure developments through agricultural habitats often provide opportunities for biodiversity enhancement and linear habitat creation in the form of ecologically sensitive design of features such as balancing ponds and soft landscaping within the highway boundary.

In the case of the M8 Baillieston to Newhouse Improvements, the drainage scheme has been used as an opportunity to open up sections of previously culverted watercourses, for instance by opening up and diverting part of Kennel Burn that is currently in culvert a new 400 m stretch of open channel will be created, in line with good practice. A further 230 m of open channel will be created to the north of the road as a consequence of the diversion and opening up of another culverted burn south of Kirkshaws.

It is considered likely that the fourteen new attenuation ponds that are being created as part of the drainage management system for the scheme represent a potentially significant contribution to the nature conservation resource of the local area, as these features will become established and can be expected to develop nature conservation interest within the short- to medium-term. Whether or not to introduce planting around all of these ponds, with the attendant risk of accidentally introducing non-native aquatic plants, or instead to allow a natural process of colonisation, is a matter for agreement on a pond-by-pond basis, subject to discussion between consultees and the Contractor at the final design stage. An indicative cross-section of a SUDs pond planted for landscape amenity and nature conservation benefit is provided in Figure .20.2.

Planting to establish lines of woodland planting parallel with the alignment of the new carriageways will help to an extent to offset some of the potential fragmentation effects resulting from the Scheme, and will create new east-west woodland links, although not resolving the north-south increase in fragmentation. In total, more than 35.5 ha of new native semi-natural woodland planting is proposed, together with 7 ha of wet woodland, 10.4 ha of native species scrub/shrub and 19,000 linear metres of new hedgerow. Elsewhere, there will be opportunities to utilise species-rich native grass seed mixes. The provision of 14 new SUDs water bodies represents a net increase in pond habitat along the line of the route, and when considered in conjunction with the proposed landscape tree and shrub planting, the impact of these elements of the Scheme is **positive** in ecological terms, and of some, low, nature conservation value.

10.7 Mitigation

The design of the proposed scheme has passed through a series of iterations, designed to minimise the potential for adverse environmental effects, and during that process ecological impacts have been minimised by reducing the number of river crossings, limiting land take and avoiding sensitive areas where possible. In general, measures to reduce adverse effects on ecology and nature conservation include minimising land take and disturbance through reducing the footprint of the works and fencing off the working area so that adjacent habitats are not impacted, avoiding key habitat and areas used by protected species and minimising pollution of watercourses. Site restoration is also an important aspect to ensure that habitats are reinstated to as near original conditions and wherever possible enhanced through use of native species of local provenance.

The following general principles will be applied when considering the mitigation of adverse impacts on ecology during construction.

10.7.1 Detailed Design and Pre-Construction Stage

Maximising Biodiversity Value

Ecologists have been, and will continue to provide input to designs for new drainage arrangements and site landscaping, to ensure that opportunities are taken to maximise the ecological value of new habitats created by the proposals. It is important to ensure that biodiversity enhancement proposals are appropriate to the locality and the existing interest of the surrounding area. Planting will follow the guidelines available from the Forestry Commission, namely *Forestry Practice Guides: The management of semi-natural woodlands: Wet Woodlands* (Forestry Authority, 1994), *Forests and water guidelines* (Forestry Commission, 1988) and *Forestry Authority Bulletin 112: Creating New Native Woods* (Rodwell and Patterson, 1994).

Elsewhere, habitat creation and management will be implemented to extend the area of semi-improved neutral and wet grassland habitat and maintain it to prevent loss through ecological succession. In the vicinity of the spoil-bings that support Young's helleborine, the possibility of re-using spoil on parts of the new verge is being explored, with a view to maintaining habitat suitable for this species in the long-term close to where it is currently

found. This habitat would also be of potential value to grayling butterflies, which occur in similar habitats to the north of the A8.

Planning to Minimise Environmental Risk

The construction stage will also be based upon principles designed to maintain and enhance the biodiversity of the site. A Contractor's Environmental Management Plan (EMP) will be developed, with Construction Method Statements for activities in areas of sensitivity.

Protection of Water Quality

A water quality protection plan will be implemented to ensure that the potential risks to receiving waters are minimised. This will include, for instance, measures to avoid/minimise potential for problems such as fuel and other chemical spills. A Pollution Incident Response Plan will be included as part of the EMP, to ensure that impacts from any potential accidental spill are reduced to a minimum.

Works to drain wetlands, ponds and ditches will be subject to specific Method Statements. Arrangements for dewatering will be agreed with SEPA and SNH (see also Chapters 15 and 9 with regard to mitigation measures during construction).

Monitoring Change

Although protected species are present along the road corridor, and surveys to date have found otter holts and badger setts, the use of the site may change over time because the species concerned are mobile. Lack of evidence at any one time does not preclude them being present on site in the future, especially if, as with otters, the population is thought to be undergoing an expansion in its range. It is therefore recommended that protected species surveys, including for otters, kingfishers, badgers, water vole (especially on Kennel Burn) and great crested newt, should be undertaken in the correct survey season prior to the commencement of works on site. In this way, if they have changed their use of the site and/or require licensed mitigation in order for the scheme to proceed, this can be planned for and the requirements of the legislation taken into account in planning the works.

Pre-construction surveys to identify the extent of stands of non-native invasive plants will also be required in order that measures may be set in place for appropriate control and/or removal during the construction phase.

Mitigation Strategies and Obtaining Licences

Where current evidence and pre-construction surveys indicate that there will be impacts on protected species of animal and plant, detailed mitigation schemes will need to be agreed with SNH and/or the Scottish Executive (depending upon the species concerned) and appropriate licences obtained before works to disturb those species/habitat can be lawfully implemented by the Contractor.

On the basis of survey information gathered during 2004 -2007, for the current conceptual design, licences would be required to carry out work in relation to the proposed scheme, including potentially provision of artificial otter holt(s). Although considered unlikely, the possibility that pre-construction inspections of individual trees scheduled for felling could also indicate a need for bat mitigation, and (worst case scenario), possibly including licensing.

As licensed destruction of the shelter of a protected species usually requires that a new artificial shelter has to be in place before the original place of shelter can be destroyed, and mitigation can take some time to design, a lead-in time of at least 12 months should be allowed for these protected species issues to be fully designed in detail and agreed with the authorities, so that licences to commence works can be obtained.

Planning Construction Compound and Storage Areas

Decisions on the location of storage and construction compounds will be made by the Contractor in consultation with a suitably experienced ecologist, to ensure that habitats or species of nature conservation value are not adversely affected. In particular, if the area to the north of **TN 57** where the colony of Young's helleborine is reported to be present is considered as a potential location for such a compound, this plant will be searched for at the correct time of year. Detailed searches to date have not revealed the presence of this species however. If present, a licence will be required from SNH for works affecting the colony, and the measures for ensuring appropriate protection as a matter of legislative compliance will need to be incorporated into the EMP.

Maintaining Habitat Links

Habitat links north-south (and vice versa) are required in order to minimise fragmentation effects and facilitate the safe crossing of the road by species of conservation significance, including otters and badgers specifically, but also including all species generally using the aquatic, riparian and woodland corridor of the North Calder Water.

The main way in which the integrity of the North Calder Water SINC corridor has been safeguarded is by designing the new bridge crossing and temporary haul route bailey bridge to be of open span construction, supported by abutments that are positioned well back from the water's edge. This will maintain physical continuity of the river banks, and with a high and wide span, will help to ensure that flying species such as bats and birds establish new flight lines under the road, rather than over it. The detailed design of the landscaping in these areas will be undertaken with input from suitably experienced ecologists, to ensure that screen planting of trees and shrubs does not channel species using these sheltered habitats as flight lines into the path of traffic using the elevated section of the new road.

Mammal crossings and associated otter/badger-proof fencing (if appropriate) to facilitate safe passage of these animals and thus reduce risk of traffic collisions, will be designed in accordance with principles set out in DMRB Volume 10, at locations to be determined by engineers in consultation with suitably experienced ecologists and agreed with SNH following the pre-construction survey. The specimen design has made allowance for an

accommodation bridge designed to incorporate principles of "green" crossings in order to encourage use by badgers and other wildlife to the west of the Shawhead Junction. Indicative locations, based on current survey data, are shown to the west of Shawhead Junction. Pedestrian/cycleway crossings which incorporate 'green' crossings are described in Chapter 13. At points along the Scheme where burns are culverted beneath new sections of carriageway (see Chapter 15), structures have been designed to ensure the free passage of fish and so that otters and other wildlife can pass through them (e.g. by incorporating ledges), in line with SEPA and DMRB guidelines.

10.7.2 Site Clearance and Construction Stage

Definition of Working Areas

The working areas, including temporary access tracks, will be kept to a practical minimum through areas of vegetated habitat, and their boundaries will be clearly delineated at the commencement of works. An ecologist will be consulted in decision making regarding areas proposed for use as construction compounds or site storage areas, so that sensitive habitats are avoided wherever possible.

Protective Fencing

Existing vegetation to be retained, stands of invasive species or other sensitive areas such as ditches defined in the EMP as requiring protection from accidental damage or disturbance, will be securely fenced prior to the commencement of site clearance. The area enclosed within the fencing will include the root systems of the vegetation affected. Fencing will be fit for purpose ("Netlon" or similar is not suitable) and be clearly visible to drivers of large construction vehicles. Storage of materials will not be permitted within the fenced areas. The fences will be maintained to ensure their continued function throughout construction, but will be removed from site on completion of the works.

Control of Invasive Species

Checks for and control of Japanese knotweed, which is present at a number of localities in close proximity to the proposed alignment, will form part of the EMP and will be carried out in accordance with the requirements of SEPA. It will be generally in accordance with the *Code of Practice for the Management and Disposal of Japanese Knotweed* (Environment Agency, 2001). A watching brief will be maintained for fresh germination of giant hogweed in the area where it was formerly present to the south of the existing A8.

Planning to Minimise Risk of Nuisance

Good construction site management will be implemented to avoid/minimise generation of excessive litter, dust, noise and vibration. This will be controlled and monitored through the Contractor's EMP.

Ground Preparation and Restoration

Where present, topsoil should be removed and stored separately from the underlying subsoil in piles less than 3 m high. Topsoil, in particular, should be stored for as short a time as possible. When ground affected by construction works is being restored, subsoil should be placed beneath topsoil, and steps taken to ensure that the new surfaces will settle so as to be flush with the surrounding ground level.

Minimising Potential for Impacts on Breeding Birds

The nests, eggs and young of all species of wild bird are protected from deliberate damage during the breeding season (March to July inc.) under the terms of the Wildlife and Countryside Act 1981, as amended. It is best practice to minimise the potential for such damage by removing vegetation likely to be used by breeding birds outside of the breeding season. Alternatively, a search of vegetation by the site ecologist immediately prior to clearance will be carried out, so that breeding sites can be identified and their clearance delayed until any young have fledged. It should be noted that it is not always possible to be certain that breeding birds are not present and in such circumstances a precautionary approach is adopted.

Minimising impacts to breeding ground-nesting birds presents a different challenge, as their breeding habitat cannot be removed, and thus the timing of construction works becomes a more important issue. Where possible, works of short duration in or close to the main areas of grassland used by ground-nesting birds should be scheduled to take place outside of the bird breeding season. Where this is impracticable, e.g. due to wet winter ground conditions, or where works are of longer duration, a different approach may be required.

Commencing construction activity before the arrival of ground nesting birds in March, so that levels of human and vehicle activity are high on the construction site during the bird's territory establishment phase, is likely to be successful in deterring most birds and encouraging them to seek out alternative habitat nearby. However, if construction cannot be timed in this manner, or if particular parts of the site will be relatively undisturbed during these critical few weeks, then additional measures to render ground conditions unsuitable for nesting is one of a number of alternative deterrents that might be considered.

Minimising Potential for Impacts on Amphibians and Fish

Detailed procedures for minimising impacts on amphibians and fish will be agreed with SNH and SEPA. Water bodies will be drained and infilled at a suitable time of year to minimise detrimental impact to wildlife. This ideally would be outside the amphibian breeding season and after the larval stage when they are able to leave the ponds to find new habitat. The best time would be from approximately October - February, which would also allow any invertebrates to emerge from the ponds and would be outside the bird breeding season, so would not impact on any birds which may be breeding in wet grassland around the ponds.

Although it is unlikely that great crested newts are present on the site, as a matter of best practice it is recommended that a pre-construction survey be carried out. In the unlikely event that great crested newts were found during this process, the legislation would require works on site to cease and a licence be obtained for works to re-commence.

Minimising Potential for Construction Impacts on Bats

Where tree roosts have not been confirmed by survey, but are considered as potentially being present, principally at the North Calder Water crossing, adoption of Reasonable Avoidance Measures to limit disturbance is recommended. Reasonable Avoidance Measures will include the following:

- all trees scheduled for felling will be inspected by a licensed bat worker/suitably experienced ecologist, and those which contain potential roost features will be marked;
- marked trees will be felled during the months of October or April;
- all tree sections that contain potential roost features will be soft felled. This will involve wedging open splits or cracks to prevent them from closing and not cutting through cavities. These sections will be roped down to ensure that any hidden bats remain unharmed;
- felled sections that contain potential roost features will be allowed to remain undisturbed on site or within the adjacent woodland for 48 hours to allow any hidden bats to escape. They must be stored in long lengths to prevent the setting of fires; and
- a licensed bat worker must be on call/on watching brief in the event of bats being discovered during works. If bats are discovered at any time all work must cease. A licence from the Scottish Executive may be needed before work can re-commence – the bat worker and SNH will advise.

Minimising Potential for Construction Impacts on Otters and Badgers

If pre-construction surveys confirm the need for them, new artificial holts and/or sett(s) will be in place prior to the licensed destruction of any active holts/setts that will be unavoidably lost as a result of the scheme.

Where operations are occurring close to a known holt or sett, but not so close as to need licensing, a “people and machinery exclusion zone” extending to a 30 m radius around the holt or sett should be fenced off using Heras or similarly robust temporary fencing. This will ensure legislative compliance by protecting the holt/sett from accidental damage, whilst still allowing these nocturnal mammals free passage away from their shelter at night time.

Construction activity should not limit the free movement of otters/badgers across the site. Areas of sensitivity, such as holts and setts, should not be directly illuminated. Vegetation should be retained as far as practicable along the North Calder Water where it is crossed by the new bridge, so that an element of cover is provided along this corridor.

Open trenches should be ramped in at least one location to provide a means of escape in case of animals falling in.

10.7.3 Operation Stage

Any mammal tunnels and associated fencing where it is to be provided will be in place before the new road is opened.

Measures will be put in place to ensure that mammal tunnels and fencing are checked and maintained as appropriate, on an ongoing basis.

10.7.4 Post-Construction Monitoring

In addition to the above measures, a monitoring programme will be established to assess the effectiveness of the mammal crossing measures put in place. In accordance with advice given in DMRB Volume 10, this will include a weekly visit for 4 weeks following scheme completion and then again after 6 months and after 1 year.

Additional post-construction monitoring may be required in respect of any protected species mitigation carried out under licence, and the nature and timing of such monitoring will be agreed between the Contractor and the relevant authorities at the time when the licence is applied for.

10.8 Residual Impacts

The above mitigation measures will result in the minimisation of adverse ecological impacts arising from the M8 Baillieston to Newhouse scheme, and the maximisation of any biodiversity benefits arising from implementation of the scheme.

The following residual impacts are predicted:

Loss of two SINCs (Crowflat Pond and North Calder Wood) and fragmentation of a third (North Calder Water: Rosehall Bridge to Carnbroe Mains), each SINC being a designated site of **local value** along the North Calder Water Valley. Between them the interests of the sites include a plant species (common twayblade) of local value and woodland UK and North Lanarkshire BAP habitat, 0.9 ha of which is part of an Ancient Woodland site. The residual impact to each of these three SINC is one of– **high magnitude**; meaning a **moderate**, i.e. significant adverse impact at each of these points along the river valley. However, no significant impact on the integrity of the regionally important corridor of the North Calder Water in this part of North Lanarkshire is predicted.

New planting will not fully compensate for the permanent land take loss to established woodland and residual impacts in relation to the re-located SUDs pond at Shawhead remain significant due to the impact on ancient woodland. However, the intrinsic ecological value of the area of woodland to be affected is considered to be low based on site survey (Appendix 10.2).

Creation of a significant number of new landscaped SUDs ponds and attenuation basins, designed to optimise their ecological value and associated new stretches of open ditch

and extensive new semi-natural woodland and scrub creation. Whilst the loss of Ancient Woodland cannot be redressed by new planting, and the new habitats will initially be of negligible value, there is potential for these new habitats to increase in value over time. In particular there is potential for pond habitats to contribute to the local nature conservation interest of adjacent SINCs in the North Calder Water Valley, which may be significant in nature conservation terms, within the short- to medium-term.

10.9 References

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11 Landscape and Visual

11.1 Introduction

The objective of this Chapter is to establish the significance of the landscape and visual effects associated with the proposed scheme and its conceptual design, and to identify suitable mitigation measures. The assessment re-evaluates baseline conditions established at Stage 2, which determines and the value or sensitivity of landscape character, quality and visual receptors.

This section has been prepared in accordance with the principles and techniques outlined in DMRB Volume 11 (Environmental Assessment), Section 3, Part 5. Information was gathered principally by means of desk study, but supported by site visits aimed particularly at an analysis of landscape character and quality within the study area as shown within the supporting illustrative drawings, Baseline Landscape (Figure11.1 a-e), and Landscape Appraisal (Figure 11.2 a-e). The landscape and visual impact assessment has also been undertaken with reference to the methodology set out in The Landscape Institute and The Institute of Environmental Management Assessment's Guidelines for Landscape and Visual Impact Assessment (2002) in order to incorporate the most current and accepted techniques; 'Landscape Character Assessment Guidance for England and Scotland' published by the Countryside Agency and Scottish Natural Heritage; and Planning Advice Notice 58 – Environmental Impact Assessment, as published by the Scottish Executive.

Relevant published documents were reviewed as detailed in Section 11.10. Site specific information was also gathered via consultation with statutory bodies including Scottish Natural Heritage (SNH), the Royal Commission on the Ancient and Historical Monuments of Scotland, North Lanarkshire Council and Glasgow City Council. The visual assessment at Stage 3 requires illustrated description of the anticipated significant effects of the development proposal to identify receptors; properties and areas / routes of public access affected. The Photo Viewpoint illustrations (Figures 11.4 – 11.16) establish the visual envelope from the receptors and have now been progressed to include details of the visual baseline, predicted effects, mitigation measures, the magnitude of impact and significance of effects.

Data collection was undertaken by way of familiarisation of the site (principally by car from the surrounding minor roads and tracks), desk study and field survey on foot. Since landscape and visual impact assessment are closely related, the data collected have been used for both as appropriate.

11.2 Landscape Effects Methodology

11.2.1 Landscape Assessment Methods

The five main steps in the landscape assessment process are:

- Data collection;
- Description of landscape baseline;
- Classification (character & quality);
- Evaluation; leading to potential positive/ negative effects; and
- Assessment of significance of identified effects.

Landscape assessment consists initially of the collection of baseline data relating to the components, character and scenic quality of the landscape, and an assessment of the sensitivity of the landscape to change. In undertaking the assessment, consideration was given to the following factors:

- Experience of the landscape is not only visual, but involves all five senses;
- Data relating to the components of the landscape, its character and quality will include reference to baseline information presented in separate related sections (e.g. Ecology and Nature Conservation, Cultural Heritage);
- The value placed on an area is dependant not only on its inherent scenic quality, but on its situation, rarity and usage;
- Historical and cultural associations may contribute to the value placed on landscape not generally considered to be of visual or other importance; and
- Landscapes which, although not of a quality to warrant national or regional designation may be of great local value.

11.2.2 Landscape Resource

The landscape resource refers to landscape elements or an assemblage of elements that will be directly or indirectly affected by the proposed development. They may include topography, geological or man made elements, woodland, trees and hedgerows, land use and combinations of elements that create distinctive landscape character.

Landscape effects associated with the proposed scheme are determined by changes to the physical landscape, the character and quality of the landscape resource (the receptor) and how this is perceived and experienced. Landscape assessment considers the different aspects of the landscape resource, which are outlined below:

Elements – individual landscape components such as hills, valleys, woods, trees and hedges, ponds, buildings and communication routes (incl. prominent or eye-catching features that are quantifiable and easily described);

Characteristics – elements, or combinations of elements, that contribute to the particular character of an area (incl. intangible characteristics such as tranquillity, wilderness and cultural associations); and

Character – a distinct, recognisable and consistent pattern of elements and characteristics that creates distinctiveness and a sense of place. Areas of similar character can be described and identified on maps (incl. designated landscapes, conservation areas, and other acknowledged special areas of interest).

The aim of the desk study is to identify the landscape resource components:

- Landscape designations;
- Landscape character;
- Topography;
- Vegetation of significant landscape value;
- Areas of important features of historical, cultural or local importance; and
- Possible suitable mitigation measures.

The field survey was undertaken as part of the assessment process to confirm the information obtained during the desk study and to gain any additional in-situ details. As part of the field survey a Visual Envelope (as illustrated on the Landscape Effects - Landscape Quality Figure 11.3 (a-e) and the Photo Viewpoints 1-18, Figures 11.4-11.21) was identified, identifying the principal visual receptors from which the road or traffic may be visible, concentrated around Visually Intrusive Highway elements and assessed their significance, as stated within DMRB Guidelines Stage 3. This is considered further in

Public use of open spaces, roads and footpaths was observed during the course of the field survey. This has a direct bearing on landscape as a human resource and is taken into account in the evaluation process. Further information relating to public use of the environment is provided within Pedestrians, Cyclists, Equestrians and Community Effects (Chapter 13).

11.2.3 Landscape Character

Recent National Planning Policy Guidelines (NPPG's 1, 14 & 18) highlight the importance of sound analysis of the character of an area. The assessment analyses the baseline conditions highlighting the unique features (landscape resource) which can be attributed to a recognised landscape character. The landscape is classified into broadly homogenous units of character based on existing character assessments (such as that carried out by Scottish Natural Heritage, SNH), regional or local landscape character assessments or designations (such as that which may be carried out by a local authority) and detailed analysis of the landscape resource baseline data to determine site specific character areas for the purposes of this assessment.

The significance of landscape effects depends upon the extent to which the landscape changes are perceptible in the wider context. In the context of the M8 preferred route, this includes the relationship of the scheme to the identified landscapes within the study area, Local Plan and the SNH Character Areas.

11.2.4 Sensitivity & Value of the Landscape Resource

The landscape resource has an associated value and sensitivity. Sensitivity is a measure of the capacity of the landscape to accommodate change without change in character. Value is a measure of the perceived importance of the components and features of the landscape to users.

Landscape Value

For the purpose of this assessment, landscape value or importance has been defined as "the importance ascribed to the landscape by public perception, value to the community or professional judgement." In this study, informal public use of open spaces, roads and footpaths as observed during the course of the field survey, together with professional judgement on landscape quality (see below) was used to ascertain the value of the landscape and whether this was considered to be of local, regional or national importance.

The guidelines stated within SNH and The Countryside Agency Landscape Character Assessment 'Guidance for England and Scotland' recommend the development of thresholds of landscape value and Table 11.1 provides a definition of the criteria used to assess value for the purpose of this study. The analysis of landscape value or importance aims to reflect the perceived value of the landscape at a specific scale, identify the group to which it is important and describe why it is important.

Table 11.1 – Criteria for Assessing Landscape Value

Value		Typical Criteria	Typical Scale	Typical Examples
High	Exceptional	High importance and rarity; No or very limited potential for substitution	Designated at International or National level	World Heritage site, National Park, Area of Outstanding Natural Beauty (AONB), National Scenic Area (NSA), Environmentally Sensitive Area (ESA).
	High	High importance and rarity Limited potential for substitution	Designated at a National or Regional level.	National Park, AONB, National Scenic Area, Areas of Great Landscape Value (AGLV), Regional Scenic Area.
Moderate	Medium	Medium importance and rarity Limited potential for substitution	Designated at a Regional or Local level.	AGLV, Regional Scenic Areas, ESA
	Medium - Low	Medium importance and rarity Some or good potential for substitution	Undesignated but of Regional or, local scale value	Undesignated but value expressed for instance in demonstrable use

Value		Typical Criteria	Typical Scale	Typical Examples
Low	Poor	Low importance and rarity	Local	Areas identified as having some redeeming feature or features and possibly identified for improvement
	Very poor	Degraded condition	Local	Areas identified for restoration or improvement.

Table 11.1 establishes general guidance on the perceived level of landscape value. A landscape may have international, national, regional and local level planning and environmental designations, which may reinforce the associated value by the general public.

Quantification of landscape 'value' can be attributed to the use and perception of particular characteristics that contribute to a sense of place, the visitor, or user experiences of the landscape.

National scale or publicly recognised/designated/or defined policy areas reflect the perceived value of the landscape to society as a whole. The 'broad brush' nature of any designations as stated within Table 11.1, and their boundaries require more detailed study at a site-specific scale. This establishes what is locally important about the affected landscape and to whom it is important.

In addition landscapes that are not of a quality to warrant national or regional designation may be of great local amenity value, in particular natural features, semi-natural vegetation, local parks and gardens in urban areas.

Landscape Sensitivity

The associated landscape effects of any development are dependent upon the sensitivity of the landscape resource and the magnitude of impacts. Sensitivity equates to the degree to which a particular landscape type or area can accommodate or is susceptible to change arising from a particular development, without detrimental effects on its character, quality or value. Landscape designations are only one of a number of factors considered influencing the relative sensitivity of the landscape resource affected by the proposed development. Sensitivity is also influenced by the following:

- Existing land use;
- The pattern and scale of the landscape;
- Visual enclosure/openness of views of the landscape, and distribution of visual receptors; and
- The value placed on the landscape.

Table 11.2 below determines criteria for the sensitivity of the landscape resource.

Table 11.2 – Landscape Sensitivity Criteria

Sensitivity	Criteria
High	Important elements of a landscape of a particularly distinctive and valued character (e.g.: National Park, AONB) susceptible to relatively small changes. Landscape features of particularly distinctive character such as broadleaf woodland and mature trees, old intact diverse or visually significant hedgerows, significant landforms, natural watercourses, historic/archaeological features, semi-natural vegetation.
Medium	A landscape of moderately valued characteristics, perhaps of local significance and reasonable tolerant to changes; or a formerly highly sensitive landscape whose sensitivity has been degraded by the presence of intrusive features. Landscape features such as coniferous forestry and scrub, young fragmented or species poor hedgerows, young or senescent trees, recent or fragmented walls.
Low	Low value or degraded landscape tolerant of substantial change without adverse impact on character. Landscape features such as arable land or improved grassland, derelict or reclaimed land, fences, degraded or remnant hedgerows, dead, moribund or diseased trees, general landform without significant features.

11.2.5 Magnitude of Impacts

Magnitude of impact (change) is the extent and degree to which the fabric and character of the landscape changes as a result of the proposed development. An evaluation of the magnitude of the proposed changes on the elements of the landscape, through which the preferred route option will pass, was carried out through a review of the nature, scale and extent of the change, together with its duration and degree of permanence, using the criteria outlined in Table 11.3 below.

Table 11.3 – Landscape Magnitude of Impact Criteria

Magnitude	Criteria
Severe	Total loss or major obvious change in key landscape characteristics noticeable over an extensive area.
Substantial	Notable change in landscape characteristics over an extensive area

	ranging to very intensive change over a more limited area.
Moderate	Minor changes in landscape characteristics over a wide area ranging to notable changes in a more limited area.
Slight	Minor changes in landscape characteristics over a limited area.
Negligible / None	Minor or virtually imperceptible change in any area or landscape components.

11.2.6 Significance of Effects

Significance is not absolute and should be defined in relation to individual developments and their context and location. The two principal criteria determining significance are the magnitude of the impact and the sensitivity of the receptor. A higher level of significance is generally attached to large-scale impacts and impacts on sensitive or highly sensitive receptors; thus moderate magnitude impacts on highly sensitive sites can be more important than severe/substantial impacts on less sensitive sites. Professional judgement is required to make a balanced and objective assessment taking all of these criteria into account.

Significance thresholds can therefore be determined from different combinations of sensitivity of the landscape resource and magnitude of impact, which is simplified in Table 11.4 below.

Table 11.4 –Significance of Landscape Effect

Resulting Significance of Effect					
Sensitivity (Table 11.2)	**Magnitude of Impact (Table 11.3)**				
	Severe	**Substantial**	**Moderate**	**Slight**	**Negligible / None**
High	Substantial Effect (significant)	Substantial Effect (significant)	Substantial Effect (significant)	Moderate Effect (significant)	Slight Effect (not significant)
Medium	Substantial Effect (significant)	Substantial Effect (significant)	Moderate Effect (significant)	Slight Effect (not significant)	No change (not significant)
Low	Moderate Effect	Moderate Effect	Slight Effect (not	Slight Effect (not	No change (not

	(significant)	(significant)	significant)	significant)	significant)

Overall significant effects may be adverse, neutral or beneficial, and are assigned a level on the scale: No change/Negligible-Slight-Moderate-Substantial, taking into account mitigation measures and different stages of the project lifecycle. Intermediate levels, such as slight to moderate, may also apply. The following Table 11.5 assigns criteria to each level of landscape effect, as applied in this assessment.

Table 11.5 –Criteria for Significance of Landscape Effects

Significant Effect	Definition – The Proposed Scheme Residual Effects
Substantial Adverse Effect	Cannot be fully mitigated. Possible cumulative effects at complete variance with character landform, scale and pattern Will be substantially damaging to a high quality landscape.
Moderate Adverse Effect	Out of scale with landscape resource, leaving an adverse effect on a landscape of recognised quality.
Slight Adverse Effect	Does not quite fit into the landform and scale of the landscape affecting an area of recognised landscape character.
Slight Beneficial Effect	Potential to improve landscape quality & character fitting scale, landform, and landscape pattern.
Moderate Beneficial Effect	Potential to improve landscape quality & character to enable restoration of previously removed valued features.
Substantial Beneficial Effect	Environmental fit responds well within the site context, improving the quality of the valued landscape character through the removal of damage caused by existing land uses or addition of beneficial features.
No Change (Negligible)	Does not affect the landscape or complements the scale, landform and pattern of the landscape, maintaining existing quality

Separate assessments concentrating upon discrete sections of road and each aspect of the landscape have been undertaken due to the complexity of the road scheme.

11.3 Visual Effects Methodology

11.3.1 Visual Assessment Methodology

Visual effects relate closely to landscape effects, but are mainly concerned with changes that arise in the composition of available views, from identified receptors. Visual

assessment concerns people's perception and response to changes in visual amenity. Effects may result from new elements in the landscape that cause visual intrusion or new features that obstruct views across the landscape as well as loss of existing features. As with landscape effects, visual effects can be positive or negative.

The assessment considers the approximate visibility of the development when taking into account landform and land cover; identifying principal representative viewpoints and sensitive visual receptors from publicly accessible areas within the study area.

The assessment criteria for visual effects concentrated upon the parameters stated below:

- ***Visual Analysis*** – (identification of potential sources of effects) - extent to which the road will be visible (road line highlighted as Visually Intrusive Highway, where cuttings/embankments are 4m above/below existing topography) from identified receptors; residential properties, public buildings (workplaces), recreational resources and designated landscapes are illustrated on Landscape Quality Figures 11.3 (a-e) and Photo Viewpoints 1-18 (Figures 11.4 to 11.21).
- ***Sensitivity of Visual Receptors*** – capacity of visual amenity to accept change are illustrated on Landscape Quality Figures 11.3 (a-e) and Photo Viewpoints 1-18 (Figures 11.4 to 11.21).
- ***Magnitude*** of visual impacts and resulting significance of effect are illustrated on Landscape Quality Figures 11.3 (a-e) and Photo Viewpoints 1-18 (Figures 11.4 to 11.21).
- ***Mitigation*** – measures by which effects are reduced or the road is integrated into its landscape setting. The visual effects of the proposed scheme have been assessed taking into account any mitigation 15 years after the scheme opens, are illustrated within the Conceptual Mitigation Strategy Sheets (Figures 11.31 a-g).
- ***Sketches / Illustrations*** – These show the main wire frame perspectives of bridges, structures and proposed ground modelling to aid the assessment of visual intrusion where the anticipated effects from Photo Viewpoints are significant. The visual effects are overlaid as a perspective sketch of the proposed road development onto the Photo Viewpoints of the established visual envelope baseline. See Appendix 11.2 for Perspective Sketches.

The visual assessment considers the preferred option and its surrounding context, focusing on identified primary receptors that will experience visual effects. Key Photo Viewpoint Locations are determined and used to establish a visual envelope; the overall baseline position; the anticipated visual effects of the proposed scheme, taking into account factors such as local topography, vegetation and existing development (built form). The results of the visual assessment determine the significance of effects on views from publicly accessible viewpoints, in terms of the magnitude of impact that would be generated by the proposed development and the sensitivity of the receptor. Views identified in Figures 11.4 to 11.21 (Photo Viewpoints 1-18) have been assessed from an average height of approximately 1.8m above ground level from publicly accessible areas within the study area around the Visual Envelope.

Where the established visual envelope illustrated within the Photo Viewpoints has been affected significantly, wire frame perspective of bridges, structures and ground modelling have been prepared (taking into account mitigation measures) to aid the assessment of visual effects (See Appendix 11.1 Photomontages)

Although the scheme may be visible to a degree beyond the highlighted receptors within the visual analysis and subsequent Visual Envelope Mapping (Figure 11.3); illustrated Photo Viewpoints 1-13 (Figures 11.4-11.16); Landscape Quality and Visual Effects Drawing (Figure 11.3); it is considered that any potential visual effects would not be significant and, therefore, would not be considered further in this Chapter.

11.3.2 Sensitivity of Visual Receptors

The sensitivity of the visual receptors/viewpoints was assessed by evaluation of a range of factors, including:

- The nature and context of the receptors/viewpoints;
- The nature of the existing view;
- The expectations of users/receptors (occupants of dwellings were considered to have higher expectations and more sensitive than occupants of industrial buildings/ or vehicle users;
- The importance and value of the development site in the view.

The criteria used to determine the sensitivity of the receptors to the proposed changes are shown below in Table 11.6.

Table 11.6 Sensitivity of Visual Receptors

High Sensitivity	Residential properties / public rights of way –footpaths/bridleways and waterways – where the landscape to be changed is an important element in the view
Moderate Sensitivity	Roads/ Other non residential buildings - Sporting / recreational facilities/ where the landscape to be changed is an important element in the view; Residential properties PROW's/ where the landscape to be changed is less important element in the view
Low Sensitivity	Roads/ Other non residential buildings - Sporting / recreational facilities/ where the landscape to be changed is less important element in the view; Residential properties PROW's/ where the landscape to be changed is an unimportant element in the view

11.3.3 Magnitude of Impact to Visual Amenity

The assessment of magnitude of impact includes the consideration of the likely effects of development on visual amenity, taking into consideration the scale of the change to the landscape, the addition or loss of visual elements, the change in visual amenity and the amount/extent of the view affected. The criteria for the magnitude of impact, is presented below.

The main elements of magnitude evaluation include:

- The extent of the receptors view affected by the development as a proportion of the view available;
- The distance of the receptor from the proposals;
- The angle of the view relative to the main activity of the receptor;
- The level of integration or contrast created by the road, the traffic on the road and its associated elements within the view; and
- The potential for effective mitigation of adverse effects and opportunities for landscape enhancement.

Magnitude is determined by the distance from the viewer, the extent of change in the field of vision, the proportion or number of viewers affected and the duration of activity apparent from each viewpoint, or a sequence of points that may have transient views e.g. along a road. The following criteria are used to determine magnitude of impacts (Table 11.7):

Table 11.7 – Magnitude of Visual Impacts

Severe Magnitude	All viewers affected / proposal forms majority or all of the view and alters all the components and significantly alters the character of the view.
Substantial Magnitude	Majority of viewers affected / the proposals dominate the view and fundamentally change its character and components
Moderate Magnitude	Many viewers affected / the proposals are noticeable in the view, affecting its character and altering some of its components and features
Slight Magnitude	Few viewers affected / the changes are only a minor element of the overall view that are likely to be missed by the casual observer and/or scarcely appreciated.
Negligible / None	Barely any viewers affected / change in view is virtually imperceptible.

The changes brought about by a proposal may be long or short term, permanent or temporary. Mitigation may or may not be achievable.

The visual assessment identifies effects on individual views and visual amenity taking into consideration the sensitivity and importance of the receptor and the magnitude and duration of the impact.

11.3.4 Significance of Visual Effects

Significance is not absolute and can only be defined in relation to each development and its location. For the purposes of this assessment a 'significant effect' whether adverse or beneficial is considered to be of either moderate or substantial significance. The two principle criteria determining significance are the magnitude of the visual impacts and the sensitivity of the receptor. A higher level of significance is generally attached to large-scale effects and effects on sensitive or highly sensitive receptors; thus small effects on highly sensitive sites can be more important than large effects on less sensitive areas.

Table 11.8 shows the combinations used to determine significance of the resulting effects:

Table 11.8 –Significance of Visual Effect

Resulting Significance of Effect					
Sensitivity (Table 11..6)	**Magnitude of Impact (Table 11.7)**				
	Severe	**Substantial**	**Moderate**	**Slight**	**Negligible / None**
High	Substantial Effect (significant)	Substantial Effect (significant)	Substantial Effect (significant)	Moderate Effect (significant)	Slight Effect (not significant)
Medium	Substantial Effect (significant)	Substantial Effect (significant)	Moderate Effect (significant)	Slight Effect (not significant)	No change (not significant)
Low	Moderate Effect (significant)	Moderate Effect (significant)	Slight Effect (not significant)	Slight Effect (not significant)	No change (not significant)

The thresholds for significance of effects on visual amenity are categorised according to the following scale:

- Substantial adverse or beneficial effect – where the scheme would result in a significant deterioration (or improvement) in the existing view;
- Moderate adverse or beneficial effect – where the scheme would result in a noticeable deterioration (or improvement) in the existing view;

- Slight adverse or beneficial effect – where the scheme would result in a barely perceptible deterioration (or improvement) in the existing view; and
- None (Neutral) – no discernible deterioration (or improvement) in the existing view.

11.4 Baseline Conditions

11.4.1 Landscape Character

The study area contains the following landscape or related planning designations:

- Green Belt;
- Sites of Importance for Nature Conservation (SINC's); and
- Locally designed landscapes within the Local Plan Policy, as covered within the Planning Section.(Chapter 17)

Figures 11.1(a-e) – 11.3(a-e) illustrate the range of existing landscape elements/features identified within the study area and also show the potential effects of the scheme.

In a regional context the study area forms part of the Clyde Basin Farmlands Regional Character Area (RCA) identified in No 116; Glasgow and the Clyde Valley landscape assessment, prepared by Scottish Natural Heritage (SNH). The RCA comprises much of the lowland area of the Clyde Basin surrounding the Glasgow conurbation.

Key features of the Clyde Basin Farmlands (RCA) include:

- river landscapes;
- deciduous woodland in the form of farm woodlands and hedgerow trees (some designated as Protected Urban Woodland);
- pastoral and some arable farming; and
- areas that have been subject to mineral working and industrial development, resulting in dereliction or damaged land.

The study area bounded by Crosshill, near the Baillieston Interchange to the west, through to Newhouse to the east; settlements of Coatbridge and Calderbank to the north and Tannochside and Viewpark to the south lies within four local landscape character types as shown on Figures 11.2 (a-e). These areas are characterised as follows:

- Plateau Farmlands (Central Plateau);
- Fragmented Farmland (North Calder);
- Incised River Valley (North Calder Water); and
- Plateau Moorland (Central Plateau).

Only three of these four local landscape character areas are considered to be affected by the road proposal (Plateau Farmlands, Fragmented Farmlands and Incised River Valley), and the SNH description relating to them sets out those valued landscape components and features which help to determine regional and local character, and which provide a unique sense of place and subsequent perceived landscape value.

The three key components of the landscape are; landform, vegetation/land cover of significance and cultural and historical associations. Relevant characteristics are summarised below, from the original report No 116; Glasgow and the Clyde Valley landscape assessment, prepared by Scottish Natural Heritage (SNH)

11.4.2 Plateau Farmlands:

Landform:

Key Characteristics:

- extensive, gently undulating landform;
- visually prominent, but sparse settlements comprising mainly of farmsteads often with identifiable sheltering woodlands; and
- transport and communication routes tend to favour the uniformity and accessibility of this character area and accommodate major roads, rail lines, pylons and telegraph poles, all of which have considerable impact on the exposed landscape.

Vegetation/Land cover: (of significance)

Key Characteristics:

- dominance of pastoral farming with large, rectilinear and evenly spaced field patterns;
- limited and declining tree cover; and
- the rural character of the Plateau has suffered as tree cover has declined and the visual influence of settlements, transport infrastructure and mineral workings increased.

Cultural and Historical Associations:

Key Characteristics:

- visual and conservation effects of historic coal mining activities;
- various sites situated in the farmlands, including ancient enclosures and crop markings; and
- settlement patterns include scattered farmsteads; often enclosed by urban or industrial development (e.g. Calderbank). Older towns and villages exist also, but are predominantly situated on the higher ground away from the river valley.

11.4.3 Fragmented Farmland

Landform

Key Characteristics:

- the Fragmented Farmlands defined by their damaged and fragmented character, occurring where urban fringe and industrial activity has broken up previous farming patterns to the extent that they are no longer predominant in the landscape;
- visual influence of the urban edge of former and current urban development and transportation infrastructure; and
- these Fragmented Farmland landscapes occur along major road routes at the urban fringes (A8/M8) and are therefore important strategic 'gateways' into Glasgow and form many people's first impression of the city.

Vegetation/Land cover: (of significance)

Key Characteristics:

- pockets of remnant pastoral farming, in some areas retaining an important recognised landscape structure of mature farmland hedges and trees, but in others suffering from serious decline;
- areas of significant semi-natural vegetation occur mostly in the under-developed river valleys; and
- unique physical features associated with the recognised designated (Green Belt/ SINC's) and designed landscapes are most commonplace.

Cultural and Historical Associations:

Key Characteristics:

- urban fringe and industrial activity fragments the agricultural, rural character. Historical industrial heritage sometimes difficult to perceive, but the urban areas have a direct or indirect adverse effect on this landscape type;
- rich archaeological and historical qualities. Industrial heritage features such as bings, tip, quarries, derelict railways and canals as well as remnants of pre-industrial estate landscapes;
- re-opened tracts of canal (e.g. Monklands Canal) provide recreational and tourism opportunities;
- development pressure due to good access to major transport routes has led to reclamation/ regeneration activities, which are removing these historical landscape remnants and

- urban fringe issues of blight, management decline and anti-social behaviour such as fly tipping.

11.4.4 Incised River Valley

Landform:

Key Characteristics:

- narrow, steep sided valleys cut deeply into the plateau farmlands with gorge areas where the burns and rivers have formed waterfalls within harder rock. Elsewhere erosion is evident and subsidence is common place;
- bounded by a series of smaller watercourses running perpendicular from the North Calder Water, creating defined field patterns by associated shelterbelts and road patterns within the landscape and
- focal role of rivers and tributaries.

Vegetation/Land cover: (of significance)

Key Characteristics:

- ecologically rich broadleaf woodlands (SINC's) on steep valley sides sheltered and settled areas, often hidden within the wider landscape;
- unique physical features of woodland, characteristic patterns of land use and settlement has created a recognised landscape character; and
- the North Calder Water valley represents an important surviving corridor of undeveloped land in an area increasingly pressurised by urban fringe activities.

Cultural and Historical Associations:

Key Characteristics:

- historic landscape features such as woodlands, walls, bridges, large houses, and designed landscapes; and
- a number of Incised River valleys provide a recreational resource, such as the North Calder Heritage Trail combining access and interpretation.

The typical characteristics of all the three identified significant Local Landscape Character Areas (LLCA's) are all evident within the study area itself. The linear presence of the existing A8 Trunk Road, including the recent major maintenance improvements to the A8 between Baillieston and Newhouse, has a significant effect on the landscape baseline conditions. The existing road alignment and associated roadside planting acts as a buffer between the urban corridor (settlements) and the more rural agricultural land areas and North Calder Water River Valley.

11.5 Landscape Character – Assessment of Quality (Value).

The assessment of landscape baseline conditions, as illustrated on Figures 11.1 (a-e) to 11.3 (a-e) Landscape Effects Baseline Landscape/Landscape Appraisal/Landscape Quality, has highlighted the individual features and components of value at a local level (communication routes/ landscape/ topography). The associated landscape effects of the development proposal correlates directly upon the perceived quality of the landscape resource in which it sits. This in turn provides mitigation opportunities and constraints that respond to the significance of effects in relation to the individual development proposal, and likely residual effects.

The landscape quality (or condition) relates more closely to landscape features and the associated physical appearance of these elements in terms of a visual (woodland screening/ prominent landform/ built form edge), functional and ecological perspective (Landscape Designations/Characters), as illustrated on Figures. 11.2 (a-e) Landscape Effects, Landscape Appraisal.

The landscape resource, a combination of these elements, contributes to the landscape context, character and value See Tables 11.10 and 11.11 – Landscape Quality & Appraisal, and Landscape Resource Assessment.

The landscape character within the road corridor setting is not of a quality to warrant national or regional designation. It is of local value due to its context within the urban fringe, in particular any natural features and semi-natural vegetation, which contributes to its identified landscape character.

A field study was undertaken from public roads and footpaths noting the physical and human influences on the landscape and any current trends/pressures for change. The resulting landscape quality values of the LLCA's were generally categorised as follows;

11.5.1 Fragmented Farmlands are of low –poor quality typically;

Weak/degraded landscape structure, difficult to distinguish landscape features, field patterns & combinations of landform/cover due to dominant agricultural land use. Lack of appropriate management/ intervention has resulted in degradation and dereliction, which contributes to the frequent/extensive detracting character as illustrated on Photo Viewpoints 10, 12, 13 & 14 (Figures 11.13, 11.15-11.17).

11.5.2 Plateau Farmlands (North Calder) medium quality typically;

Has a recognised landscape structure; characteristic, pattern and combinations of landform/cover are still evident. Possible scope to improve management for land use/cover with some features worthy of conservation. Detracting features are present hence typical characteristics as illustrated on Photo Viewpoints 13,15,17 & 18. (Figures 11.16, 11.18, 11.20 & 11.21).

11.5.3 Incised River Valleys (North Calder Water) high quality

Rare or occasional detracting features, strong landscape structure; characteristic, balanced pattern and combinations of landform/cover are still apparent. Evidence of appropriate management for land use/cover with distinct features worthy of conservation, creating a definitive sense of place typical characteristics, are illustrated on Photo Viewpoints 4, 6 & 9. (Figures 11.7, 11.9, & 11.12).

The urban fringe landscape context of the scheme, combined with no national or locally recognised designations suggests the perceived value is predominantly low using the criteria set out in Table 11.1 – Criteria for Assessing Value.

For the purposes of this assessment the determination of landscape value (quality) has been based on the condition of the recognised landscape elements and features that contribute to the differing characters as described above.

This further field survey provided a quantification of the landscape quality perceived by the local community and society affected by the road scheme and the higher value placed upon it due to the accessibility and the limited landscape resource within the existing A8 corridor as a whole.

This established the subjective local landscape quality areas of **low**, **medium**, **high** & **unclassified** using the above methodology modified by the observed 'urban fringe' influence upon the landscape resource, leading to localised downgrading. or upgrading in areas where perceived scenic value is considered to increase quality. Landscape Quality for the study area is illustrated on Figures. 11.3 (a-e) Landscape Effects Landscape Quality.

11.5.4 Visual Assessment

The assessment identifies a number of principal representative viewpoints and sensitive receptors along the road corridor study area using the criteria set out in section 11.2.3. The visual envelopes illustrated within the Photo Viewpoints 1 –18 (illustrated on Figures 11.4 – 11.21), establish the Visual Impact Schedule; a detailed summary of the anticipated visual effects from these sensitive visual receptors. The likely changes within the existing visual envelope and resulting significance of effects from identified receptors is categorised as substantial, moderate, slight or none (no change) when taking into account the following criteria:

- visual analysis;
- landscape sensitivity of visual receptors;
- scale or magnitude of visual effects; and
- mitigation.

The visual effects are also illustrated on the Landscape Effects Landscape Appraisal & Landscape Quality Figures 11.2 (a-e) & 11.3 (a-e) and combined to provide an indication of major visual barriers, landform, woodland screening, intervening builtform, cuttings and

embankments (visually intrusive highway) and Photo Viewpoint Locations which establish definitions of arcs of views.

11.6 Predicted Effects

11.6.1 Introduction

The criteria described in Section 11.2 have been used to provide an overview of the predicted landscape and visual effects of the preferred route option taking into account the nature of the effect, the sensitivity of the landscape resource being affected and the magnitude and significance of the proposed development upon the identified receptor. See Figures 11.1 to 11.21 (Landscape Effects Baseline Landscape/ Landscape Appraisal and Photo Viewpoints 1-18).

11.6.2 Preferred Route – Visual Effects

The likely negative visual effects of road building are briefly summarised as:

- intrusion of the road into valuable existing features, undisturbed, higher quality landscapes. Kirkshaws - Shawhead (Douglas Support Estate) & Carnbroe Mains Farm;
- large earthworks, which intrude into views from nearby property and public places (for example Bargeddie APR (A8) and Bankhead Farm);
- intrusive embankments, structures, traffic, lighting or signage crossing valleys and low-lying land. New lighting provision within rural areas where the road alignment is off-line, altering the baseline lighting conditions. New overbridges / footbridges (5 in number), retaining walls (3 in number), other visually significant structures (12 in number);
- lengths of cutting which create notches on the skyline or scars on hillsides and sidelong ground (for example Newhouse Interchange – Sandyford Farm and Bargeddie APR (A8);
- elevated junctions between new and existing landscape features (for example Shawhead and Chapelhall);
- land take required for large earthworks & SUDs attenuation features affecting heritage and nature conservation sites. (NMRS sites and setting); and
- changes to watercourses and drainage regimes. New attenuation ponds/wetlands introduced along the preferred route.

Table 11.9 Visual Effects Schedule provides a more detailed summary of the visual receptors affected, their landscape sensitivity and magnitude of effects.

The following text should be read in conjunction with the Landscape Effects Figures - Baseline Landscape (11.1a-e) /Landscape Appraisal (11.2 a-e) /Landscape Quality (11.3 a-e), and in conjunction with the illustrations seeks to establish the associated visual effects upon the landscape resource. The receptors considered in the assessment include residencies, urban areas, communication routes, places of work and recreational

facilities using the methodology shown in Table 11.3 (Sensitivity of Visual Receptors) and Table 11.4 (Scale or Magnitude of Visual Effects).

Table 11.9 Visual Effects Schedule

(See - Landscape Effects – Landscape Appraisal/ Landscape Quality Sheets 1 to 5 (Figure 11.3 a-e)/ Photo Viewpoints 1-18 (Figures 11.4-11.21))

Visual receptor	Sheet	Landscape Sensitivity	Magnitude of Effects
Bargeddie – southern edge of residential area – Rosebank Terr/ Mainhill Road	1 of 5	High sensitivity (elevation /distance/ degree of change)	Moderate Magnitude
Bargeddie – southern edge of residential area –Monkland View/ Park Road	1 of 5	Moderate sensitivity (elevation /distance/ degree of change)	Low Magnitude (only a few viewers affected)
Bargeddie – western edge recreational ground	1 of 5	Low sensitivity (elevation /distance/ degree of change)	Low Magnitude (only a few viewers affected)
Isolated Dwellings – Newlands Farm	1 of 5	Low sensitivity (elevation/distance/ degree of change)	Low Magnitude (only a few viewers affected)
Swinton/ Crosshill - eastern edge of residential area (Bredisholm Terr/ Crossview Place	1 of 5	Low sensitivity (elevation/distance/ degree of change)	Low Magnitude (only a few viewers affected)
Swinton/Crosshill – eastern edge of residential (Rhindhouse Place)	1 of 5	Low sensitivity (elevation/distance/degree of change)	Low Magnitude (only a few viewers affected)
Swinton/ Crosshill – (eastern edge) recreational ground	1 of 5	Low sensitivity (elevation/distance/ degree of change)	Low Magnitude (only a few viewers affected)
Swinton/ Crosshill - Isolated Dwelling – Ellismuir	1 of 5	Low sensitivity (elevation/distance/ degree of change)	None
Kirkwood /Kirshaws - southern edge of residential area	2 of 5	Moderate sensitivity (elevation/ distance / degree of change)	Low /Moderate Magnitude
Kirkwood /Kirshaws - Recreational Route –	2 of 5	Moderate sensitivity (elevation/ distance / degree of change)	High Magnitude (only a few viewers affected)
Isolated Dwelling – Aitkenhead	2 of 5	Low sensitivity (elevation/distance/ degree of change)	Low Magnitude (only a few viewers affected)
Isolated Dwellings – Bankhead/ Shawhead	2 of 5	High sensitivity (elevation/distance/ degree of change)	High Magnitude (only a few viewers affected)
Showcase Leisure (Kirkwood)	2 of 5	Moderate sensitivity (elevation/ distance/ degree of change)	Moderate Magnitude
Shawhead - southern edge of residential area	3 of 5	High sensitivity (elevation/ distance/ degree of change)	Moderate Magnitude

Visual receptor	Sheet	Landscape Sensitivity	Magnitude of Effects
Industrial areas southern edge of Shawhead (either side of junction)	3 of 5	Moderate sensitivity (elevation/ distance/ degree of change)	Low /Moderate Magnitude
Douglas Support Estate –Recreational Route	3 of 5	High sensitivity (elevation/ distance/ degree of change)	High Magnitude (only a few viewers affected)
Shirrel northern edge of residential area	3 of 5	Low sensitivity (elevation/distance/ degree of change)	None
Isolated Dwellings - Carnbroe Mains	3 of 5	High sensitivity (elevation/ distance/ degree of change)	Moderate Magnitude (only a few viewers affected)
Isolated Dwellings - Orchard Farm/ Carnbroe Road	3 of 5	High sensitivity (elevation/ distance/ degree of change)	Low Magnitude (only a few viewers affected)
Recreational Route – North Calder Water	3 of 5	Low sensitivity (elevation/distance/ degree of change)	None
Eurocentral / Newhouse- Industrial areas south of A8	4 of 5	Low sensitivity (elevation/distance/ degree of change)	Low Magnitude
Calderbank /Newhouse southern edge of residential area	4 of 5	Moderate sensitivity (elevation/ distance/ degree of change)	Low Magnitude (only a few viewers affected)
Calderbank - Cricket Ground	4 of 5	Low sensitivity (elevation/distance/ degree of change)	Low Magnitude (only a few viewers affected)
Isolated Dwellings – Parkhaven Lodge	4 of 5	High sensitivity (elevation/ distance/ degree of change)	High Magnitude (only a few viewers affected)
Newhouse- Industrial areas north of A8	4 of 5	Moderate sensitivity (elevation/distance/ degree of change)	Moderate Magnitude (only a few viewers affected)
Chapelhall - southern edge of residential area	5 of 5	Moderate sensitivity (elevation/ distance/ degree of change)	Low Magnitude
Newhouse- Industrial areas south of A8	5 of 5	Low sensitivity (elevation/distance/ degree of change)	Low Magnitude
Isolated Dwellings – Newhouse Motel/ Carlindean/Budshaw	5 of 5	Low sensitivity (elevation/distance/ degree of change)	Low Magnitude (only a few viewers affected)
Isolated Dwellings – Sandyford Farm/ Fairy-bank/ Rowantree Row	5 of 5	Moderate sensitivity (elevation/ distance/ degree of change)	Moderate Magnitude (only a few viewers affected)

11.6.3 Views from Residential/Urban Areas/Individual Dwellings

Within the 9 settlements within the study area that border the proposed M8 between Baillieston and Newhouse, there are receptors that have a range of partial and open, mid,

short and long distance views of the road, with the possible exception of Calderbank, due to the intervening combination of landform, land cover and built form. Variations in the visual envelope of the preferred option are a result of the existing landform and significant vegetation, which restrict views of the road in places. There will however be seasonal variations in the extent of screening of the road by the existing vegetation.

The motorway route will be visible from surrounding residential & urban areas and individual dwellings, as illustrated within the Landscape Quality Sheets 1-5 (Figures 11.3 a-e), Photo Viewpoints 1-18 (Figures 11.4-11.21) discussed further below to establish the magnitude of visual effects from the identified principal representative viewpoints and sensitive receptors.

Bargeddie (Sheet 1of 5- Fig 11.3a),

The preferred option involves the widening of on/off slip roads(M8), the proposed APR will run to the east of the existing junction linking the existing A8 & A89, adjacent to the western boundary of Bargeddie. The addition of a roundabout and APR to the east of the junction and the resulting landform (cutting) will be partially visible from receptors in Bargeddie. (See Photo Viewpoints 1, 2 & 3, Figures 11.4-11.6).

The main motorway route alignment is predominantly in cutting and the existing mature roadside planting provides good screening from the residential area. A more sensitive receptor is the existing recreational route which will be revised by a proposed new footbridge over the extended road corridor. Photo Viewpoints 2 and 3 illustrate where open elevated views into the extended road corridor over the APR and M8 are more difficult to mitigate fully.

Construction Stage – short term

Site preparation and excavation/ earthworks works will be visible to the residential properties along the southern edge of the settlement especially in relation to the APR route and new structures (railway overbridge/ retaining wall). The magnitude of visual effects will be moderate to substantial, due to the distance/ elevation/ sensitivity of the receptors and the receiving landscape quality.

Operation Stage (Scheme Open) – mid term

Photo Viewpoints 2 & 3 (Figures 11.5 and 11.6) illustrate the most significant visual effects from the recreational route at Holm Road crossing the APR/M8 route and new structures (railway overbridge/ retaining wall). The magnitude of visual effects will be substantial, due to the distance/ elevation/ sensitivity of the receptors and the receiving landscape quality.

15 years from Operation – long term

The magnitude of visual effects will be substantial, due to the distance/ elevation/ sensitivity of the receptors and the receiving landscape quality. The maturing mitigation planting is an extensive change in relation to the landscape fabric.

Crosshill and Swinton (Sheet 1of 5- Fig 11.3a)

Crosshill and Swinton experience views of the existing road network (M73/M8/A8) from the west of the Baillieston junction. The views towards the proposed M8 route are partially screened by existing vegetation associated with the existing road infrastructure. The removal of this roadside planting for a new roundabout will affect some receptors (Photo Viewpoint 1 & 2 - Figures 11.4 and 11.5 looking west towards settlements illustrates the woodland screening).

The Swinton roundabout forms a large feature in the visual landscape as perceived front residential areas of Swinton and Crosshill. It's eastern extents protrude beyond the line of an existing access road, cutting into the existing rectangular field pattern. This will result in wide spread of lighting and prominence of vehicle movements around the junction. However, this large size of roundabout will reduce the likelihood of queuing traffic, and its associated effects on landscape character and views.

The location of the Swinton roundabout is in close proximity to the Baillieston Interchange. The location of the roundabout means that the alignment of the dual carriageway access to the main interchange fragments the existing block of woodland into 3 small areas. This area includes the bridging of the M73 and M8 Slip road.

The removal of a significant part of this roadside woodland planting for the proposed Swinton roundabout and the alignment of the dual carriageway, will affect residential properties in Crosshill and Swinton. (Photo Viewpoint 19 shows the existing woodland screening; and it is also visible in the distant view of Photo Viewpoint 1).

Construction Stage – short term

Site preparation and excavation/ earthworks operations will be visible to the residential/ recreational areas along the eastern edge of the settlement. Loss of screening vegetation will increase the prominence of the road infrastructure. The magnitude of visual effects will be moderate, due to the distance/ elevation/ sensitivity of the receptors and the receiving landscape quality.

Earthworks will be visible in near distance views from residential properties on the eastern boundaries of Swinton and Crosshill; from Crosshill Sports Ground; and from users on the A8. The scale and size of the roundabout and its associated bridge structure results in the magnitude of visual effects being moderate at the construction stage. Existing woodland planting will screen middle distance views of the building of the proposed bridge, and demolition of the old bridges.

Operation Stage (Scheme Open) – mid term

Loss of screening vegetation will be mitigated by new planting to address the adverse effects of the road infrastructure. The magnitude of visual effects will be moderate, due to the distance/ elevation/ sensitivity of the receptors and the receiving landscape quality.

The extents and position of the Swinton roundabout; and the newly planted mitigation planting, will be visible in near distance within view from residential properties on the eastern boundaries of Swinton and Crosshill; from Crosshill Sports Ground; and from users on the A8. The scale and size of the roundabout results in the magnitude of visual effects being moderate at the operation stage.

15 years from Operation –long term

The magnitude of visual effects will be slight, due to the distance/ elevation/ sensitivity of the receptors and the receiving landscape quality. The maturing mitigation planting is reinforcing the landscape fabric by providing valuable links to existing features that contribute to the recognised character.

The magnitude of visual effects will be moderate due to the scale of the roundabout proposed, and its protrusion beyond the visual envelope of the existing grouped arrangement of carriageways in this location. The maturing replacement planting cannot fully mitigate for the loss of field boundaries and the impact of additional road infrastructure on the landscape character in this area. The proposed bridge will not be significantly more visually intrusive than the existing bridges; and will be screened by the replacement woodland planting.

Kirkwood (Sheet 2of 5-Fig 11.3b),

Kirkwood, as with Bargeddie, overlooks the proposed M8 route with receptors along the southern boundary of the settlement having more prominent open views of the road. Views will be restricted by existing mature vegetation and built form associated with leisure, commercial and residential developments, see Photo Viewpoints 4, 5 & 6 (Figures 11.7-11.9).

The M8 motorway route is elevated to cross the A752 and Luggie Burn in front of the Showcase Cinema (See Photo Viewpoint 4). The addition of a new pedestrian overbridge will add to the visual elements associated with the road development. This will result in the new road infrastructure being visible to receptors at Kirkwood (See Photo Viewpoint 5) which will have partial mid distance views of the road.

A particularly sensitive site is Monklands Cemetery, which is approximately 80-150 metres from the centre line of the road. Here the M8 will alter the landform significantly as the motorway is in cutting at this point. The addition of a new accommodation overbridge will also add to the visual elements associated with the road development. Photo Viewpoints 5 & 6 describe the typical visual envelope towards the development from the elevated residential areas of Kirkwood and Kirkshaws.

The existing woodland adjacent to the Incised River Valley, south of the existing M8 alignment provides a significant visual screen to any receptors from Tannochside and Viewpark to the south. No associated visual effects are anticipated.

Construction Stage – short term

Site preparation and excavation/ earthworks works will be visible initially to the residential properties along the southern edge of the settlement especially in relation to the M8 route and new structures (pedestrian and accommodation overbridges). The magnitude of visual effects will be slight, due to the distance/ elevation/ sensitivity of the receptors and the receiving landscape quality.

Operation Stage (Scheme Open) – mid term

Photo Viewpoint 6 describes the most significant visual effects from the residential area above Old Monklands Cemetery, Kirkwood, of the M8 route and new structure (overbridge). The magnitude of visual effects will be moderate, due to the distance/ elevation/ sensitivity of the receptors and the receiving landscape quality.

15 years from Operation –long term
The magnitude of visual effects will be moderate, due to the distance/ elevation/ sensitivity of the receptors and the receiving landscape quality. The maturing mitigation planting is a minor change over a wide area in relation to the landscape fabric and does not quite fit the receiving landscape pattern.

Shawhead and Shirrel (Sheet 3of 5-Fig 11.3c)

The new Shawhead Junction is a complex interchange with a combination of Visually Intrusive Highway (VIH), the eastbound on/ off slips and a two lane off slip to the A725 southbound. The junction is developed on either side of the proposed motorway route, approximately 600 metres from the residential area of East Shawhead. The main motorway route alignment is predominantly in cutting and the existing mature roadside planting provides good screening from the residential area of Shirrel to the south. A more sensitive receptor is the recreational route and proposed new footbridges where open elevated views into the extended road corridor over the A725 and M8, are more difficult to mitigate (Photo Viewpoints 8 & 9, Figures 11.11 and 11.12).

The warehouses situated along the southern boundary of the settlement around the Shawhead junction will have short range views of the proposed on/off link roads, as the existing A8 route runs directly in front of the site, see Photo Viewpoints 7 & 8 (Figures 11.10 and 11.11).

Receptors along the southern boundary of the residential area will experience short-range views of the pedestrian footbridge from Shawhead (See Photo Viewpoint 8).

Carnbroe Mains Farm and Orchard Farm's locally higher landscape quality setting and open views will be significantly affected by the proximity of the M8 route alignment. The motorway will be in cutting, but the new accommodation bridge will add to the visual intrusion of the development. Mitigation will not address all the adverse effects resulting in a severe magnitude of change. Orchard Farm was vacant at the time the assessment was undertaken.

Properties located along the northern edge of Shirrel; Caldwell Grove, Rosegreen & Hillview Crescent will have no views of the road proposal. No associated visual effects are anticipated.

The individual property situated on Carnbroe Road opposite to Orchard Farm will experience similar views as that illustrated within Photo Viewpoint 10. The elevated westbound APR and associated overbridge crossing the M8 is the most significant change in view. Off site planting will assist in limiting substantial visual effects at operational stage. The maturing mitigation planting will look to address the long-term issues of the overbridge and establishes the new woodland skyline in keeping with the rural character of the landscape. Mitigation measures look to mask the increased road infrastructure of the eastbound and westbound APR's, the more dominant element of the proposal as the M8 alignment returns to follow the existing A8.

Construction Stage – short term

Photo Viewpoints 7 & 8 describe the visual effects from the residential receptors to the north of the new junction. Retained visually significant vegetation associated with the North Calder Water and Douglas Support Estate assists in reducing the visual envelope towards the road development. Site preparation works removes some of this vegetation which is significant but limited in extent and contributes to an intensive change of view of the existing skyline. The magnitude of visual effects will be moderate, due to the distance/ elevation/ sensitivity of the receptors and the receiving landscape quality.

Operation Stage (Scheme Open) – mid term

The most significant effects are described in Photo Viewpoint 9 (Figure 11.12) where the scheme increases the visual dominance of vehicle movements. A re-engineered landform and two footbridges either side of the motorway create a new skyline. Vehicle users (A725) are predominantly affected as existing roadside vegetation limits the inter-visibility from other receptors to the south within Shirrel. The magnitude of visual effects will be substantial, due to the distance/ elevation/ sensitivity of the receptors and the receiving landscape quality.

15 years from Operation –long term

Matured mitigation planting alters the character of the landscape substantially from East Shawhead and the A725. Woodland blocks within grassland reflect the recognised/valued features of the locality addressing landscape quality and minimising the adverse visual effects of the footbridge, but not fully, creating a very intensive change within the foreground north and south of the junction. The magnitude of visual effects will be moderate, due to the distance/ elevation/ sensitivity of the receptors and the receiving landscape quality.

Eurocentral and Chapelhall (Sheet 4 of 5-Fig 11.3d)

The visual influence on receptors at Eurocentral and Chapelhall will be largely limited to those receptors adjacent to the existing road corridor. Photo Viewpoints 10, 12 & 13

(Figures 11.13, 11.5 and 11.16) show views of the current Eurocentral landform and road context. There is existing vegetation which will provide some screening, but the scale of the changes, in conjunction with woodland being partially removed as a result of the road layout between Eurocentral and Chapelhall, means that the visual envelope of the scheme will be altered.

Views from receptors at Chapelhall and Calderbank will be limited due to the intervening land cover and built form, and typically Photo Viewpoint 11 illustrates the visual envelope from the residential areas. (see Figure 11.14).

Photo Viewpoints 12 & 13 describe the visual effects of the changes to the APRs, new roundabouts and re-aligned on/off links north and south of the existing bridge structure. Receptors are limited to the industrial/commercial users of Eurocentral from the south and isolated agricultural properties to the north and west (see Photo Viewpoint 12). Intervening landform (road is in a cutting) and extensive woodland screening limits inter-visibility of the road and the surrounding landscape.

Construction Stage – short term

Site preparation and excavation/earthworks will be mainly visible to the vehicle users within the road corridor, the new elevated APR's outside the existing A8 alignment have more extensive visual effects but few receptors are affected. The magnitude of visual effects will be moderate, due to the distance/ elevation/ sensitivity of the receptors and the receiving landscape quality.

Operation Stage(Scheme Open) – mid term

Viewpoints 12 & 13 describe the most significant effects from the recreational route at the Eurocentral overbridge crossing the M8, of the extended carriageway provision and additional APR routes outside the existing A8 road corridor. Extensive mitigation measures start to address adverse visual effects but the resulting magnitude is substantial due to the notable change in landscape characteristics over an extensive area and the distance/elevation/sensitivity of the receptors and receiving landscape quality.

15 years from Operation –long term

The magnitude of visual effects will be substantial, due to the distance/ elevation/ sensitivity of the receptors and the receiving landscape quality. The maturing mitigation planting is an extensive change in relation to the landscape fabric. The rural landscape between Orchard Farm and Eurocentral is sensitive, due to its open character and the visual effects will be more noticeable compared to the context around the Commercial/Industrial areas where existing landform, builtform and land cover limits inter visibility of the road.

Chapelhall (Sheet 4 of 5-Fig 11.3d)

Photo Viewpoints 14, 15 & 16 (Figures 11.17-11.19) describe the visual effects of the changes to the APRs, new roundabouts and re-aligned on/off links north and south of the

existing bridge structure. Receptors are limited to the industrial/commercial users of Eurocentral (southwest) and Newhouse Industrial Estate from the northeast/ southeast and isolated residential properties to the north and west. Intervening landform and extensive woodland screening limits inter-visibility of the road and the surrounding landscape. The junction improvements require removal of existing vegetation and redesigned landform in conjunction with the elevated road infrastructure.

Construction Stage – short term

Photo Viewpoints 14 & 16 describe the visual effects from the receptors to the east and south of the new junction. Retained visually significant vegetation associated with the Woodhall Estate (west) and Blacklands Plantation within Eurocentral assists to reduce the visual envelope towards the road development. Site preparation works removes some of this vegetation which is significant but limited and contributes to an intensive change of view of the existing skyline. The magnitude of visual effects will be moderate, due to the distance/ elevation/ sensitivity of the receptors and the receiving landscape quality.

Operation Stage (Scheme Open) – mid term

The most significant effects are shown in Photo Viewpoint 14 & 16 where the scheme increases the visual dominance of vehicle movements. Re-engineered landform and two overbridges either side of the new junction creates a new skyline. Vehicle users (B799) are predominantly affected as existing roadside vegetation limits the inter-visibility from other receptors to the south. The magnitude of visual effects will be substantial, due to the distance/ elevation/ sensitivity of the receptors and the receiving landscape quality.

15 years from Operation –long term

Matured mitigation planting alters the character of the landscape substantially from the new overbridges and the B799. Woodland blocks within grassland and wetland reflect the recognised/valued features of the locality addressing landscape quality and minimising the adverse visual affects of the footbridge, but not fully, creating a very intensive change within the foreground west and south of the junction. The magnitude of visual effects will be moderate, due to the distance/ elevation/ sensitivity of the receptors and the receiving landscape quality.

Newhouse (Sheet 5 of 5-Fig 11.3e)

The preferred option will affect the visual influence on receptors at Newhouse Industrial Estate (to the north) and Chapelhall North. There are minor changes to the Newhouse Junction and the preferred option will change the shape and size of the roundabout which shall result in the loss of planted features. There are individual dwellings that may have partial long distance views of the junction alterations at Newhouse due to the rising elevation (approximately 170-180 m AOD, see Photo Viewpoints 17 & 18 (Figures 11.20 and 11.21)) and subsequently the associated magnitude of change is slight over the short, mid and long-term.

11.6.4 Views from Transport Routes

The potential for visual effects on public highways has been assessed and should be read in conjunction with the Vehicle Users Chapter 14. It should be noted that views from roads are considered transient due to the nature of receptors. The following major and minor highways have been identified as crossing, or passing near to the proposed M8 and so are likely to experience visual effects as a result of the road.

M73 Baillieston (Sheet 1of 5- Fig 11.3a)

The M73 runs across the site and intersects the A8/M8 at the Baillieston Interchange. Partial views of the proposed M8 will be possible in the direction of Kirkwood; however, when travelling along the M73 in a northerly direction, vehicles will be moving at such a speed that any changes will be less prominent. It is, however, possible that users of the M8 will have changed views north of the Baillieston Junction, as the proposed changes allow for an additional roundabout and APR north of the Baillieston Junction. Associated mature roadside infrastructure planting will again minimize the visual envelope. The low sensitivity of this route, combined with distance and elevation from the road proposal, means that the magnitude of visual effects will be slight in the long term.

A89 (Connects Swinton and Bargeddie) (Sheet 1of 5- Fig 11.3a)

Travellers along the A89 will have a changed view north of the Baillieston Junction, as the proposed changes allow for an additional roundabout and APR north of the Baillieston Junction. Associated mature roadside infrastructure planting will again minimize the visual envelope. The low sensitivity of this route, combined with distance and elevation from the road proposal, means that the magnitude of visual effects will be slight, with a notable change in a limited area where the roundabout formal landscape planting creates a gateway feature for Bargeddie.

A752 (Bargeddie) (Sheet 2of 5- Fig 11.3b)

The A752 currently runs from Bargeddie, south of Tannochside, but will have an additional overbridge for the M8 elevated motorway. Therefore users of the A752 will have limited views of the new road as users approach due to the significant visual screening associated with the North Calder Water from the south. The low sensitivity of this route, combined with distance and elevation from the road proposal, means that the magnitude of visual effects will be moderate.

A725 (Shawhead) (Sheet 3of 5- Fig 11.3c)

The A725 currently crosses the A8 to the south of Shawhead. The motorway proposal requires the A725 to cross above the M8 and associated roads. Some would be in cutting, others are elevated, altering the existing skyline due also to the provision of two new footbridges. This would afford users open views of the M8 and elevated slip roads, as they travel from Shawhead to Shirrel or vice versa. . Coming from the industrial estates north towards Shawhead travellers will notice the loss of ancient woodland, (part of Easter Wood), adjacent to the road to enable the creation of a SUDS pond cut into the hill side with its associated tarmac access road. The moderate sensitivity of this route,

combined with distance and elevation from the road proposal, means that the magnitude of visual effects will be moderate in the long term.

B7070 (Shawhead) (Sheet 3 of 5- Fig 11.3c)

The B7070 currently crosses the A725 close to the North Calder Water south of Shawhead. The motorway proposal requires the B7070 to cross above the M8 and associated roads, altering the existing landform. The provision of two new footbridges will be more significant as these structures will alter the skyline for the vehicle users. This would afford users open views of the M8 from the elevated roads, as they travel from Shawhead to Shirrel or vice versa. The moderate sensitivity of route, combined with distance and elevation from the road proposal, means that the magnitude of visual effects will be moderate.

B799 (Chapelhall) (Sheet 4of 5- Fig 11.3d)

The B799 runs from Chapelhall to the south of the site. The Chapelhall junction is approximately 250 metres to the west of the B799, and involves raised landforms in association with the three new roundabouts and link roads. The junction will be partially visible to traffic using the B799 during the short-mid term, due to the removal of the existing roadside planting adjacent to the existing bridge structure. New mitigation planting will look to screen the slip roads linking the roundabouts north/ south of the M8 and the new overbridge accommodating the B799. The moderate sensitivity of this route, combined with distance and elevation from the road, means that the magnitude of visual effects will be moderate in the long term.

A73 (Newhouse) (Sheet 5 of 5 - Fig 11.3e)

The A73 road crosses the existing A8 at the Newhouse junction, and the scheme retains this provision with an elevated roundabout layout. As the roundabout shape and size will be altered, views from the A73 will change. The changes to the form of the roundabout are limited, but changes to the visual envelope will result from the associated loss of vegetation in the centre of the roundabout. The low sensitivity of the receptors along this route and minimal changes to the road layout mean the magnitude of visual effects will be moderate in the short-mid term, but mitigation planting will result in a slight magnitude of effects longer term.

Minor roads servicing the A8

A number of minor roads that run perpendicular to the A8 highlight previous severance due to road infrastructure improvements. These cul-de-sacs now offer illegal tipping areas increasing the character of dereliction. Further severance of minor roads has been avoided and the rationalisation of recreational routes and land use will look to address this problem.

Bredisholm Road (Sheet 1of 5- Fig 11.3a)

Changes to the views from the Bredisholm Road will be limited due to the existing roadside vegetation, but the additional APR and roundabout link to the A89 will be more extensively visible, when looking in a westerly direction. The replacement bridge

(recreational footbridge) at this location will alter the visual envelope north/south. The motorway alignment to the east and the additional railway overbridge add to the intrusive elements which are difficult to mitigate fully (see Photo Viewpoints 2 & 3, Figures 11.5 &11.6). The moderate sensitivity of the receptors along this route combined with the elevation of the road proposal, means that the magnitude of visual effects will be substantial.

Existing A8 route

The scheme largely maintains the existing road alignment from Baillieston as far as Eurocentral, with the motorway running to the south of the existing A8. Between Eurocentral and Newhouse the motorway runs on line with the A8 APR's outside effectively widening the road corridor. Views from the existing A8 will be radically altered at Kirkwood, Eurocentral and Chapelhall. The proposed main motorway route is predominantly either in a cutting or crossed by new overbridge structures. There are points at which views of the proposed M8 from the existing A8 will be altered, for example south of Kirkwood where the proposed M8 runs close to the North Calder Water. Views coming along the existing A8 out of Swinton and Crosshill towards the Baillieston Interchange will have a fragmented urban character, resulting from the extent, location and impact on the visible landscape as a result of the proposals. The low sensitivity of these receptors along the existing route, combined with elevation from the new road scheme, means that the magnitude of visual effects will be moderate.

Railway Lines (Sheets 1 of 5 & 3 of 5- Fig 11.3a &11.3c)

The route of the railway lines will remain unchanged, but will be crossed by the motorway at two points (Baillieston, and east of Shawhead next to Orchard Farm). The low sensitivity of the receptors along this route, combined with distance and elevation of the road proposal, means that the magnitude of visual effects will be slight.

Recreational Routes and Areas

Recreational ground at Bargeddie will be screened by woodland mitigation planting either side of the proposed APR linking the A8 to Coatbridge Road. This is a high sensitivity receptor, however the distance and elevation of the road proposal means that the magnitude of visual effects will be slight.

The North Calder Water river valley accommodates and provides links to Rights of Way; designated long distance paths and national and regional cycleways. The proposed scheme includes provision for footbridges, footpaths, cycleways and agricultural accommodation bridges which maintain the continuity of recreational routes east west along the route. The provision of overbridges for pedestrians and cyclists or Non Motorised Users (NMUs) has also looked to provide benefits for north/ south journeys where the scheme potentially caused severance or where the existing route could be improved.

The proposed scheme includes the introduction of an east-west footpath/cycle route as part of the mitigation measures of the wider scheme. Receptors along this route will have views from the operational stage of development, however, are of low sensitivity because

the changes to views will be those taking place when the scheme is in place and the road will gradually be screened as new planting grows and matures. The magnitude of visual effects will therefore be slight.

11.6.5 Preferred Route – Landscape Effects

The main potential negative effects on landscape character, without mitigation measures being incorporated into the proposed scheme, are briefly summarised as:

- permanent change in land use/management as a result of the proposed land take associated with the motorway off line alignment and junction arrangement near Douglas Support Estate to Orchard Farm;
- permanent alteration to topography and skyline at Shawhead and Chapelhall due to the introduced landform of road embankments, cuttings, bridge structures and elevated slip roads;
- temporary/permanent loss of woodland during the construction phase and associated disturbance existing vegetation in particular along the offline section of the scheme;
- changes to land cover resulting from mitigation measures associated with the scheme e.g. native mixed broad-leaved woodland planting around major new junction layouts at Shawhead and Chapelhall. Change in perceived landscape pattern and environmental fit;
- permanent alteration to public access and recreation routes linking the main settlement/leisure/commercial destinations. Increased possible severance caused by proposed option and new provision of linkages to the wider community surrounding the new road alignment (see Chapter 8). New access routes are shown also in Figure 20.1 a-g (Conceptual Environmental Mitigation Sheets 1-7); and
- cumulative effects as a result of the proposed development in relation to; heritage and nature conservation sites; watercourses and drainage regimes, human beings and surrounding amenity.

Valuable Landscape Elements/ Features are described within Landscape Effects Baseline (Landscape Sheets 1 to 5). Table 11.10 Landscape Quality and Appraisal Summary provides a more detailed analysis of landscape character classification (value/quality); landscape designation and valued features affected by the road proposal.

Table 11.10 Landscape Quality and Appraisal Summary of Effects

(See Landscape Effects – Landscape Appraisal/ Landscape Quality Sheets 1 to 5)

Location	Sheet	Landscape Quality/Value	Effects Upon Landscape Appraisal
Baillieston to Bargeddie	1	Main Route – Medium (Value locally) APR – Low (Value locally)	Green Belt, landform (cutting), VIH, New Bridge Structures (2)
Kirkwood to Kirshaws	2	Main Route – Med. To Low (Value locally)	Green Belt, SINC's (2), landform (cuttings 2), VIH (2), New Bridge Structures (2)
Shawhead to Eurocentral	3	Main Route – High (Value locally) New Junction & APR's: (north) – Low (Value locally) (south) – High (Value locally) (west) – High (Value locally)	Green Belt, SINC's (2), TPO areas (5) Ancient Woodland Other woodland
Eurocentral to Chapelhall	4	Main Route – Medium (Route Widening) (Value locally) APR- eastbound-Medium (Value locally) APR-westbound-Medium (Value locally)	Green Belt (north), SINC (2), VIH (APR's and Junction Layouts) (6)
Chapelhall to Newhouse	5	Main Route – Medium (Route Widening) (Value locally) APR-eastbound-Medium (Value locally) APR- westbound-Medium (Value locally)	Green Belt, VIH (3), Cutting (2) Other planted features.

11.6.6 Valuable landscape elements/ features

The landscape character areas through which the scheme passes are related strongly to the underlying geology, and pattern of land use, which runs perpendicular to the proposed road. Previous transportation corridors (road and rail) have attempted to respect topography, as seen by the current A8 and mainline railway but are still very dominant linear features within the landscape and contribute to the urban fringe character of much of the site context between Baillieston – Shawhead and Eurocentral – Chapelhall. Any route alignment which is effectively 'off line' from the existing A8 will find it hard to avoid severing the various zones of landscape character. Mitigation, in terms of engineering solutions and landscape designed features, will therefore be important in helping to fit the scheme into the landform and blend it into the surrounding landscape.

The valuable landscape elements affected by the scheme and outlined below will be significant in some sensitive areas by altering the landscape resource and residual character areas in terms of landform, vegetation/land cover and cultural heritage features.

Bargeddie (Sheet 1of 5- Fig 11.2a & 11.3a),

The proposed APR linking the A8 to Coatbridge Road affects the existing landform to the west of Bargeddie. The road is in cutting. Visually Intrusive Highway (VIH) passes

through a landscape of low quality (urban fringe); rough pasture and scattered scrub of agricultural character within the Greenbelt.

The new bridge structures (railway and accommodation/ recreation route) will require the removal of some vegetation, but this is not significant.

The new motorway alignment is effectively a road widening scheme at Bargeddie, before moving south parallel to the A8 alignment where the landscape is of medium quality, within the Greenbelt.

The proposed location of the Swinton roundabout will result in the temporary loss of woodland until new planting matures, with some permanent loss under the footprint of the scheme. Slight loss of tree cover to TPO woodland will occur to create the proposed east-west recreational route, but it may be possible to vary this during the detailed siting of the path/cycleway. There will be permanent loss of field boundaries and traditional landform around new footpaths and proposed roundabout resulting in a slight adverse effect on the landscape character in this location.

No cultural heritage features are directly affected by the road scheme.

Kirkwood to Kirkshaw (Sheet 2 of 5-Fig 11.2b & 11.3b),

The line of the proposed motorway passes through a landscape of differing quality within the Greenbelt. The most significant effects are situated within a lower quality landscape, near to the Glenview property and Luggie Burn, where the road is elevated on embankment and a new overbridge is introduced.

The motorway route runs south of Bargeddie, starting on-line then cuts towards the Incised River Valley, and therefore introduces additional visible engineered features within this higher quality landscape. A dominant engineered structure (a benched retaining wall) adjacent to Glenview allows for the retention of existing significant vegetation adjacent to the North Calder Water. Areas of recent roadside planting will be removed.

The new bridge structures (agricultural accommodation/ recreation routes) will require some landform changes.

A single National Monuments and Recorded Site (NMRS) is directly affected by the preferred motorway alignment. The setting around Bankhead Farm (NMRS) will also be affected due to the proximity to the new accommodation bridge over the motorway which is in cutting. Two Sites of Interest to Nature Conservation (SINCs) are severed by the motorway route either side of Shawhead Farm.

Shawhead to Eurocentral (Sheet 3 of 5-Fig 11.2c & 11.3c),

Due to the more complicated topography and existing significant vegetation within this area of the road the associated effects upon landscape character are greater. The motorway is in cutting reducing the effects upon the character area, therefore the

changes to landform are limited. Existing mature woodland within the Douglas Support Estate and Ancient Woodland around the North Calder Water will be removed, east and west of the new interchange layout respectively. This would otherwise serve an important function in screening views of the proposed M8 from receptors to the south. One Site of Interest to Nature Conservation (SINC) associated with the North Calder Water is affected by the motorway route to the east of the new interchange.

Scattered woodland blocks and trees with Tree Preservation Orders (TPOs) are also severed by the motorway alignment within the locality of Carnbroe Mains and Orchard Farm, before the motorway returns to the existing A8 alignment, where the landscape is of lower quality (medium to low).

The interchange layout at Shawhead is predominantly within a low quality landscape. Changes in landform due to the elevated roads (VIH), combined with new road, accommodation and recreational overbridges will add to the poor landscape quality of the area. The on/off slip roads run counter to the landform and cause field severance that will change the pattern of the landscape.

No cultural heritage features are affected directly. The setting of two NMRS located at The Mount and near to the North Calder Water will be altered, but not significantly.

There will be permanent loss of part of the ancient woodland at Easter Wood, to accommodate the revised Shawhead SUDS pond location and access track.

With reference to Table 11.1 in the Methodology above, titled Criteria for Assessing Landscape Value, ancient woodland has an exceptionally high value because of its high importance and rarity both ecologically and culturally. The value of ancient woodland is at a national as well as local scale so despite the percentage of felling of Easter Wood being relatively small, the cumulative impact nationally of every such ‘small’ loss needs to be considered.

All trees are sensitive to even small changes in the water table or other ground conditions, but these indirect effects are delayed, and so often unreported. In such circumstances, trees may take 5 or 10 years to die. Because the SUDS pond is cut down steeply into the hillside, this it has the potential to affect the water table within Easter Wood, beyond the portion of the Wood directly lost to construct the pond.

The magnitude of this landscape change could therefore without mitigation be substantial, with notable change in landscape characteristics over an extensive area. Sensitive detailed design will attempt to minimise tree felling and any mitigation replacement planting will look to enhance the surrounding woodland.

Hydrological checks as part of the scheme assessment have confirmed that there is a risk that the SUDS pond will intercept groundwater flows, but are unable to quantify the extents of changes to the water table without further detailed investigation. The possible mitigation option of lining the SUDS basin with clay to help maintain a high water table is

not proposed because of the adverse impacts arising from the additional construction activity that would be required.

During the preparation of the specimen design the detailed design of this area will addressed, and there will be a requirement for the Contractor to minimise impacts on the ancient woodland, SINC, and bankside areas of the North Calder Water. This will be done through the Employer's requirements and Contract documents in the form of restrictions on the extents of construction activity, drainage design, vehicle movements, and the requirement to produce method statements.

Eurocentral to Chapelhall (Sheet 4 of 5-Fig 11.2d & 11.3d),

The motorway alignment returns back to the existing A8 infrastructure east of Orchard Farm, widening the existing road corridor. The proposed A8 APRs run parallel north and south within an area of medium landscape quality. The elevated southern route (westbound) alters the landform significantly as it rises to cross the motorway, and to a lesser extent around the new Eurocentral interchange. The elevated eastbound road is less visible, but affects a landscape of higher quality, designated Greenbelt, and encroaches upon two SINC's and removes woodland.

Other roadside planted features will be removed around the existing Eurocentral junction.

Due to the level landform and existing significant vegetation lost around Chapelhall, the effects of the road upon landscape character are greater due to the complexity of the interchange layout. The motorway is at grade and passes through a landscape of medium quality, the on/off slips and new roundabouts are elevated and therefore the changes to landform are greater. Existing mature woodland and other valuable roadside planting will be removed due to the new interchange layout. This would otherwise serve an important function in screening views of the proposed M8 from receptors within this locality. One Site of Interest to Nature Conservation (SINC) associated with the Blacklands Plantation is affected by the motorway route to the west of the new interchange.

The interchange layout at Chapelhall is predominantly within a medium quality landscape. Changes in landform due to the elevated roads (VIH) combined with new road overbridges will detract from the higher landscape quality at Parkhaven Lodge and the existing open character of the existing junction. The on/off slip roads run counter to the existing landform will change the pattern of the landscape.

No cultural heritage features are affected directly; the setting of one NMRS located west of Parkhaven will be altered, but not significantly.

Chapelhall to Newhouse (Sheet 5 of 5-Fig 11.2e & 11.3e),

The motorway alignment continues along the existing A8 infrastructure east of the new Chapelhall Interchange, effectively widening the existing road corridor. The proposed A8 APRs run parallel north and south in an area of medium landscape quality at existing grade. The widened road footprint alters the landform slightly until it reaches the

prominent landform at Sandyford Farm east of the Newhouse Interchange. The skyline and landform has been previously altered by the motorway scheme and is re-profiled due to the widening proposals which affected land designated as Greenbelt and will remove valuable screening roadside vegetation.

11.6.7 Landscape character sensitivity (overall)

The Landscape Resource Assessment describes how the differing elements of the landscape; topography; tree & woodland; valuable habitats; land use; road/rail/ recreational networks and drainage contribute to the landscape character baseline. Table 11.11 below provides a summary of this.

The sensitivity of the resource, nature of effect; magnitude; mitigation and residual effect (short-term 0-15 years/ long-term 15 years +) are established in relation to the overall scheme proposal. The Landscape Resource Assessment looks to identify significant effects which need to be considered during mitigation. Primary and secondary effects (farm severance/field pattern land use change) are also considered.

Table 11.1111 Landscape Resource Assessment

Resource	Landscape Character	Sensitivity	Nature of Effect	Magnitude	Mitigation	Residual Effect Short Term: 0-15yrs Long Term: 15yrs +
Topography	Proposed road within woodland incised river valley progressing into more open gently undulating character. Existing road corridor within lower basin with agriculture in between urban fringe on the elevated valley sides(north and south)	Moderate	Re-modelling of topography and skylines due to introduced landform of road embankments/cuttings , bridge structures and elevated slip roads	Moderate: Direct impact to receptors surrounding new major junctions and river crossing points	Road alignment better integrated by responding to existing landform and retains significant existing vegetation particular affinity with the surroundings. New embankments/ cuttings profiles to assist sensitive integration into existing resource	Short Term: Moderate Adverse Long Term: Moderate /Slight Adverse
Tree & Woodland	Irregular woodland cover, enclosed rural character (south), often mature hedgerow and protected urban woodland blocks. Maturing screen planting around communication routes A8 and industry. Area of Ancient Woodland at Easter Wood	Moderate/ High:	Changes to land cover around major new junctions and other significant visual elements of the road scheme through mitigation planting measures. Change to existing landscape pattern and environmental fit. Loss of small area of Ancient Woodland at Easter Wood. .	Moderate: Direct impact to resource surrounding new major junctions and river crossing points, also off-line	Mitigation and enhancement planting of native mixed broad-leaved woodland with particular affinity with the surroundings.	Short Term: Moderate Adverse Long Term: Slight Adverse

Table 11.1111 Landscape Resource Assessment						
Valuable Habitats	Associated riparian habitat adjacent to River Calder Incised River Valley (flora & fauna) Protected Urban Woodland/ponds Associated agricultural grass - land habitats	High:	Disturbance to existing flora and fauna adjacent to the development through operational activities and any residual adverse effects	Moderate: Direct/indirect impact to resource surrounding new major junctions and river crossing points.	Enhancement and management of existing ponds. Protective measure to minimise disturbance to valuable habitats Wildlife movement/migratory requirements to link into green corridors	Short Term: Moderate Adverse Long Term: Moderate Adverse
Land-use	Existing road corridor with urban influences to the north &south (east of Eurocentral) and agriculture defined by field patterns predominantly to the south	Moderate:	Changes in land use/management due to required land take in relation to the proposed road design. Indirect effect on segregated land and future management/ use	Moderate/High: Direct/indirect impact to resource	Reinstatement of recognised landscape character (native mixed broad-leaved woodland and strong field delineation). Wildlife movement/migratory requirements to link into green corridors, water habitats and recreational routes	Short Term: Moderate Adverse Long Term: Moderate Adverse
Road/ rail Networks, Public Rights of Way (PROW)	Transport routes, A8/M8, M73/A73 A89, A752, A725 & minor roads; West Coast Mainline and local branch lines. Access to countryside/ recreational resource PROW, Heritage Trail, cycleways and designated paths	Moderate:	Visual intrusion and physical severance due to new road layout. Increased travelling distances/times for non road users	Moderate: Transient off site impact from receptors and restricted access within site context	Enhancement native mixed broad-leaved woodland planting to assist in screening the proposed development. New provision for better linkages (north /south) to the wider community surrounding this linear development. Restoration of route severance	Short Term: Moderate Adverse Long Term: Slight Adverse

Table 11.1111 Landscape Resource Assessment						
Drainage	North Calder Water and associated minor water courses	Moderate/ High:	Disturbance to existing resource adjacent to the development through operational activities and any residual adverse effects	Moderate: Direct/indirect impact to resource	Road alignment better integrated by responding to existing landform and retains significant existing watercourses. New embankments/ cuttings profiles to assist sensitive integration into existing resource	Short Term: Moderate Adverse Long Term: Slight Adverse

11.7 Mitigation Strategy

11.7.1 General

The purpose of mitigation is to avoid, reduce and, where appropriate, provide remediation/compensation to alleviate any significant negative environmental effects associated with proposed development. This section describes landscape and visual mitigation measures that have been incorporated into the conceptual design for the scheme to offset identified adverse effects.

Primary mitigation measures generally relate to basic design elements such as:

- sensitive location and siting of road infrastructure including Sustainable Drainage (SUDs) features;
- site layout and access during construction and operational stages;
- choice of site level or vertical alignment;
- appropriate form, materials and design of built structures;
- lighting and signage;
- ground modelling; and
- protection of existing/proposed new planting.

These principles are incorporated into the Conceptual Mitigation Strategy (11.31 a-g, Sheets 1-7) and further developed taking into consideration the constraints and opportunities identified during the assessment process to provide the optimum environmentally integrated design, which responds to the differing landscape context along the line of the proposed scheme.

Secondary mitigation measures (avoidance or reduction) seek to address significant negative effects of the final preferred development as identified during the landscape and visual assessment.

The mitigation strategy provided below sets out the primary and secondary mitigation principles, which have been considered during the scheme development.

11.7.2 Mitigation Strategy

1. Highway and accommodation route design will seek to minimise identified potential adverse effects on the existing landform and avoid disruption of major topographical, ecological and other significant landscape features.
2. The alignment will seek to use the existing landform and retain existing vegetation (land cover) to good effect, thereby minimising the scale of earthworks and enhancement planting that is required.
3. The design and siting of new structures (bridges/gantries/signage) and slope profiles will follow existing natural topography where possible, and new features

will be integrated into the surrounding landscape context. (e.g. woodland, hedges; mature trees, water features).

4. The scheme will retain only that land commensurate with that necessary for the construction and operation of the project.
5. Existing landform will be used to minimise noise and visual intrusion, for example by placing a road in a cutting or behind rising ground, to protect identified receptors.
6. New landforms will be developed, such as mounds and false cutting, to screen the road from the identified receptors.
7. The design will strive for a balance between horizontal and vertical road alignment, which minimises earthworks, but provides the best integration with natural landform and the best screening for the identified receptors.
8. Mitigation measures will develop site restoration, landscape features and planting proposals that link with/reinforce positive features of the landscape character.

11.7.3 Objectives for Landscape Design

Several site visits were carried out to assess the landscape character and environmental context of the area. Visiting at different times of the year enabled contrasting summer and winter impressions to be gained, and contributed to a better understanding of site conditions and seasonal screening within the landscape context of the scheme. Photographs were taken to record typical landscape features and the circumstances of the existing landscape baseline in which the proposed road sits.

The Conceptual Mitigation Strategy Sheets 1-7 (Figures 20.1 a-g) shows the mitigation proposals and environmental requirements of the scheme to address the likely landscape, visual, ecological, noise and water quality and quantity effects of the proposed road development.

The Scottish Executive policy document “Cost Effective Landscape: Learning from Nature” (Scottish Executive) has been taken into account, and any further environmental appraisal together with the mitigation measures relevant to any identified significant environmental effects including any protected species previously identified. The Contractor will be required to undertake further consultations as appropriate with SEPA, SNH, HS in developing the specimen design any subsequent comments will be included within the review of the finalised scheme design.

11.7.4 Natural Processes, Materials and Features

As a general principle there will be re-use, wherever practicable, of stripped topsoil and of selected existing vegetation (grassland/wetland). Careful storage and application of this valuable material (for example on embankments and around SUDs ponds respectively) will help conserve biodiversity and perpetuate existing seed banks.

Vegetation will be established on newly created cutting or embankment slopes primarily by means of seed application, probably on a hydraseeding basis. The practicality of this will also be investigated for the engineered benched retaining structure near Luggie Burn.

Aided by the process of regeneration those species most suited to the location will develop naturally to address the negative visual effects of this structure from the rural area to the south. The more formal, ornamental planted areas (for example on roundabouts) are intended to be established using plants of an older transplanted material typical of urban-style planting appropriate to the road context within residential or commercial areas. Within the more rural areas, more large scale planting is intended to be of smaller native stock, which is more likely to establish quickly and survive the exposure and relatively hostile conditions of these locations. This type of planting will quickly establish and form informal 'naturalistic' swathes of woodland and scrub to fit in with the countryside context where it has been applied.

The proposed new planting consists mostly of native species appropriate to the locality; plants produced from seed of local provenance are likely to be most successful and will be used wherever possible. The availability of wild flower and grass seed of local provenance will also be explored in the interests of maximising ecological benefit.

Maximum use has been made of existing subsoil and topsoil both as landscape fill and as a finished surface for soft landscape treatment; no importation of soils is anticipated. As far as is reasonably practicable, stripped soils, especially from cutting slopes, will be stored (for as short a time as possible and such that the viability of the soil is maintained) in separate locations to assist in replicating particular habitats where required.

Where not in conflict with road safety sight lines and other engineering requirements, disturbed areas around new junctions, at Shawhead for example, will be stripped of topsoil and seeded with wild flower mixes direct into low fertility substrate material. Such variety of ground conditions will promote diversity of both sward and visual interest, permit more sustainable maintenance, and assist in consolidating fragmented habitat. New cutting slopes and elevated road sections are potentially significant visual and landscape elements of the scheme and the engineered slopes will be designed to 'fit' with the surrounding land form as far as is practicable. For example, east of Newhouse the previous motorway cutting was planted and subsequently became a dominant linear feature. Mitigation for the current proposed scheme will seek to reflect better the open agricultural character of the surrounding land and use grassland and hedgerow planting instead. Tree and shrub planting as is incorporated elsewhere in the scheme will have similar aspirations and be based on natural characteristics of informal arrangement and varied density.

11.7.5 Opportunities and Benefits

The central focus of landscape and visual mitigation is integration within the surrounding landscape where the proposed alignment deviates from the existing road corridor. The road context is essentially urban fringe/ rural, where existing mature vegetation is highly valued. Therefore new planting of woodland, hedgerow and shrub/scrub areas is an important element of the mitigation strategy.

A principal design aim has also been to achieve sensitive gradients in new earthworks to avoid the adverse effects of artificiality in landform. The softening effects of planting will be utilised as a mitigating technique where deemed to assist the environmental 'fit' of the

proposed road. The immediate environs of the road are characterised by planting which is mostly of scrub/woodland nature. Extensive new planting would be inappropriate and serve only to emphasise the road line in the landscape; the preferred objective is to introduce only modest planted areas of discontinuous character which will best reflect and complement the existing pattern.

Where structures assist in minimising extensive earthworks, associated mitigation planting will look to address any adverse effects. The existing Baillieston Interchange illustrates where good landscape planting design can achieve effective mitigation around elevated structures. This approach has been reflected within the mitigation proposals around the new Shawhead and Chapelhall Interchanges.

The essence of visual interest for road users lies in exploiting the potential for outward views. Where scenic views of the wider landscape are available, the objective here is to maximise opportunities for their enjoyment and avoid foreground obstruction, for example views out onto the North Calder Water at Bargeddie, Kirkshaws; Eurocentral towards the Faskine Estate and at Newhouse to promote views out onto the countryside. At a more local level, visual interest will be enhanced by the introduction of wild flower seeding to verge areas, ornamental shrub and native woodland planting within the locality.

The proposed cuttings and associated works will also support an ecological objective in expanding the opportunity for more varied plant habitat which will contribute to local biodiversity. Planting generally will seek to introduce ecologically appropriate species and, whilst retaining an evergreen element for winter interest. In a wildlife context the scheme will aim to benefit long term any identified protected species found within the locality (e.g. badger crossing facilities for the motorway route in accordance with recommended measures).

Design based on natural characteristics is expected to produce a more sustainable scheme in which the commitment to ongoing management is reduced. Long term maintenance is intended to be minimal and in particular to avoid the need for continuation of frequent verge mowing except where road safety or visibility requirements need to be observed.

11.7.6 Sustainability and Biodiversity

Design development recognises the principles set out in the Scottish Executive's Cost Effective Landscape: Learning from Nature, and Trunk Road Biodiversity Action Plan documents. It aims to maximise sustainability and biodiversity both during construction and in the longer term.

The mitigation measures proposed as part of the scheme seek to develop a range of habitat types (woodland, scrub, shrub, hedgerow, grassland and wetland) to offset adverse effects arising from the scheme and to contribute in the longer term to local biodiversity.

Planting generally seeks to introduce locally appropriate native species, whilst retaining an evergreen element for winter interest. In a wildlife context the scheme will aim to

reduce the habitat fragmentation effects of the road caused by severance through creating new linking planted areas and wetland habitat (SUDs ponds).

Design based on natural characteristics is expected to produce a more sustainable scheme in which the commitment to ongoing management is reduced. Long-term maintenance is intended to be minimal and in particular is designed to avoid the need for continuation of frequent verge mowing except where road safety or visibility requirements need to be observed.

Excavations creating interesting cutting features, or SUDS attenuation ponds which are varied in shape; generally rounded topographical formation and with species-rich or conservation grassland, combined with wet woodland planting proposed for other side slopes and wider verges, will contribute to both ecological and landscape long-term benefits. Where the availability of fill material and of adjoining land permits, grading out of some embankment slopes will contribute to landscape integration.

Potentially hostile growing conditions have been turned to advantage by excluding where possible overly cosmetic treatment, and focusing on the use of native species to reflect the “natural” planting and habitats in the vicinity. New planting is necessarily limited in scenic areas, but provides an important enhancement of the existing vegetation resource. It includes the re-introduction of considerable new lengths of hedgerow along parts of the new highway boundary which will, as they mature, have a valuable integrating/linking function.

In combination, all of these elements contribute over the longer term to increased ecological variety, a more diverse landscape character, and greater visual interest in the highway corridor without prejudice to existing outward views.

Earthworks have been designed to minimise the need for imported materials. Re-cycling and re-use of excavated soils is an underlying philosophy of the scheme which, *inter alia*, enables existing seed banks to be utilised.

Establishment of circumstances conducive to natural regeneration of vegetation is emphasised, where new native species planting seeks to re-create a woodland edge adjacent to a semi-natural ancient woodland or within new attenuation ponds adjacent to existing watercourses. Where plant material is introduced it is substantially based on native species intended to be of local provenance thus optimising survival and growth prospects.

The natural characteristics of the scheme design will not only minimise the requirement for landscape maintenance, but also provide a varied series of grassland and scrub/ woodland and wetland habitats the value of which is increased by linkages throughout the scheme. In the long term it is expected that a highway landscape environment will develop which is largely self-maintaining and which contributes to nature conservation and local biodiversity.

11.7.7 Indicative Planting Schedule

Species mixes within planting types are intended to be locally variable to integrate with existing landscape elements and /or for different design objectives. The species proposed are set out below.

Woodland Species Planting (approx. 35.5ha)

Semi - Natural Woodland)

Fraxinus excelsior (Ash)
Quercus robur (Oak)
Fagus sylvatica (Beech)
Pinus sylvestris (Scots Pine)
Prunus avium (Gean/Wild Cherry)
Sorbus aucuparia (Rowan/Mountain Ash)
Acer pseudoplatanus (Sycamore)
Crataegus monogyna (Hawthorn)
Ilex aquifolium (Holly)
Ligustrum vulgare (Wild Privet)
Prunus spinosa (Blackthorn)
Rosa canina (Dog Rose)
Corylus avellana (Hazel)
Salix cinerea (Grey willow)

Wet Woodland Mix

Fraxinus excelsior (Ash)
Alnus glutinosa (Common Alder)
Betula pubescens (Downy Birch)
Salix caprea (Goat Willow)
Salix viminalis (Osier)
Viburnum opulus (Guelder Rose)

Scrub/Shrub Species Planting (approx. 10 ha).

Betula pubescens (Downy Birch)
Sorbus aria (Whitebeam)
Sorbus aucuparia (Rowan/Mountain Ash)
Prunus padus (Bird Cherry)
Salix caprea (Goat willow)
Crataegus monogyna (Hawthorn)
Rosa canina (Dog Rose)
Sambucus nigra (Elder)
Prunus spinosa (Blackthorn)
Corylus avellana (Hazel)
Salix viminalis (Osier)

Hedgerow Species Planting (approx. 19,000 linear/m)

Crataegus monogyna (Hawthorn)
Prunus spinosa (Blackthorn)
Corylus avellana (Hazel)
Rosa canina (Dog Rose)
Fagus sylvatica (Beech)

Hedgerow and Specimen Trees (approx. 400 in number)

Fraxinus excelsior (Ash)
Quercus robur (Oak)
Prunus avium (Gean/Wild Cherry)
Fagus sylvatica (Beech)

11.7.8 Grass seed mixes

All seeded and herbaceous plant mixes should be of at least UK provenance and will be finalised by the Contractor in consultation with the Local Authority Ecologist at the specimen design before work commences. Natural regeneration is to be encouraged. Planted areas (woodland etc.) will not be seeded to enable natural re-vegetation to take place.

Grass Verges

Road verges, visibility splays, and other areas intended for regular mowing as short grass are to be seeded onto 100mm topsoil at 20g/m^2 with a minimum maintenance/wide tolerance grass mix including minimum 50% Fescues based on BSH mix A18 or equivalent.

Conservation Grassland

Cutting slopes, embankments and other informal highway land not the subject of tree and shrub planting to be seeded onto low nutrient substrate or 100mm economy grade topsoil at 5g/m^2 with grass and wildflower mix in an 80/20 combination based on BSH mixes A4 and WFG13 and including a high percentage of Fescues and at least a proportion of yellow rattle, common knapweed, ribwort plantain, yarrow, ox-eye daisy, meadow buttercup and red campion.

Marginal Wetland

Where wet woodland/scrub planting is not proposed around SUDs attenuation ponds, 50% of the exposed excavated surface is to be seeded when there is least risk of flooding at 5g/m^2 with a grass and wildflower mix in an 80/20 combination based on BSH mix WFG9 and including at least greater spearwort, meadow cranesbill, purple loosetrife, water speedwell, greater burnet, and crested dogstail and meadow fescue as grass components.

A further 25% of the available area will be randomly planted with informal groups of emergent marginal herbaceous plants at average 4/m^2 selected from Common Reed, Marsh Marigold, Soft Rush, Lesser Spearwort, and Purple Loosetrife. Excessively invasive plants such as *Typha* spp will not be included.

The remaining 25% of the exposed surface shall remain as bare earth to permit colonisation by indigenous pond edge plant communities.

Ornamental Planting (2 ha)

Selected from the following or their cultivars:

Betula pendula (Silver Birch)	*Cornus alba* (Dog wood)
Acer platanoides (Norway Maple)	*Cornus stolonifera* (Dog wood)
Acer pseudoplatanus (Sycamore)	Cotoneaster ssp
Carpinus betulus (Hornbeam)	*Elaeagnus pungens*
Tilia platyphyllos (Large Leaved Lime)	*Prunus laurocerasus*
Sorbus aucuparia (Rowan)	*Symphoricarpos chenaultii*
Sorbus aria (Whitebeam)	*Rosa spp*
	Pyracantha spp
	Viburnum tinus

Woodland, scrub and shrub areas planted at 1m^2 using minimum 1+1 transplants 400 – 600mm high and with feathered trees at average 5m c/c where appropriate. Hedgerows planted 6/m in double row with informally spaced feathered or standard trees. Specimen or ornamental trees minimum 8-10cm standards; ornamental shrubs minimum 2 litre pot grown at varying density according to species.

11.7.9 Mitigation Schedule

The extensive mitigation strategy for the new road is proposed to enhance and screen the road infrastructure and its traffic from the adjacent areas (business/recreational) and properties, and to effectively provide the best 'environmental fit' of the scheme into the surrounding landscape. The full schedule is included within Appendix 11.1.

11.8 Residual Effects

The combination of visual and landscape effects associated with the proposed scheme has been established previously and highlights the 'significance' of effects. When mitigation has been taken into account the associated residual effects are stated. Table 11.11 Landscape Resource Assessment, states the anticipated effects; sensitivity; magnitude; nature of effect; mitigation and the residual effect. The following provides a comprehensive statement on the anticipated residual effects on the landscape and visual amenity within the study area. For the purposes of this assessment a 'significant effect' whether adverse or beneficial occurs where a sensitive viewpoint or landscape resource is subject to a substantial – moderate change/effect. The assessment of the landscape and visual effects as summarised previously within the text and illustrative material has highlighted significant effects to be addressed through mitigation including:

1. the design of horizontal/vertical alignment of main route, side roads and junctions; and
2. specific primary and secondary landscape mitigation measures.

The conceptual design for the scheme has the potential for significant effects on the landscape resource - directly within the proposed development footprint and indirectly

upon the wider site context. Mitigation measures look to avoid or minimise, where practicable, identified adverse effects.

Generally, the scheme has the greatest effects on landscape and visual receptors at the western end of the route (Bargeddie – Eurocentral) and lesser effects at the eastern end (Eurocentral – Newhouse), with the exception of the proposals at the new Chapelhall Interchange. This relates to the sensitivity of the landscape resource or visual receptors being affected and the scale or magnitude of effect on the receptors (as illustrated in Figures 11.2 (a-e) and 11.3 (a-e) Landscape Appraisal and Landscape Quality).

Very prominent engineered structures including bridges, earth embankments engineered slopes and slipways etc. are introduced where the routes cross the Incised River Valley and at major new road junctions (Shawhead and Chapelhall). It will be difficult to integrate these into the surrounding landscape in the short term, or to fully mitigate any adverse effects, long term. However where the proposed motorway route alignment follows closely the line of the existing A8 (Eurocentral – Newhouse) any effects are less extensive as the landscape has already been significantly affected by the existing road development and associated road infrastructure. Here there will be no significant additional alterations to existing landscape/visual conditions and through a comprehensive approach towards mitigation the residual effect in the long term would be beneficial, outside of the new interchanges at Eurocentral, Chapelhall and Newhouse.

The effects of lighting upon the identified receptors and surrounding landscape resource relate to the preferred route alignment and new junction layouts. The baseline lighting conditions include provision between Baillieston and Eurocentral along the main route of the A8 with additional ancillary lighting at major junctions. Where the scheme deviates from these existing lit routes, lighting and potential light pollution requires mitigation.

Modern lighting columns and lamp detailing will improve visibility for road users without significant light pollution. A lighting and planting mitigation strategy responds to the site context, within an urban environment where a precedent has been established, lighting provision will be considered to an acceptable standard for road safety and light pollution guidelines. Mitigation planting design at this conceptual design stage has looked to minimise adverse effects from light pollution whilst responding to visibility and highway safety requirements. Within a more rural setting i.e. where the route alignment deviates from the existing A8 (Kirkwood to Shawhead), further consideration by the Contractor through the development of the specimen design will be required to incorporate detailed lighting plan and mitigation strategy where lighting provision is required in line with national guidelines.

11.8.1 Visual Effects (Significance)

Bargeddie

The residential area is likely to have limited views of the APR, which is in cutting, due to the proposed woodland planting either side of the APR linking into hedgerow and specimen tree planting along the highway boundary where is joins the motorway. Overall,

due to the scale of the likely short-term effects and any long-term benefits of the maturing infrastructure planting, the residual effect would be **Slight beneficial**.

Properties near Rosebank Terrace are likely to experience **Moderate adverse** effects in the short-term due to the new overbridges, (railway/accommodation) and other engineered structures which can not be fully mitigated.

Properties within the locality of Crosshill, Swinton and isolated agricultural properties to the south, due to the scale of the likely short-term effects and any long-term benefits of the maturing infrastructure planting, the residual effect would be **Slight adverse**.

The significance of the residual visual effects of the intrusive Swinton roundabout are **slight adverse**.

Kirkwood to Kirkshaw

Generally, due to the elevation of these properties along the southern built edge of Kirkwood and Kirkshaws, the scale of the likely short-term effects and any long-term benefits of the maturing infrastructure planting the resulting residual effect would be **Slight adverse**. The residential area adjacent to the cemetery and users of the Showcase Cinema will experience **Moderate adverse** effects due to the visual prominence of the overbridges, which are difficult to mitigate fully.

Most of the significant visual effects along this section are limited to the agricultural dwellings of Bankhead and Shawhead Farms. The proximity to the development, scale of the likely short-term effects and any long-term benefits of the maturing infrastructure planting, the residual effect would be **Substantial adverse**.

Shawhead to Eurocentral

The residential area along the southern boundary of Shawhead are likely to experience **Moderate adverse** effects in the short-term due to the new overbridges, (road/accommodation/footbridge) and other structures which can not be fully mitigated.

The motorway is in cutting, therefore short term effects are limited due to the proposed woodland planting around the interchange and linking hedgerow, specimen tree planting along the highway boundary within existing retained vegetation, visual effects from the commercial areas to the east and west will be limited. Overall, due to the scale of the likely short-term effects and any long-term benefits of the maturing infrastructure planting, the residual effect would be **Slight beneficial**.

Coming from the industrial estates north towards Shawhead, travellers will notice the loss part of Easter Wood adjacent to the road and a SUDS pond and associated tarmac access road. The moderate sensitivity of this route, combined with distance and elevation from the road proposal, means that the magnitude of visual effects will be moderate in the short term, but reduced over time as screening planting matures.

Most significant effects are limited to the agricultural dwellings of Carnbroe Mains Farm and Douglas Support Estate. The proximity to the development, scale of the likely short-term effects and any long-term benefits of the maturing infrastructure planting, the residual effect would be **Substantial adverse**.

Existing woodland screening views around the North Calder Water from Shirrel and the Strathclyde Business Park is reinforced with mitigation planting providing a strong seasonal visual barrier. The increased lighting provision around the interchange is likely to have a **Slight adverse** residual effect after mitigation.

The isolated dwellings Ivy Cottage and Orchard Farm (derelict) are likely to experience **Moderate adverse** effects in the short-term due to the new overbridges, (APR road and footbridge) which can not be fully mitigated.

Eurocentral to Chapelhall

The visual effects from the commercial areas of Eurocentral will be limited. Overall, due to the scale of the likely short-term effects and any long-term benefits of the maturing infrastructure planting, the residual effect would be **Slight beneficial** to non-road users.

Newhouse Industrial Estate is likely to experience **Moderate adverse** due to the visual prominence of the overbridges and removal of mature roadside planting at the new Chapelhall Interchange, which are difficult to mitigate fully in the short term.

The isolated dwellings of Parkhaven Lodge, Woodhall Cottage and East Lodge are likely to experience **Moderate adverse** effects in the short-term due to the extensive changes in landform and noise mitigation, which can not be fully integrated into the landscape.

The increased lighting provision around the interchanges is likely to have a **Slight adverse** residual effect after mitigation, affecting the southern edge of the residential areas around Calderbank and Chapelhall to the north of the new interchange.

Chapelhall to Newhouse

The isolated dwellings of Rowantree Row, Sandyford and Fairybank Farms are likely to experience **Moderate adverse** effects in the short-term due to the changes in landform and loss of roadside screening vegetation.

Elsewhere isolated residential receptors to the north and the south are likely to have limited long term residual effects. Overall, due to the scale of the likely short-term effects and any long-term benefits of the maturing infrastructure planting, the residual effect would be **Slight beneficial** to non road users.

11.8.2 Landscape Effects (Significance)

Significant vegetation and other valuable features/habitats contribute towards the recognised landscape character type and perceived scenic value along the route. The visual envelope of the linear development also relates closely to the surrounding landform and land cover.

The scheme will generally remove Green Belt land, existing valuable land cover in the form of ancient woodland, protected urban woodland, ponds, watercourses (SINC's) and new roadside planting. The significant residual landscape effects with mitigation in place are summarised below;

Bargeddie

The APR will result in a moderate magnitude of change (notable changes over a limited area). The subsequent significance of effects will be **Slight beneficial** in the long term as the route alignment, land modelling and maturing roadside enhancement planting would combine to improve the landscape quality/character and pattern.

The main motorway route residual effects contribute towards a substantial magnitude of change (intensive change over a limited area around the new bridge structures). The subsequent significance of effects will be **Slight adverse** in the long term as the engineering structures, land modelling and maturing roadside enhancement planting does not quite fit into the landform and scale of the landscape.

The landscape effects of the Swinton Roundabout are concentrated on the loss of ancient woodland, which is a considered to be a **moderate adverse** effect.

Loss of field boundaries, and greater urbanisation of the character of the landscape around the Swinton roundabout and the east-west paths has a **slight adverse** effect.

Kirkwood to Kirkshaw

The main motorway route magnitude of change relates to the engineering retaining structures, overbridges and SUDs attenuation ponds around Luggie Burn and Aitkenhead Road, resulting in a substantial magnitude of change (intensive change over a limited area around the new bridge structures). Elsewhere along the road scheme, the magnitude of change will be moderate (minor changes over a wide area) The subsequent significance of effects will be **Slight adverse** in the long term, as the engineering structures, land modelling, maturing roadside enhancement planting and SUDs attenuation ponds would not quite fit into the landform and scale of the landscape. and will affect its perceived value/quality.

Shawhead to Eurocentral

The main motorway route's magnitude of change will be moderate either side of the new Shawhead Interchange (minor changes over a wide area) as the road is in cutting. The subsequent significance of effects will be **Slight beneficial** in the long term as the route alignment, land modelling, SUDs attenuation ponds and maturing roadside enhancement planting would combine to improve the landscape quality/character and pattern.

The new junction arrangements at Shawhead (north and south of the motorway) introduce elevated roads, overbridge structures (road/accommodation/footbridge) resulting in a substantial magnitude of change (intensive change over a limited area around the new bridge structures). The resulting significance of effects will be **Moderate adverse,** out of scale with the landscape resource and character.

Eurocentral to Chapelhall

The magnitude of change due to the motorway route along this section will be moderate until the new Eurocentral Interchange (minor changes over a wide area), as the road is predominantly a highway widening scheme at grade. The subsequent significance of effects will be **Slight beneficial** in the long term as the route alignment, land modelling, SUDs attenuation ponds and maturing roadside enhancement planting would combine to improve the landscape quality/character and pattern.

The new junction arrangements at Chapelhall (north and south of the motorway) introduce elevated roads, overbridge structures and four SUDs attenuation ponds; resulting in a substantial magnitude of change (obvious change of key characteristics around the new bridge structures and roundabouts). The resulting significance of effects will be **Moderate adverse,** out of scale with the landscape resource of recognised quality.

Chapelhall to Newhouse

The magnitude of change due to the motorway and APR along this section will be moderate until the proposed Newhouse Interchange (minor changes over a wide area), as the roads are predominantly highway widening at grade. Roadside tree loss around the existing Newhouse junction is significant in the short term, but mitigation planting will address adverse effects The subsequent significance of effects will be **Slight beneficial** in the long term as the route alignment, land modelling, maturing roadside enhancement planting and SUDs attenuation ponds would combine to improve the landscape quality/character and pattern.

11.9 Summary

The proposed scheme alignment affects the differing landscape character areas directly in relation to the existing highway infrastructure. Between Baillieston and Eurocentral Junction, the new motorway is routed to the south of the existing trunk road; east of Eurocentral it is an on-line upgrading which combines the motorway and adjacent all purpose roads in a widened highway corridor. The off-line section will pass through agricultural land with occasional woodland plantations of locally medium to high landscape quality, (Kirkwood to Eurocentral). Elsewhere, designated business and commercial land adjoins most of the corridor although there is more open countryside to the east of Newhouse of medium landscape quality.

Predominantly the road alignment is in cutting, thereby minimising adverse visual effects. Most significant are the elevated bridges and road sections at Kirkwood and the new junctions at Shawhead and Chapelhall. Mitigation measures address visual adverse effects and the remaining residual adverse effects will be limited to areas around proposed accommodation tracks and bridges, which will however bring benefits for the local and regional network of recreational routes. The visual significance of the landform changes and loss of field patterns associated with creating the SUDs ponds, and proposed recreational routes, where the mitigation measures cannot fully mitigate the long term effects are **slight adverse**.

The landscape effects of the scheme have been minimised by the preferred route alignment which has sought to limit the adverse impact upon the baseline landform, significant vegetation and elements of cultural/ historical interest. Designated landscape areas of Green Belt are affected due to the necessary land take and there will also be adverse impacts on ancient and other woodland, Tree Preservation Orders, Protected Urban Woodland and Protected Open Space. Loss of designated environmental features (SINCs) will be compensated, however, by extensive new planting, SUDS attenuation ponds and seeding aimed at enhancement of landscape and biodiversity. New planting will include over 45 ha of new woodland and scrub/shrub habitat, 19km of hedgerow and additional specimen/hedgerow trees and ornamental planting.

Overall the landscape and visual effects are limited to the more elevated Visually Intrusive Highway elements of the road scheme where mitigation measures can not fully mitigate the associated effects. The overall significance of these effects is likely to be moderately adverse. Overall along the whole of the proposed route the cumulative residual effects is likely to be slight adverse In the longer term they should be outweighed by recreational access and road infrastructure improvement together with the potential long-term ecological features and landscape benefits which the scheme is expected to promote.

11.10 References

Highways Agency, The Scottish Executive Development Department, The National Assembly of Wales and The Department of the Environment for Northern Ireland The Design Manual for Roads and Bridges Volume 11 Environmental Assessment (1993, amended and updated 1998/1999/2000/2001/2003)

North Lanarkshire Council (1991): Monkland District Local Plan

North Lanarkshire Council: (2001): Southern Area Local Plan (Final Draft, Modified June 2001)

Ordnance Survey Map Data

Scottish Natural Heritage (1999) 'No. 116: Glasgow and the Clyde Valley landscape assessment'

Landscape Institute & The Institute of Environmental Management & Assessment (2002) 'Guidelines for Landscape & Visual Impact Assessment'

Scottish Executive 'Cost Effective Landscapes: Learning from Nature'

Scottish Executive 'Trunk Roads Biodiversity Action Plan – Draft for Discussion' (2000).

Scottish Natural Heritage and The Countryside Agency 'Landscape Character Assessment Guidance for England and Scotland' (April 2002)

12 Traffic Noise and Vibration

12.1 Introduction

The objective of this chapter is to assess the noise impact of the proposed Scheme using the guidance contained within the Design Manual for Roads and Bridges Volume 11, Section 3, Part 7 Traffic Noise and Vibration (DMRB). The Scheme under assessment, which is described in Chapter 3, is that presented as Option B at the DMRB Stage 2 assessment stage with the following principal amendments:

- increase in motorway carriageway provision between Baillieston Interchange and Chapelhall Junction on the proposed M8 Scheme;
- realignment of the M8 in the vicinity of the A752 at Bargeddie and immediately adjacent to the North Calder Water;
- redesign of the proposed Shawhead Junction; and
- amendments to Eurocentral and Chapelhall Junctions to incorporate direct motorway connections to the proposed M8 to and from the west, with a discontinuous all purpose road connecting into these junctions.

The assessment of noise is in terms of the difference likely to be experienced with the proposed Scheme in place for the with Scheme scenario (Do-something scenario) as compared with the Do-minimum scenario for both the Year of Opening and the Design Year together with a consideration of the existing noise climate. It is acknowledged that a DMRB noise assessment requires that the Design year is 15 years after the Year of Opening; however traffic modelling work for this scheme uses the CSTM3A traffic model that was developed for the Central Scotland Transport Corridor Studies, ensuring a consistent approach with the methodologies adopted for other recent studies across Scotland. CSTM3A provides data for the years 2010 and 2020. There is not considered to be a significant difference between the predicted changes in traffic between 2020 and 2025, and therefore the year 2020 (Scenario 1 High Growth) provides a sufficiently robust dataset upon which to base the assessment of traffic noise and vibration. Traffic assessment and CSTM3A is further explained in Chapter 2, Section 2.4.

This chapter firstly explains the basis of road traffic noise and vibration and then outlines the scope of the study area and the methods used for the assessment of the noise and vibration prior to presenting the findings of the actual assessment.

A glossary of acoustical terminology is included as Appendix 12.1.

12.1.1 Traffic Noise

Firstly, the World Health Organisation (1999) has defined noise as unwanted sound, and sound is measured in terms of decibels (dB). The decibel is not an absolute unit of measurement. It is a ratio between a measured quantity and an agreed reference level. The measured quantity is the variation in atmospheric pressure and the reference level is taken as the lowest pressure to which the ear can respond, i.e. 2×10^{-5} Pa. However,

although the audible frequency range extends from 20Hz to 20,000 Hz, the ear does not respond equally across this range of frequencies and therefore corrections or "weightings" require to be applied to the measured linear levels to simulate the response of the ear. Consequently, the A-weighting is used to simulate the response of the human ear, so environmental noise is generally measured in terms of dB(A). With noise being assessed as a logarithmic ratio of pressure levels, i.e. decibels, it is sometimes helpful to consider the relationship between the subjective evaluation of noise and the actual objective levels. The following description may provide some assistance in understanding this relationship.

dB(A)	Description
120	Threshold of pain
94	Pneumatic drill (unsilenced) 7m distance
90	Hazard to hearing from continuous exposure (previous HSE standard,)[21]
86	Heavy diesel lorry at 40km/h 7m distance
82	Twin engine modern jet during take-off at 152m distance
70	Passenger car or light van 60km/h 7m distance
60	Busy general office
55	Communication starts becoming difficult
35	Quiet bedroom
0	Threshold of hearing

In terms of noise, road traffic can be separated into two components. The first is generated by the engine, exhaust system and transmission and is the dominant noise source when traffic is not freely flowing. This is particularly apparent from heavy vehicles, when accelerating, braking or changing of gears, and this contributes a significant proportion of low frequency noise. The second noise source component is generated from the interaction of tyres with the road surface. This is the dominant noise source under free flow traffic conditions at moderate to high road speeds and contributes a significant proportion of higher frequency noise.

[21] The Control of Noise at Work Regulations 2005 set a limit of 87dB(A) (with lower and upper action levels of 80dB(A) and 85dB(A)) $L_{EP,d}$

The sound from a stream of traffic at a reception point is an aggregation of noise from each of a number of vehicles at various distances. The factors that influence the noise level experienced by any listener include the volume of traffic, vehicle speed, the composition of the traffic (i.e. the percentage of heavy goods vehicles (HGVs)), the gradient and the surface characteristics of the carriageway. In addition to the aforementioned variables there is the actual propagation of the sound from the source to the receiver to consider. The propagation is affected by characteristics, such as the distance of the receptor from the source, the topography and characteristics of the ground between the source and receptor, the presence of any screening or barrier effects, and the wind strength and direction.

12.1.2 Measurement of Traffic Noise

The Design Manual for Roads and Bridges, Volume 11 (DMRB) reports that the "A" weighting has been found to give one the best correlations with perceived noisiness of vehicles. Therefore road traffic sound is measured and/or predicted in terms of dB(A).

As the sound from a traffic stream is not constant and varies with time it is necessary to use an index of measurement that will be suitable for the assessment of this sound. An analysis of the statistical distributions of sound levels is a useful tool when assessing noise. For example, L_{90}, is the level exceeded for 90% of the measurement time, and L_{10} is the level exceeded for 10% of the measurement time period. The index adopted by the Government to assess traffic noise is the $L_{A10(18hr)}$, which is the arithmetic mean of the noise levels exceeded for 10% of the time in each of the one hour periods between 06.00 hours and midnight. In general environmental noise is described in terms of the equivalent continuous sound pressure level, L_{Aeq}.

12.1.3 Traffic Induced Vibration

Traffic-induced vibration is a low frequency disturbance, which can be transmitted through the air or ground. Air-borne vibration from traffic is produced by the drive-train of the vehicle, the engines and exhausts, whereas ground-borne vibration is produced by the interaction between rolling wheels and the road surface.

There are two effects of traffic vibration that need to be considered, these being the effects on buildings and the disturbance caused to occupiers of properties. Extensive research has been carried out on a range of buildings of various ages and types, and no evidence has been found to support the theory that traffic-induced ground-borne vibration is a source of significant damage to buildings (Watts 1990). Ground-borne vibration is also much less likely to be the cause of disturbance to occupiers than air-borne vibration (Baughan and Martin 1981, Watts 1984).

Neither is there any evidence that traffic induced air-borne vibration can cause even minor damage to buildings. However, it can be a source of annoyance to local people, causing vibrations of flexible elements within the building, such as doors, windows and, on occasions, the floors of properties close to the carriageway. This section, therefore, also addresses the issue of nuisance at properties caused by vibration.

12.1.4 Requirements of a DMRB Stage 3 Assessment

Where alterations or improvements are made to the existing road network and where the nature of the changes triggers an assessment in terms of The Environmental Assessment (Scotland) Regulations 1999 an environmental impact assessment has to be undertaken. As part of this assessment the significance of the potential changes in traffic-generated noise has been assessed. In accordance with the requirements of DMRB Volume 11, Section 3, Part 7, a Stage 3 assessment has been carried out by:

- identifying noise sensitive locations and calculating the ambient and proposed noise levels to determine possible noise changes due to the Scheme. As stated above, properties in the vicinity of the proposed road and side roads where traffic increases as a result of the Scheme by 25% or decreases by 20% have been assessed (+25%, -20% represents ±1dB noise level changes);
- identifying appropriate mitigation methods to reduce the impact of any adverse effects;
- undertaking a noise nuisance assessment for properties which experience a noise change of ±1dB(A) or more;
- a note on traffic induced vibration; and
- an estimate of the number of properties potentially eligible under the Noise Insulation (Scotland) Regulations 1975.

12.2 Scope of Study Area and Methods

12.2.1 Scope of Study Area

The operational noise has been considered in terms of the Scheme Study Area. The Study Area comprises the Core Study Area and the Wider Study Area, with the area 300m either side of the road centre line known as the Core Study Area. Areas out with 300m of the road centre line where road traffic generated noise levels will change (by +25%, or -20%) as a consequence of changes to traffic flows resulting from the Scheme are known as the Wider Study Area.

For the Wider Study Area, which extends as shown in Appendix 12.4, an assessment of the impacts as a consequence of the Scheme has been made on the basis of changes in traffic flow and the number of properties affected. The areas that are clearly isolated from the scheme can be taken as “model noise” and have not been included in the building counts. The links were identified on the basis of a 25% increase or a 20% decrease in traffic flow arising as a consequence of the Scheme as required by DMRB Volume 11, Section 3, Part 7. For the Wider Study Area a geographical analysis of properties within 50m of all identified links has been undertaken. (distance based on Scottish Transport Appraisal Guidance (STAG), see http://www.scot-tag.org.uk/stag/exec.htm).

12.2.2 Impact Assessment Methods

Where predictions of noise were required they have been calculated using the Department of Transport publication ‘*Calculation of Road Traffic Noise’* 1988 (CRTN) and are quoted as free field levels unless otherwise indicated. A three dimensional model of

the Core Study Area has been created using CAD (Computer Aided Design) and the CRTN methodology implemented by importing the CAD model into Cadna® noise prediction software. Noise levels have been calculated for the Enhanced Do-minimum (EDM)[22] and With-Scheme option in the year of opening, (2010) and the future year, which in this case is 2020. All calculations are based on the predicted traffic flows and associated variables as supplied by SIAS. All traffic variables used for the noise assessment were provided by SIAS. All traffic flows were supplied as 18 hour AAWT (Annual Average Weekday Traffic). The speeds were modelled as am, pm and interpeak speeds and were corrected by SIAS to give 18hr average speeds for use with the 18hr traffic flows.

For the Scheme Study Area the traffic noise assessment has classified locations according to their ambient noise levels, in bands of <50 dB(A), 50 to <60 dB(A), 60 to <70 dB(A) and ≥70 dB(A), as required by DMRB. For each ambient noise band, the number of properties, and other receptors, subject to the following increases or decreases have been assessed: 1 to <3 dB(A), 3 to <5 dB(A), 5 to <10 dB(A), 10 to 15 dB(A) and over 15 dB(A).

For the properties within the Scheme Study Area the assessment of the significance of noise impacts has been based on the change in the predicted noise levels (between the EDM and the With–Scheme option for the proposed year of opening and design year), and the magnitude of noise change, and the sensitivity of noise receptors. In effect, it is a future year comparison. However, the proposed Scheme is one of three road upgrade proposals that are all closely linked; the other two being the M74 (Raith) junction upgrading and the M8 Baillieston to Newhouse Associated Network Improvements (ANIs). Both of these other proposals will be assessed in separate reports, however, SIAS considers that the most likely operational characteristics, impacts and benefits of the Scheme will only be realised if both of the other proposals also go ahead. Thus, if the noise impact assessment were based on traffic data which simulated the construction of the proposed Scheme in isolation, it is considered that this assessment would be based on an underestimate of the traffic flows and operational characteristics most likely to ultimately materialise for the Scheme. The road traffic model has, therefore, not been run to predict the impacts of the proposed Scheme against a future year baseline of the existing network.

In common with the other sections of this EIA that deal with impacts related to road traffic, a pragmatic approach has been taken in order to assess the impacts associated with the Scheme. The approach describes the noise impacts that the Scheme is likely to bring about, assuming that each of the other proposals also goes ahead. It relies on assessing the With-Scheme scenario against an Enhanced Do-Minimum (EDM) as opposed to the standard Do-Minimum (DM). As previously explained the EDM road traffic model includes committed developments and also representations of both the Raith

[22] The EDM traffic included committed developments and representations of both the Raith Improvements and the ANI's as explained in Chapter 3.

improvements and the ANIs[23]. All noise predictions are based on traffic predictions from the CSTM3A model, utilising Scenario 1 Traffic Growth to the Year of Opening (2010) and the Future Year (2020) and therefore represent a worst case assessment. Traffic modelling indicated very strongly that the Do-minimum network would experience significant traffic congestion on the network in 2010. The consequence of this congestion is that traffic would not reach the A8 corridor and therefore the full traffic implications, including the economic benefits of any proposed improvement would not be appropriately modelled, or the benefits realised. As described in Chapter 3 improvements have been identified that supplement the committed Do-minimum network. This revised network is referred to as the Enhanced Do-minimum (EDM) in this report. Thus, the With-Scheme results predict the impacts with each of the three proposals in place. The difference between the EDM and the With-Scheme is the impact attributable to the A8 corridor Scheme alone.

Because each of the three separate road proposals will clearly influence the same road network, the opportunity has been taken to assess their cumulative impacts. This has been done by comparing the predicted with-Scheme traffic flows against those associated with the Committed Do-Minimum (CDM) traffic network (which includes committed developments only). The difference between the CDM and with-Scheme will thus be the cumulative impacts of all three proposals together. The approach can be summarised thus:

- Scheme-only impacts = with-Scheme - EDM
- Cumulative impacts = with-Scheme - CDM

12.2.3 Significance of Impacts

Whilst DMRB gives no guidance on assessing the significance of effects, this assessment assesses the significance of noise impacts based on the predicted noise levels and magnitude of noise change and the sensitivity of noise receptors. The criteria used for classification of sensitivity of receptors to impacts from noise for this Scheme are defined in Table 12.1, the magnitude of impacts in Table 12.2 and the significance of impact in Table 12.3.

[23] Various design options for Raith and the ANIs were considered at Stage 2. The transport model for the current Scheme was run before any decision was made regarding which options would be promoted for each proposal. “Typical” designs have thus been used for both Raith and the ANIs.

Table 12.1 Criteria used to Define Noise Sensitive Receptors

Sensitivity	Description	Examples of Receptors
High	Receptors where people or operations are particularly susceptible to noise	Residential Quiet outdoor areas used for recreation Conference facilities Auditoria/studios Schools in daytime Hospitals/residential care homes
Medium	Receptors moderately sensitive to noise, where it may cause some distraction or disturbance	Offices Restaurants
Low	Receptors where distraction or disturbance from noise is minimal	Residences and other buildings not occupied during working hours. Factories and working environments with existing high noise levels.

To facilitate an understanding of the magnitude of change it is necessary to appreciate that when considering two sounds of similar acoustic properties, i.e. similar spectral and temporal characteristics, a change of more than 3 dB(A) is regarded as being just perceptible to the human ear under normal conditions. The magnitude of impact can therefore be based on this acoustic 'rule of thumb', supplemented with the evidence contained within DMRB Vol. 11 Section 3 Part 7 Chapter 3 Paragraph 3.5. The latter highlights that "*people are more sensitive to abrupt changes in traffic noise associated with new road Schemes than would be predicted from the steady state evidence. In the period following a change in traffic flow, people may find benefits or disbenefits when the noise changes are as small as 1 dB(A)".*

The magnitude of impact has therefore been assessed by comparison between the increase or decrease in noise levels between the Enhanced Do-minimum and With-Scheme options as defined as shown in Table 12.2.

Table 12.2 Magnitude of Impacts due to Changes in Road Traffic Noise

Change in Noise Level	Magnitude of Impact
5 dB(A) and greater	High adverse
3 to < 5 dB(A)	Medium adverse
1 to < 3 dB(A)	Low adverse
0 to < 1 dB(A)	Negligible adverse
0 dB(A)	No impact
0 to < -1 dB(A)	Negligible beneficial
-1 to < -3 dB(A)	Low beneficial
-3 to < -5 dB(A)	Medium beneficial
-5 dB(A) and greater	High beneficial

The significance of noise impacts is determined according to the relationship between magnitude and sensitivity as shown in Table 12.3.

Table 12.3 Significance of Noise Impacts

Magnitude	Sensitivity		
	Low	Medium	High
High	Moderate	Moderate/Substantial	Substantial
Medium	Slight/Moderate	Moderate	Moderate/Substantial
Low	Negligible/Slight	Slight/Moderate	Moderate
Negligible	Negligible	Negligible/Slight	Slight
No Impact	None	None	None

Whilst all properties have been assessed in accordance with DMRB, for discussion purposes some properties and locations have been selected as representative on the basis of one or more of the following principles:

- where it has been considered that buildings may qualify for sound insulation;
- where it has been anticipated that properties will experience significant changes in noise level; and,
- where properties are representative of surrounding buildings and the effects of noise will be similar.

Mitigation has been considered where the significance of impact is identified as being greater than “slight adverse”. It should also be noted that mitigation is primarily aimed at the ground floor of properties.

12.2.4 Determination of Baseline Noise

To facilitate a nuisance assessment as required by DMRB it is first of all necessary to know the existing ambient noise level within the area potentially affected by the change. DMRB advises that there are three basic types of ambient noise situations which can occur:-

- where the ambient noise is dominated by traffic noise;
- where the ambient noise is comprised of a combination of several undefined sources such as might be encountered in low noise sites in rural settings; or
- where the ambient noise is dominated by noise from non-road traffic sources such as aircraft or trains.

For condition (i) the ambient noise should be measured using L_{A10}. For condition (ii) it is advised that the L_{A10} may be inappropriate and suggests that while the L_{Aeq} parameter could be considered, the L_{A90} scale is a suitable alternative. For condition (iii) DMRB recommends the L_{A90}. Generally, the properties potentially affected by the Scheme have a noise climate presently determined by road traffic noise and therefore other than for the exceptions as stated in the second paragraph following on from Table 12.5 the L_{A10} parameter is used to describe the existing noise climate.

In addition to the on-site measurements, further receptors have been identified, and as the noise climate at all of these receptors was dominated by road traffic noise the existing noise level has been predicted in term of $L_{A10(T),}$ using traffic flows factored from the 2000 Base Flows. The predicted baseline levels are shown in Table 12.6 and it should be noted that where the existing noise climate at properties in Table 12.5 was found to be dominated by road traffic noise the receptor locations have been included in Table 12.6, with the actual measured level (indicated as either free field or façade) as a bracketed term, to facilitate a comparison between the actual measured and the modelled noise levels (the modelled noise levels do not include a façade correction and therefore where the measured levels are facade +2.5dB must be added to the modelled levels to facilitate comparison with the measured levels). However, whilst the existing noise climate, where road noise dominates, can be determined using the methodology set out in CRTN it should be noted that the DMRB does not expect perfect agreement between measured and predicted levels. It is stated in DMRB that with regard to the actual measured levels *"Care is needed in the interpreting of the levels of the $L_{A10,18h}$ recorded. These will vary from day to day during the year, depending on the influence of varying traffic and weather conditions and seasonal effects*." It is therefore recommended, that, where the ambient levels are determined by road traffic the predicted levels of $L_{A10,18h}$ provide a more reliable measure for an average day and these are therefore used in the assessment. Where the existing noise climate is not determined by existing road traffic the existing ambient level will be described in terms of the measured L_{A90}.

12.2.5 Vibration

The previous Stage 2 assessment required an assessment of the number of buildings likely to be exposed to perceptible vibrations along the route. However a Stage 3 assessment (which this is) only requires a note on traffic induced vibration where necessary. The vibration nuisance assessments presented here are for comparison only and are not indicative of individual response. The survey of vibration nuisance was, in accordance with DMRB, restricted to properties within 40m of the carriageway, and only a very small percentage of people are expected to be bothered by vibration at exposure levels below 58dB(A). Therefore, only those properties within approximately 40m of the road, and with predicted or measured levels greater than 58dB(A), have been included..

12.2.6 Noise Nuisance

DMRB states that a noise nuisance assessment should be carried out. However, DMRB makes clear that because of the variability in individual responses, practical research has moved from the idea of explaining individual attitudes or annoyance with noise and has instead adopted the concept of community annoyance ratings. It is therefore important to realise that the results of the nuisance assessment should not be related to individual annoyance response. The term 'nuisance' is assessed as the percentage of people bothered by traffic noise (i.e., those who say they are 'very much' or 'quite a lot' bothered on a four point worded scale).

DMRB details procedures for estimating changes in traffic noise nuisance when a new road scheme is planned. This procedure relies on the results from surveys which have examined the relationship between objective measures of road traffic noise outside residential properties and the percentage of people bothered by road traffic noise. The National Environmental Survey 1977 (Harland and Abbot, 1997), has shown that once people become accustomed to a change in noise, their general dissatisfaction with traffic noise does not alter until changes in level on the $L_{A10,18h}$ scale exceed at least 3 dB(A). However, in the period immediately following the completion of a road scheme, people may find appreciable benefits or disbenefits when noise changes are less than 3 dB(A). Recent research indicates that an abrupt change in traffic noise as small as 1 dB(A) may result in a 21% change in the number of people bothered very much or quite a lot by road traffic noise. A noise disturbance assessment is, therefore, made for all properties where the noise change is expected to be 1 dB(A) or greater. This change in noise level would be produced by a change in traffic flow of approximately +25%/-20% assuming that other factors, such as the average speed and the percentage of HGVs, remain unchanged.

DMRB defines a 'steady-state' relationship between noise exposure and noise nuisance and also shows a relationship between changes in noise nuisance (on the same nuisance scale) and changes in noise exposure. It shows that the change in nuisance soon after a sudden change in noise is much greater than would be predicted from the steady state curve. Noise nuisance predictions for the scheme are based on the highest nuisance levels expected during the first 15 years after opening. These assessments have been undertaken in accordance with the predictive technique presented in DMRB, although the method has limitations as discussed in the following paragraphs. Although it is important

to note that selection of properties is used as an indication of community annoyance ratings.

The surveys on which the DMRB assessment method were based were conducted at sites where road traffic was the dominant noise source, noise levels ranged from 65 to 78 dB $L_{A10,18h}$, the changes in traffic noise were up to 10 dB $L_{A10,18h}$, and properties were up to 18m from the road. Therefore, it is only at these noise levels and distance ranges that the method is strictly valid. The DMRB method is also valid only for noise changes caused by alterations in traffic flow variables. It will not necessarily give a good prediction if traffic noise changes are brought about by other means such as barriers or low noise road surfaces. However, DMRB, Volume 11, Section 3, Part 7, Chapter 8 Paragraph 5.10 states that "*Strictly, the method should not be used outside the noise and distance ranges covered by the surveys, or when the ambient noise is not from traffic. However, it seems likely that the mechanisms underlying the survey results will operate outside these ranges. Until better information becomes available, it is recommended that the method is used to predict nuisance changes outside these noise and distance ranges, albeit with caution*".

12.2.7 Vibration Nuisance

Investigations have determined a relationship between the number of people affected by the traffic noise and those adversely impacted by air-borne vibration. It was found that the $L_{A10,18h}$ index was among the physical variables most closely associated with average vibration disturbance ratings. The relationships between the percentage of people affected by largely air-borne vibration and this noise exposure index are similar to that for noise nuisance. However, it is recommended in DMRB that the percentage of people bothered by vibration is 10% lower than the corresponding noise nuisance figure, and that at noise levels below 58dB $L_{A10,18h}$, it should be assumed that no people would be affected.

As the method for assessing vibration is similar to noise nuisance it is subject to the same limitations as discussed previously. In general, when using DMRB Volume 11 to predict disturbance caused by air-borne vibration it applies directly only to properties within 40m of the road which are un-screened. Outside these conditions, the results of the assessment are considered as only broadly indicative

12.2.8 Noise Insulation

DMRB also requires an indication of the number of properties which are likely to be eligible for statutory insulation. The Noise Insulation (Scotland) Regulations 1975 provide for noise insulation to be offered in respect of residential properties. The qualifying criteria are detailed within the Regulations and within the Memorandum on the Noise Insulation (Scotland) Regulations 1975 (NISR), regulations 3 and 6: The qualifying criteria are as follows:

- the properties are situated within 300 metres of the new or altered carriageway;
- the properties lie within the triangular area at the terminal point of the new highway, the apexes of which are 50m along the centre-line of the existing

highway from the terminal points and the bases of which extend from points 300m on either side of the highway to the nearest point on the carriageway at right angles to the centre line of the carriageway;

- a straight line can be drawn from any point of the property to a point on the carriageway without passing through another building;
- the use of the highway causes or is expected to cause noise at a level not less than 68 dB(A); and
- the property will experience noise levels exceeding the 'prevailing noise level' by at least 1.0 dB(A).

The prediction method detailed within the aforementioned Memorandum has been improved over the years and the present methodology contained within CRTN is more accurate and detailed. While DMRB does allow for the use of the method detailed within the Memorandum the predictive tool employed in this assessment is Cadna® and it uses the predictive methods set out in CRTN to calculate noise levels. While the CRTN methodology is more detailed and accurate than that contained within the Memorandum, the NISR requires that eligibility be assessed in terms of the Memorandum. Therefore, this assessment uses a CRTN predicted level of 65dB(A) as a preliminary indicator of the need to utilise the full Memorandum methodology assessment of eligibility where all the other qualifying criteria are met.

12.3 Baseline Conditions

A description of the existing network has been provided in Chapter 2 but for clarification a short description of the existing road network is presented in this chapter.

The existing A8 corridor has recently been upgraded to a Dual 2 Lane All Purpose Road, with hard shoulders that are discontinuous due to physical and land constraints, it is derestricted and the national speed limit of 70mph applies. The route runs west to east between Baillieston and Newhouse. Non-motorway traffic heading westbound leaves the network at Baillieston Interchange, where the A8 connects directly into the existing M8, and, similarly, non-motorway traffic heading eastbound exit the motorway network at Newhouse Junction.

Access to the A8 is available in both directions at Baillieston Interchange, Bargeddie Junction, Shawhead Junction, Eurocentral Junction, Chapelhall Junction and Newhouse Junction. In addition there is access directly onto the A8 at Braehead Farm (Westbound), Bankhead farm (Westbound), Shawhead (Westbound), Shanks Depot (Eastbound), Carnbroe (Eastbound) and Orchard Farm (Westbound). There are also a number of gated accesses to adjacent agricultural land at the back of the existing verges.

A number of side roads cross the A8 corridor in a north-south direction within the limits of the proposed scheme;

- A752 at Bargeddie;
- A725 at Shawhead;
- B799 at Chapelhall;
- A73 at Newhouse.

The A752 is a single carriageway local road connecting Tannochside and Bargeddie and connects with the A89 to the north of Bargeddie. The A89 is a major dual carriageway link road from Baillieston to Coatbridge lying to the north of the A8 corridor. The A725 also runs north-south. It is a Dual 2 Lane All Purpose Road and connects to East Kilbride to the south and Coatbridge to the North. The existing Shawhead junction is heavily trafficked and suffers from congestion, although improvements were made for turning movements by construction of a new roundabout to the north of the A8 during the Major Maintenance contract. To the south of the A8, the A725 has a number of grade separated junctions with sub-standard weaving lengths feeding in particular to Righead Industrial Estate and Strathclyde Business Park.

The B799 at Chapelhall is a single carriageway road. To the north of the A8 it feeds towards Airdrie and Chapelhall, while to the south it connects with the A723, providing access to Motherwell.

The A73 is a dual carriageway in the vicinity of the scheme although it reverts to single carriageway, and connects Airdrie to the north with outlying areas of South Lanarkshire, such as Newmains to the south.

Actual on-site monitoring was undertaken for the Stage 2 assessment report. Sixteen properties, as identified in Table 12.4, were used as sample receptors for the baseline measurement in the Stage 2 report and have also been included as part of the Stage 3 report. The properties were 2 Rockcliffe Path, 5 Doune Crescent, Carnbroe Mains Farm Cottage, 27 Hillview Crescent, 8 Milroy Gardens, 1 Dunottar Avenue, Woodhall Kennels, Orchard Farm, Mill Bank, Bankhead Farm, 51 Viewfield Road, Kirkwood Sports Barn, Braehead Cottage, 10 Crossview Place, 48 Rosebank Terrace and 157 North Calder Road. All of these properties are shown in Figures 12.1 to 12.6 and are representative of the worst case impact of properties close to the main lines (A8) and also those properties affected by proposed junction changes.

All of the previous Stage 2 measurements were undertaken during the period of 24th – 27th August 2004. The aim was to capture data at each location over two fifteen minute periods with each measurement period out with peak hours. The results are presented in Table 12.4, which also details the prevailing meteorological conditions during the measurement period, the measurement time and whether or not the measurements were free field or façade. Façade means that the measurement was 1m from a building façade and therefore includes a 2.5dB(A)[24] allowance for reflection from the façade. Free field measurements are at least 3.5m from any other reflecting surface other than the ground. To compare free field and facade measurements 2.5dB(A) must be subtracted from the façade measurement to facilitate comparison with the predicted levels.

The instrumentation used was a CEL 593.C.1.T Sound Level Analyser (serial no. 0371070) with a CEL pre-amplifier (serial no. 0371027) and CEL 192/2F 1/2" microphone

[24] A +2.5dB(A) is the correction factor to be applied to account for the doubling of sound pressure level which occurs when incident sound is reflected back from a surface such as a property wall.

(Serial no. 19397). The calibrator used to calibrate the 593 analyser and microphone prior to and after each set of measurements was a CEL 284/2 Acoustic Calibrator Class 1L (serial no. 3/03716895). The instrument calibrated satisfactorily before and after each set of measurements and there was no shift in the calibration level. The instrument was in calibration and operated in accordance with the manufacturers' instructions.

Table 12.4 Measured Ambient Levels (at ground floor level)

Location	Free field	Date	Time		Measured Sound Level (dB)			Wind	
	or façade		Start	Finish	$L_{Aeq(T)}$	$L_{A10(T)}$	$L_{A90(T)}$	Speed (m/s)	Dir.
Location 1 2 Rockcliffe Path	Free Field	24.8.04	10:25	10:40	60.2	62.0	47.0	0.0	-
	Free Field	24.8.04	10:40	10:55	60.8	60.0	46.0	0.0	-
	Free Field	24.8.04	10:59	11:16	61.8	63.0	46.0	0.0	-
Location 2 5 Doune Crescent	Façade	24.8.04	11:28	11:43	61.3	65.0	54.0	0.0	-
	Façade	24.8.04	11:43	11:58	61.0	64.0	52.0	0.0	-
Location 3 Carnbroe Mains Farm Cottage	Free Field	24.8.04	12:32	12:47	55.5	57.0	54.0	0.5	NE
	Free Field	24.8.04	12:47	13:02	55.0	57.0	53.0	1.0	NE
Location 4 27 Hillview Crescent	Free Field	24.8.04	13:16	13:31	47.3	49.0	45.0	0.2	NE
	Free Field	24.8.04	13:31	13:46	49.5	49.0	45.0	0.5	NE
Location 5 8 Milroy Gardens	Free Field	24.8.04	13:58	14:13	55.1	57.0	52.0	0.2	NE
	Free Field	24.8.04	14:13	14:29	55.6	57.0	53.0	0.0	-
Location 7 Woodhall Kennels (south façade)	Free Field	25.8.04	10:31	10:46	53.3	55.0	50.0	0.0	-
	Free Field	25.8.04	10:46	11:01	54.8	57.0	52.0	0.0	-
Location 8 Woodhall Kennels (east façade)	Free Field	25.8.04	11:17	11:34	61.1*	65.0	51.0	0.0	-
Location 9 Orchard Farm (north façade)	Free Field	25.8.04	11:46	12:01	63.7	66.0	61.0	0.0	-
	Free Field	25.8.04	12:01	12:17	64.6	67.0	64.0	0.0	-

Location	Free field	Date	Time		Measured Sound Level (dB)			Wind	
	or façade		Start	Finish	$L_{Aeq(T)}$	$L_{A10(T)}$	$L_{A90(T)}$	Speed (m/s)	Dir.
Location 10 Orchard Farm (south façade)	Free Field	25.8.04	12:20	12:35	52.9	55.0	50.0*	0.0	-
	Free Field	25.8.04	12:36	12:51	57.2	54.0	49.0*	0.0	-
Location 11 Mill Bank (south façade)	Façade	25.8.04	13:09	13:24	43.5	45.0	42.0*	0.1	W
	Façade	25.8.04	13:24	13:39	48.9	48.0	42.0*	0.0	-
Location 12 Mill Bank (north façade)	Free Field	25.8.04	14:01	14:16	57.4	59.0	55.0	0.0	-
	Free Field	25.8.04	14:16	14:31	59.3	61.0	56.0	0.0	-
Location 13 Bankhead Farm	Free Field	25.8.04	15:43	15:58	63.0	65.0	61.0	0.3	W
	Free Field	25.8.04	15:58	16:13	62.8	64.0	61.0	0.4	W
Location 14 51 Viewfield Road	Free Field	26.8.04	13:24	13:39	68.9	73.0	61.0	0.6	W
	Free Field	26.8.04	13:40	13:55	68.5	72.0	61.0	0.5	W
Location 15 Kirkwood Sports Barn	Free Field	26.8.04	13:59	14:14	58.1	59.0	57.0	1.2	W
	Free Field	26.8.04	14:14	14:29	59.0	60.0	57.0	1.5	W
Location 16 Braehead Cottage	Refused Entry	26.8.04	-	-	-	-	-	-	-
	Refused Entry	26.8.04	-	-	-	-	-	-	-
Location 17 10 Crossview Place	Free Field	26.8.04	14:58	15:13	72.9	76.0	54.0	0.5	SW
	Free Field	26.8.04	15:13	15:28	73.1	77.0	55.0	0.4	SW
Location 18	Free Field	27.8.04	10:21	10:36	62.2	63.0	58.0	3.5	W
48 Rosebank Terrace	Free Field	27.8.04	10:36	10:51	60.5	62.0	58.0	3.8	W

*Used to describe the existing noise climate at these locations.

Table 12.4 shows that the existing measured noise climate within the area cannot be considered as quiet. In appreciating what is considered to be a quiet environment it may be of some assistance to consider that the Scottish Executive Planning Advice Note 50,

Annex A (in relation to opencast extraction sites) describes an exceptionally quiet rural area as having an existing background noise level of less than 35dB L_{A90}. A level of 35dB(A) is described in Section 12.1.1 as being on a par with a quiet bedroom. If less than 35dB(A) can be considered as exceptionally quiet then it is not unreasonable to describe 40dB(A) as being quiet. None of the measured background noise levels (L_{A90}) are 40dB(A) or less.

With reference to the site notes (see Appendix 12.2), road traffic noise dominates at all locations except Woodhall Kennels (Location No 8), Orchard Farm (Location No 10) and Mill Bank (Location No 11). At the eastern façade of Woodhall Kennels (Location No 8) the sound of barking dogs masked all other noise. At the southern façades of Orchard Farm and Mill Bank there was minimal noise from traffic sources. Consequently, for the majority of properties, the existing noise climate will be described in terms of L_{A10}, but at Orchard Farm (south façade - Location No 10) and Mill Bank (south façade - Location No 11) the existing noise climate will be described in terms of the L_{A90}, and at Woodhall Kennels (east façade - Location No 8) in terms of the L_{Aeq}. The dominance of road traffic within the area means that the existing noise climate can generally be described in terms of $L_{A10,18hr}$ using the CRTN prediction methodology.

In addition to the properties included in the Table 12.4 there are also other noise sensitive areas worthy of note at this stage; namely-

- Kirkshaws Cemetery
- Football Fields (x2) at end of Bredisholm Road (to the west of the aforementioned cemetery)
- Orchard Farm Pond (a locally designated site of nature conservation interest) (informal recreational use)
- Calderbank (Chapelhall) Football Ground
- Douglas Support Estate (informal recreational use)
- Grounds of Woodhall House (informal recreational use)

During the Stage 2 assessment comment was provided in respect of the measured existing noise levels and the effects of noise sources other than traffic on the levels obtained. To facilitate comparison of the measured and modelled levels only receptor locations where traffic noise dominated and other noise sources, including traffic on local roads not in the traffic model) were considered not to have contributed significantly to the measured levels were used for comparison. In addition to the properties detailed in Table 12.4 the modelled existing noise levels at a number of properties representing the potential worst case effects of the scheme i.e. close to the proposed main line and junction changes, are shown in Table 12.5. The measured levels are included as a bracketed term. The receptors used for the comparison of the actual measured and the predicted road traffic levels were No's, 2 (5 Doune Crescent), 3 (Carnbroe Main Farm Cottage), 9 (Orchard Farm north façade) and 15 (Kirkwood Sports Barn). There is an apparent lack of agreement in the modelled and measured levels at Location 14 (14 Viewfield Road) and Location 17 (10 Crossview Pace). However, there are reasons for

this. Firstly at 14 Viewfield Place the measured levels appear to very high, however on checking with the site engineer the local traffic was very busy and the small local roads are not included in the traffic model output. Furthermore the road surface outside 10 Crossview Place increased the traffic generated noise. Although the measured and modelled levels at these locations do not agree the relative changes and therefore impacts are valid.

Table 12.5 Existing 2005 Modelled Levels at Representative Sample Properties (1.5m above finished ground level)

Location	Address	2005 Modelled Predicted Noise Level $L_{A10(T)}$ dB (Free Field)
1	2 Rockcliffe Path	63.1
2	5 Doune Crescent	64.4
3	Carnbroe Mains Farm Cottage	59.8
4	27 Hillview Crescent	53.3
5	8 Milroy Gardens	60.8
7	Woodhall Kennels (south façade)	61.2
8	Woodhall Kennels (east façade	61.2
9	Orchard Farm (north façade)	66.0
10	Orchard Farm (south façade)	58.0
11	Mill Bank (south façade)	54.0
12	Mill Bank (north façade)	56.0
13	Bankhead Farm	58.7
14	51 Viewfield Road	59.4
15	Kirkwood Sports Barn	58.3
16	Braehead Cottage	62.4
17	10 Crossview Place	62.4
18	48 Rosebank Terrace	60.5
20	MSA (Britain) Ltd	72.0
21	Dunlophiflex Fluid Power Ltd	74.8
22	Higherness Way, Coatbridge	69.3
23	R A Labone & Co Ltd	72.1
25	78 Rhindmuir Drive	67.2
27	118 Bredisholm Road	61.3
28	5 Ellismuir Road	58.0
29	43 Roslyn Drive	70.3

Location	Address	2005 Modelled Predicted Noise Level $L_{A10(T)}$ dB (Free Field)
31	**Showcase Cinema, Barrbridge Road**	65.7
32	**7 Collree Gardens**	63.0
33	**Kirkshaws Cemetery**	77.3
34	**Football Fields (x2) at end of Bredisholm Road (to west of cemetery)**	63.5
35	**Orchard Farm Pond**	68.1
36	**Chapelhall Football Ground**	66.1
37	**Douglas Support**	58.1
38	**Stakis Hotel, Strathclyde Business Park**	64.5
39	**Woodhall Estate**	62.2

The predicted 2005 baseline levels and the actual measured levels at locations No's, 2, 3, 9, and 12 are within 3dB.

To assist in the preparation of the DMRB Noise Summary Tables, as shown in Appendix 12.3, the number of properties within the <50 dB(A), 50 to <60 dB(A), 60 to <70 dB(A) and ≥70 dB(A) noise bands for the Core Network are detailed in Table 12.6. The properties are split by five implied uses from address point, namely residential, commercial/industrial, farms, schools and recreational amenity use. These implied uses are based on whether an address has an organisation associated with it (if it does not, a residential use is assumed).

Table 12.6 Number of Properties Within 300m Either Side of the Baillieston to Newhouse Route as Existing (2005) Categorised According to Noise Band ($L_{A10,18hr}$ dB(A))

Distance Band	Residential				Commercial/ Industrial				Amenity Recreational Areas				Farms		Schools			
	<50	50 to <60	60 to <70	≥70	<50	50 to <60	60 to <70	≥70	<50	50 to <60	60 to <70	≥70	<50	50 to <60	60 to <70	≥70	<50	50 to <60	60 to <70	≥70
0 – 50m	1	14	174	98	-	-	2	26	-	-	-	-	-	-	-	-	-	-	-	-
50 – 100m	1	312	271	18	-	-	-	-	-	-	19	9	-	-	1	-	-	-	-	-
100 – 200m	92	792	325	29	5	15	31	-	-	-	-	-	-	1	2	-	-	-	2	-
200 – 300m	397	1202	360	56	4	24	27	-	-	-	-	-	-	2	-	-	1	-	1	-
Total	491	2320	1076	201	9	39	60	26			19	9		3	3		1		3	

12.3.1 Existing Vibration Assessment

Using the properties selected sample receptors, as detailed in Table 12.6, the estimated percentage of people bothered very much or quite a lot by vibration, before any change in traffic, is shown in Table 12.7. It should be noted that as DMRB states that, *"on average, traffic induced vibration is expected to affect a very small percentage of people at exposure levels below 58dB(A) and therefore zero percent should be assumed in these cases*," receiver locations reported in Table 12.6 with predicted levels of less than 58dB $L_{A10(18hr)}$ have been omitted. Also, as previously stated only properties within approximately 40m which exceed the DMRB threshold (greater than 58dB $L_{A10(18hr)}$) have been included. The sample property façade levels are included as a bracketed term in the results rows of the measured $L_{A10,(18hr)}$ dB column of Table 12.7. There are 210 properties within the Core Network which meet these criteria.

Table 12.7 Existing Vibration Assessment (2005)

Location ID	Sample Receiver Location	Measured $L_{A10(18hr)}$ dB (ff)	Estimation of Traffic Vibration Nuisance (% of people bothered by vibration)
17	10 Crossview Place	64.9 (62.4)	12%
29	43 Roslyn Drive	72.8 (70.3)	31%
22	Higherness Way	71.8 (69.3)	29%
21	Dunlophiflex Fluid power Ltd	77.3 (74.8)	45%
20	MSA (Britain) Limited	74.5 (72)	37%

12.4 Predicted Impacts

12.4.1 Enhanced Do-minimum Scenario: Noise

DMRB requires that the Do-minimum scenarios be assessed for both the year of opening and the worst year in the first fifteen years after the Scheme has opened. The fifteenth year following the Scheme opening is normally referred to as the design year. However, in this instance as has been previously stated in Section 12.2 there is no traffic data available for 2025 and therefore data for 2020 has been used. Traffic assessment is further explained in Chapter 2.

The Enhanced Do-minimum scenario represents the flows in 2010 and 2020 without the introduction of any of the Scheme options. As the noise levels have been predicted using a full three dimensional model the predicted levels will vary from those used at the Stage 2 assessment. It must be stressed that this is not relevant here as Stage 2 was a relative comparison of scheme options. The predicted EDM levels at the selected noise sensitive receptors are given in Tables 12.8(a) and 12.8(b). The resulting noise contour bands are shown in Figures 12.2 and 12.4 for EDM 2010 and EDM 2020 respectively. The number of properties falling within the commercial/industrial, farms, schools and recreational/amenity classifications for the Enhanced Do minimum Option classified in terms of <50 dB(A), 50 to <60 dB(A), 60 to <70 dB(A) and ≥70 dB(A) existing noise bands are detailed in Table 12.9 (a) and 12.9(b) for the Core Study Area.

Table 12.8(a) Enhanced Do-minimum (2010) (Unmitigated) at 1.5m and 4m

Location	Address	EDM 2010 Modelled Predicted Noise Level $L_{A10(T)}$ dB (Façade) (Ground Floor)	EDM 2010 Modelled Predicted Noise Level $L_{A10(T)}$ dB (Façade) (First Floor)
1	2 Rockcliffe Path	64.6	65.0
2	5 Doune Crescent	68.5	68.9
3	Carnbroe Mains Farm Cottage	60.9	61.6
4	27 Hillview Crescent	54.9	57.0
5	8 Milroy Gardens	61.6	62.7
7	Woodhall Kennels (south façade)	61.8	62.9
8	Woodhall Kennels (east façade	61.8	62.9
9	Orchard Farm (north façade)	66.2	66.8
10	Orchard Farm (south façade)	58.6	59.8
11	Mill Bank (south façade)	55.2	58.4
12	Mill Bank (north façade)	57.1	56.4
13	Bankhead Farm	59.7	60.0
14	51 Viewfield Road	60.6	60.8
15	Kirkwood Sports Barn	59.2	60.4
16	Braehead Cottage	63.2	64.9
17	10 Crossview Place	63.5	65.3
18	48 Rosebank Terrace	61.5	62.0
20	MSA (Britain) Ltd	73.7	74.0
21	Dunlophiflex Fluid Power Ltd	76.1	76.0
22	Higherness Way, Coatbridge	70.5	70.9
23	R A Labone & Co Ltd	73.3	74.2
25	78 Rhindmuir Drive	67.1	71.9
27	118 Bredisholm Road	63.0	63.7
28	5 Ellismuir Road	59.5	60.8
29	43 Roslyn Drive	73.1	73.8
31	Showcase Cinema, Barrbridge Road	66.9	69.6
32	7 Collree Gardens	65.1	66.0
33	Kirkshaws Cemetery	78.5	N/A
34	Football Fields (x2) at end of Bredisholm Road (to west of	64.2	N/A

Location	Address	EDM 2010 Modelled Predicted Noise Level $L_{A10(T)}$ dB (Façade) (Ground Floor)	EDM 2010 Modelled Predicted Noise Level $L_{A10(T)}$ dB (Façade) (First Floor)
	cemetery)		
35	Orchard Farm Pond	67.4	N/A
36	Chapelhall Football Ground	67.7	N/A
37	Douglas Support	59.1	N/A
38	Stakis Hotel, Strathclyde Business Park	65.1	67.8
39	Woodhall Estate	62.7	63.6

Table 12.8(b) Enhanced Do-minimum (2020) (Unmitigated) at 1.5m and 4m

Location	Address	EDM 2020 Modelled Predicted Noise Level $L_{A10(T)}$ dB (ff) (Ground Floor)	EDM 2020 Modelled Predicted Noise Level $L_{A10(T)}$ dB (ff) (First Floor)
1	2 Rockcliffe Path	65.3	65.6
2	5 Doune Crescent	68.7	69.0
3	Carnbroe Mains Farm Cottage	60.3	61.2
4	27 Hillview Crescent	55.3	57.4
5	8 Milroy Gardens	61.6	62.7
7	Woodhall Kennels (south façade)	62.0	63.2
8	Woodhall Kennels (east façade	62.0	63.2
9	Orchard Farm (north façade)	64.8	65.5
10	Orchard Farm (south façade)	59.7	61.0
11	Mill Bank (south façade)	54.4	57.2
12	Mill Bank (north façade)	56.3	55.7
13	Bankhead Farm	58.6	58.8
14	51 Viewfield Road	60.0	60.2
15	Kirkwood Sports Barn	58.5	59.8
16	Braehead Cottage	62.3	64.0
17	10 Crossview Place	64.2	65.9
18	48 Rosebank Terrace	61.4	61.9
20	MSA (Britain) Ltd	73.8	74.0
21	Dunlophiflex Fluid Power Ltd	75.5	75.4

Location	Address	EDM 2020 Modelled Predicted Noise Level $L_{A10(T)}$ dB (ff) (Ground Floor)	EDM 2020 Modelled Predicted Noise Level $L_{A10(T)}$ dB (ff) (First Floor)
22	**Higherness Way, Coatbridge**	69.9	70.3
23	**R A Labone & Co Ltd**	73.3	74.2
25	**78 Rhindmuir Drive**	68.0	72.8
27	**118 Bredisholm Road**	63.4	64.1
28	**5 Ellismuir Road**	59.8	61.1
29	**43 Roslyn Drive**	72.9	73.5
31	**Showcase Cinema, Barrbridge Road**	66.2	68.9
32	**7 Collree Gardens**	64.9	65.6
33	**Kirkshaws Cemetery**	77.9	N/A
34	**Football Fields (x2) at end of Bredisholm Road (to west of cemetery)**	63.8	N/A
35	**Orchard Farm Pond**	74.5	N/A
36	**Chapelhall Football Ground**	68.1	N/A
37	**Douglas Support**	58.1	N/A
38	**Stakis Hotel, Strathclyde Business Park**	65.1	67.8
39	**Woodhall Estate**	62.7	63.7

Table 12.9(a) Number of Residential Properties Within Core Study Area Either Side of the Baillieston to Newhouse Route Categorised According to Noise Band ($L_{A10,18hr}$ dB(A)) EDM 2010

Distance Band	Residential				Commercial/ Industrial				Amenity Recreational Areas					Farms			Schools			
	<50	50 to <60	60 to <70	≥70	<50	50 to <60	60 to <70	≥70	<50	50 to <60	60 to <70	≥70	<50	50 to <60	60 to <70	≥70	<50	50 to <60	60 to <70	≥70
0 – 50m	-	9	164	114	-	-	12	16	-	-	-	-	-	-	-	-	-	-	-	-
50 – 100m	1	235	340	26	-	-	15	13	-	-	-	-	-	-	1	-	-	-	-	-
100 – 200m	48	746	402	40	1	18	30	3	-	-		-	-	1	2	1	-	-	1	1
200 – 300m	88	1398	450	79	2	18	23	12	-	-	-	-	-	2	-	-	-	2	-	-
Total	**137**	**2388**	**1356**	**259**	**3**	**36**	**80**	**44**						**3**	**3**	**1**		**2**	**1**	**1**

Table 12.9(b) Number of Residential Properties Within Core Study Area Either Side of the Baillieston to Newhouse Categorised According to Noise Band ($L_{A10,18hr}$ dB(A)) EDM 2020

Distance Band	Residential				Commercial/ Industrial				Amenity Recreational Areas					Farms			Schools			
	<50	50 to <60	60 to <70	≥70	<50	50 to <60	60 to <70	≥70	<50	50 to <60	60 to <70	≥70	<50	50 to <60	60 to <70	≥70	<50	50 to <60	60 to <70	≥70
0 – 50m		11	159	117	-	-	3	25	-	-	-	-	-	-	-	-	-	-	-	-
50 – 100m	1	228	350	23	-	-	15	13	-	-	-	-	-	-	1	-	-	-	-	-
100 – 200m	49	720	425	42	1	18	26	7	-	-	-	-	-	1	2	1	-	-	1	1
200 – 300m	164	1313	458	80	2	18	23	12	-	-	-	-	-	2	-	-	-	2	-	-
Total	**214**	**2272**	**1392**	**262**	**3**	**36**	**67**	**57**						**3**	**3**	**1**		**2**	**1**	**1**

12.4.2 Enhanced Do-minimum and Scheme Options: Vibration

The estimations of the percentage of people bothered very much, or quite a lot by vibration for the 2010 and 2020 Enhanced Do-minimum scenarios within the Core Network are shown in Table 12.10. Note, levels less than 58dB $L_{A10(18hr)}$ are not assessed as they are below the DMRB threshold and only properties within approximately 40m of the centre line are included. This is because the DMRB vibration bother relationship is only validated up to 40m.

Table 12.10 Estimation of Traffic Vibration Nuisance (EDM 2010 and 2020 Unmitigated) (% of people bothered by vibration)

Location ID	Sample Receiver Location	2010 EDM Modelled $L_{A10(18hr)}$ dB (ff)	2020 EDM Modelled $L_{A10(18hr)}$ dB (ff)	2010 Estimation of Traffic Vibration Nuisance (% of people bothered by vibration	2020 Estimation of Traffic Vibration Nuisance (% of people bothered by vibration)
17	10 Crossview Place	65.0 (63.5)	66.8 (64.2)	12%	16%
29	43 Roslyn Drive	75.6 (73.1)	75.4 (72.9)	40%	39%
22	Higherness Way	73.0 (70.5)	72.4 (69.9)	30%	30%
21	Dunlophiflex Fluid power Ltd	78.6 (76.1)	78.0 (75.5)	49%	47%

12.4.3 With Scheme

The predicted unmitigated noise levels at the representative sample locations for the preferred Scheme are presented in Tables 12.11(a) and 12.11(b) for 2010 and 2020 respectively The predicted noise bands are shown in 12.5, Figures 12.3 and 12.5 for DS 2010 and DS 2020 respectively. The numbers of commercial/industrial properties, recreational amenity areas, schools and farms in terms of <50 dB(A), 50 to <60 dB(A), 60 to <70 dB(A) and ≥70 dB(A) predicted noise bands are detailed in Tables 12.12 and 12.13(a) the 2010 and 2020 respectively for the Core Study Area.. The numbers of properties which will be subject to a change in flows of +25% or -20% or greater with the preferred Scheme in place in 2020 are shown in Table 13.13(b).

Table 12.11(a) With Scheme (2010) (Unmitigated) at 1.5m and 4m

Location ID	Address	With Scheme 2010 Modelled Predicted Noise Level $L_{A10(T)}$ dB (Façade) (Ground Floor)	With Scheme 2010 Modelled Predicted Noise Level $L_{A10(T)}$ dB (Façade) (First Floor)
1	2 Rockcliffe Path	66.0	66.6
2	5 Doune Crescent	66.4	66.7
3	Carnbroe Mains Farm Cottage	75.5	76.4
4	27 Hillview Crescent	56.2	57.9
5	8 Milroy Gardens	62.8	64.1
7	Woodhall Kennels (south façade)	61.4	62.5
8	Woodhall Kennels (east façade	61.4	62.5
9	Orchard Farm (north façade)	72.0	73.1
10	Orchard Farm (south façade)	76.4	77.3
11	Mill Bank (south façade)	65.4	66.8
12	Mill Bank (north façade)	62.6	69.6
13	Bankhead Farm	64.5	65.0
14	51 Viewfield Road	61.5	62.1
15	Kirkwood Sports Barn	61.7	62.7
16	Braehead Cottage	79.5	79.4
17	10 Crossview Place	61.1	63.4
18	48 Rosebank Terrace	61.8	62.4
20	MSA (Britain) Ltd	67.2	67.2
21	Dunlophiflex Fluid Power Ltd	65.0	65.3
22	Higherness Way, Coatbridge	61.2	61.9
23	R A Labone & Co Ltd	74.4	74.8
25	78 Rhindmuir Drive	67.4	72.0
27	118 Bredisholm Road	62.2	62.9
28	5 Ellismuir Road	58.9	60.0
29	43 Roslyn Drive	71.6	72.4
31	Showcase Cinema, Barrbridge Road	68.8	70.0
32	7 Collree Gardens	64.4	65.1
33	Kirkshaws Cemetery	69.6	N/A

Location ID	Address	With Scheme 2010 Modelled Predicted Noise Level $L_{A10(T)}$ dB (Façade) (Ground Floor)	With Scheme 2010 Modelled Predicted Noise Level $L_{A10(T)}$ dB (Façade) (First Floor)
34	Football Fields (x2) at end of Bredisholm Road (to west of cemetery)	65.4	N/A
35	Orchard Farm Pond	66.7	N/A
36	Chapelhall Football Ground	73.2	N/A
37	Douglas Support	72.2	N/A
38	Stakis Hotel, Strathclyde Business Park	64.7	67.5
39	Woodhall Estate	62.7	65.4

Table 12.11(b) With Scheme(2020) (Unmitigated) at 1.5m and 4m

Location ID	Address	With Scheme 2020 Modelled Predicted Noise Level $L_{A10(T)}$ dB (Façade) (Ground Floor)	With Scheme 2020 Modelled Predicted Noise Level $L_{A10(T)}$ dB (Façade) (First Floor)
1	2 Rockcliffe Path	65.4	66.0
2	5 Doune Crescent	62.6	63.1
3	Carnbroe Mains Farm Cottage	76.2	77.1
4	27 Hillview Crescent	56.0	57.7
5	8 Milroy Gardens	63.1	64.4
7	Woodhall Kennels (south façade)	61.1	62.3
8	Woodhall Kennels (east façade	61.1	62.3
9	Orchard Farm (north façade)	72.4	73.7
10	Orchard Farm (south façade)	77.0	77.9
11	Mill Bank (south façade)	66.1	67.6
12	Mill Bank (north façade)	63.4	70.3
13	Bankhead Farm	65.3	65.9
14	51 Viewfield Road	62.5	63.0
15	Kirkwood Sports Barn	62.4	63.1
16	Braehead Cottage	80.1	80.0
17	10 Crossview Place	64.9	67.2
18	48 Rosebank Terrace	63.7	64.2

Location ID	Address	With Scheme 2020 Modelled Predicted Noise Level $L_{A10(T)}$ dB (Façade) (Ground Floor)	With Scheme 2020 Modelled Predicted Noise Level $L_{A10(T)}$ dB (Façade) (First Floor)
20	MSA (Britain) Ltd	70.8	71.0
21	Dunlophiflex Fluid Power Ltd	69.0	69.2
22	Higherness Way, Coatbridge	64.3	64.9
23	R A Labone & Co Ltd	74.5	74.9
25	78 Rhindmuir Drive	69.6	74.3
27	118 Bredisholm Road	63.7	64.3
28	5 Ellismuir Road	59.8	61.0
29	43 Roslyn Drive	72.7	73.4
31	Showcase Cinema, Barrbridge Road	69.7	71.0
32	7 Collree Gardens	62.0	63.0
33	Kirkshaws Cemetery	72.6	N/A
34	Football Fields (x2) at end of Bredisholm Road (to west of cemetery)	64.6	N/A
35	Orchard Farm Pond	67.4	N/A
36	Chapelhall Football Ground	73.7	N/A
37	Douglas Support	72.9	N/A
38	Stakis Hotel, Strathclyde Business Park	65.3	68.2
39	Woodhall Estate	64.4	65.4

Table 12.12(a) Number of Residential Properties Within Core Study Area Either Side of the Baillieston to Newhouse Route as Existing Categorised According to Noise Band ($L_{A10,18hr}$ dB(A)) 2010

Distance Band	Residential				Commercial/ Industrial				Amenity Recreational Areas				Farms				Schools			
	<50	50 to <60	60 to <70	≥70	<50	50 to <60	60 to <70	≥70	<50	50 to <60	60 to <70	≥70	<50	50 to <60	60 to <70	≥70	<50	50 to <60	60 to <70	≥70
0 – 50m	-	38	146	132	-	-	12	12	-	-	-	-	-	-	-	2	-	-	-	-
50 – 100m	7	356	244	31	-	-	15	14	-	-	-	-	-	-	-	-	-	-	-	-
100 – 200m	8	854	420	36	1	16	39	3	-	-	-	-	-	3	1	1	-	-	2	-
200 – 300m	80	1437	477	58	-	44	20	15	-	-	-	-	-	1	-	-	-	2	-	-
Total	**95**	**2685**	**1287**	**257**	**1**	**60**	**86**	**44**						**4**	**1**	**3**		**2**	**2**	

Table 12.13(a) Number of Residential Properties Within Core Study Area Either Side of the Baillieston to Newhouse Route as Existing Categorised According to Noise Band ($L_{A10,18hr}$ dB(A)) Do-something 2020

Distance Band	Residential				Commercial/ Industrial				Amenity Recreational Areas				Farms				Schools			
	<50	50 to <60	60 to <70	≥70	<50	50 to <60	60 to <70	≥70	<50	50 to <60	60 to <70	≥70	<50	50 to <60	60 to <70	≥70	<50	50 to <60	60 to <70	≥70
0 – 50m	-	14	206	89	-	-	20	11	-	-	-	-	-	-	-	2	-	-	-	-
50 – 100m	1	303	315	19	-	-	19	10	-	-	-	-	-	-	-	-	-	-	-	-
100 – 200m	16	883	393	26	1	19	39	-	-	-	-	-	-	4	1	-	-	-	2	-
200 – 300m	57	1493	479	23	2	48	27	2	-	-	-	-	-	1	-	-	-	2	-	-
Total	**74**	**2693**	**1393**	**157**	**3**	**67**	**105**	**23**						**5**	**1**	**2**		**2**	**2**	

Table 12.13(b) Number of Residential Properties Within Wider Study Area Subject to a 1dB(A) or Greater Change

0-50m	Residential	Commercial/ Industrial	Amenity Recreational Areas	Farms	Schools
+25% or greater	1347	97	0	1	2
-20% or greater	2908	337	0	2	3

12.4.4 With Scheme: Vibration

The estimations of the percentage of people bothered very much or quite a lot by vibration are shown in Table 12.14 for 2010 and 2020. Note that levels less than 58dB $L_{A10(18hr)}$ are not assessed as they are below DMRB threshold, and only properties within approximately 40m of the centre line are included. This is because the DMRB vibration bother relationship is only validated up to 40m. There are 234 properties within the Core Network which meet these criteria.

Table 12.14 Estimation of Traffic Vibration Nuisance (Do-something 2010 and 2020 Unmitigated) (% of people bothered by vibration)

Location ID	Sample Receiver Location	2010 DS Modelled $L_{A10(18hr)}$ dB (ff)	2020 DS Modelled $L_{A10(18hr)}$ dB (ff)	2010 Estimation of Traffic Vibration Nuisance (% of people bothered by vibration	2020 Estimation of Traffic Vibration Nuisance (% of people bothered by vibration)
17	10 Crossview Place	63.6 (61.1)	67.4 (64.9)	9%	17%
29	43 Roslyn Drive	74.1 (71.6)	75.2 (72.7)	35%	38%
13	Braehead Cottage	82.0 (79.5)	82.6 (80.1)	>55%	>55%
22	Higherness Way	63.7 (61.2)	66.8 (64.3)	9%	16%
21	Dunlophiflex Fluid power Ltd	67.5 (65.0)	71.5 (69.0)	28%	28%
10	Orchard Farm South	78.9 (76.4)	79.5 (77.0)	50%	51%
3	Carnbroe Mains Cottage	78.0 (75.5)	78.7 (76.2)	47%	49%
23	R.A Labone & Co (Ltd)	76.9 (74.4)	77.0 (74.5)	44%	44%

12.4.5 Significance of Impact

The significance of impacts for the EDM, derived as described in paragraph 12.2.2 for both 2010 and 2020 unmitigated levels for are presented in Tables 12.15(a) and Table 12.15(b) respectively together with the calculated Do-minimum and Do-something noise levels for both 2010 and 2020. A comparison of the numbers of commercial/industrial

properties recreational amenity areas, schools and farms in terms of <50 dB(A), 50 to <60 dB(A), 60 to <70 dB(A) and ≥70 dB(A) predicted noise bands are presented in the DMRB Noise Summary Tables included as Appendix12.3.

Table 12.15(a) Proposed Scheme Significance of Impact for 2010 and 2020 Unmitigated Levels at 1.5m ($L_{A10,18hr}$ dB(A)) Ground Floor

Location	2010		2020		Proposed Scheme Significance of Impact (unmitigated at ground floor level)	
	EDM	Do-so	EDM	Do-so	2010	2020
2 Rockcliffe Path	64.6	66.0	65.3	65.4	Moderate Adverse	Slight Adverse
5 Doune Crescent	68.5	66.4	68.7	62.6	Moderate Beneficial	Substantial Beneficial
Carnbroe Mains Farm Cottage	60.9	75.5	60.3	76.2	Substantial Adverse	Substantial Adverse
27 Hillview Crescent	54.9	56.2	55.3	56.0	Moderate Adverse	Slight Adverse
8 Milroy Gardens	61.6	62.8	61.6	63.1	Moderate Adverse	Moderate Adverse
Woodhall Kennels (south façade)	61.8	61.4	62.0	61.1	Slight Beneficial	Slight Beneficial
Woodhall Kennels (east façade	61.8	61.4	62.0	61.1	Slight Beneficial	Slight Beneficial
Orchard Farm (north façade)	66.2	72.0	64.8	72.4	Substantial Adverse	Substantial Adverse
Orchard Farm (south façade)	58.6	76.4	59.7	77.0	Substantial Adverse	Substantial Adverse
Mill Bank (south façade)	55.2	65.4	54.4	66.1	Substantial Adverse	Substantial Adverse
Mill Bank (north façade)	57.1	62.6	56.3	63.4	Substantial Adverse	Substantial Adverse
Bankhead Farm	59.7	64.5	58.6	65.3	Moderate/ Substantial Adverse	Substantial Adverse
51 Viewfield Road	60.6	61.5	60.0	62.5	Slight Adverse	Moderate Adverse
Kirkwood Sports Barn	59.2	61.7	58.5	62.4	Moderate Adverse	Moderate/ Substantial Adverse
Braehead Cottage	63.2	79.5	62.3	80.1	Substantial Adverse	Substantial Adverse
10 Crossview Place	63.5	61.1	64.2	64.9	Moderate Beneficial	Slight Adverse
48 Rosebank Terrace	61.5	61.8	61.4	63.7	Slight Adverse	Moderate Adverse
MSA (Britain) Ltd	73.7	67.2	73.8	70.8	Moderate/ Substantial Beneficial	Slight Moderate Beneficial
Dunlophiflex Fluid Power Ltd	76.1	65.0	75.5	69.0	Moderate/ Substantial Beneficial	Moderate/ Substantial Beneficial

Location	2010		2020		Proposed Scheme Significance of Impact (unmitigated at ground floor level)	
	EDM	Do-so	EDM	Do-so	2010	2020
Higherness Way, Coatbridge	70.5	61.2	69.9	64.3	Substantial Beneficial	Substantial Beneficial
R A Labone & Co Ltd	73.3	74.4	73.3	74.5	Slight/ Moderate Adverse	Slight/ Moderate Adverse
78 Rhindmuir Drive	67.1	67.4	68.0	69.6	Slight Adverse	Moderate Adverse
118 Bredisholm Road	63.0	62.2	63.4	63.7	Slight Beneficial	Slight Adverse
5 Ellismuir Road	59.5	58.9	59.8	59.8	Slight Beneficial	No Benefit
43 Roslyn Drive	73.1	71.6	72.9	72.7	Moderate Beneficial	Slight Beneficial
Showcase Cinema, Barrbridge Road	66.9	68.8	66.2	69.7	Slight/ Moderate Adverse	Moderate Adverse
7 Collree Gardens	65.1	64.4	64.9	62.0	Slight Beneficial	Moderate Beneficial
Kirkshaws Cemetery	78.5	69.6	77.9	72.6	Substantial Beneficial	Substantial Beneficial
Football Fields (x2) at end of Bredisholm Road (to west of cemetery)	64.2	65.4	63.8	64.6	Moderate Adverse	Slight Adverse
Orchard Farm Pond	67.4	66.7	74.5	67.4	Slight Beneficial	Substantial Beneficial
Chapelhall Football Ground	67.7	73.2	68.1	73.7	Substantial Adverse	Substantial Adverse
Douglas Support	59.1	72.2	58.1	72.9	Mod/Substantial Adverse	Moderate Adverse
Stakis Hotel, Strathclyde Business Park	65.1	64.7	65.1	65.3	Negligible/ Slight Beneficial	Negligible/ Slight Adverse
Woodhall Estate	62.7	62.7	62.7	64.4	No Benefit	Moderate Adverse

Table 12.15(b) Proposed Scheme Significance of Impact for 2010 and 2020 Unmitigated Levels at 4m ($L_{A10,18hr}$ dB(A)) First Floor

Location	2010		2020		Proposed Scheme Significance of Impact (unmitigated at first floor level)	
	EDM	Do-so	EDM	Do-so	2010	2020
2 Rockcliffe Path	65.0	66.6	65.6	66.0	Moderate Adverse	Slight Adverse
5 Doune Crescent	68.9	66.7	69.0	63.1	Moderate Beneficial	Substantial Beneficial
Carnbroe Mains Farm Cottage	61.6	76.4	61.2	77.1	Substantial Adverse	Substantial Adverse

Location	2010		2020		Proposed Scheme Significance of Impact (unmitigated at first floor level)	
	EDM	Do-so	EDM	Do-so	2010	2020
27 Hillview Crescent	57.0	57.9	57.4	57.7	Slight Adverse	Slight Adverse
8 Milroy Gardens	62.7	64.1	62.7	64.4	Moderate Adverse	Moderate Adverse
Woodhall Kennels (south façade)	62.9	62.5	63.2	62.3	Slight Beneficial	Slight Beneficial
Woodhall Kennels (east façade	62.9	62.5	63.2	62.3	Slight Beneficial	Slight Beneficial
Orchard Farm (north façade)	66.8	73.1	65.5	73.7	Substantial Adverse	Substantial Adverse
Orchard Farm (south façade)	59.8	77.3	61.0	77.9	Substantial Adverse	Substantial Adverse
Mill Bank (south façade)	58.1	66.8	57.2	67.6	Substantial Adverse	Substantial Adverse
Mill Bank (north façade)	56.4	69.6	55.7	70.3	Substantial Adverse	Substantial Adverse
Bankhead Farm	60.0	65.0	58.8	65.9	Substantial Adverse	Substantial Adverse
51 Viewfield Road	60.8	62.1	60.2	63.0	Moderate Adverse	Moderate Adverse
Kirkwood Sports Barn	60.4	62.7	59.8	63.1	Moderate Adverse	Moderate/ Substantial Adverse
Braehead Cottage	64.9	79.4	64.0	80.0	Substantial Adverse	Substantial Adverse
10 Crossview Place	65.3	63.4	65.9	67.2	Moderate Beneficial	Moderate Adverse
48 Rosebank Terrace	62.0	62.4	61.9	64.2	Slight Adverse	Moderate Adverse
MSA (Britain) Ltd	74.0	67.2	74.0	71.0	Moderate/ Substantial Beneficial	Slight Moderate Beneficial
Dunlophiflex Fluid Power Ltd	76.0	65.3	75.4	69.2	Moderate/ Substantial Beneficial	Moderate/ Substantial Beneficial
Higherness Way, Coatbridge	70.9	61.9	70.3	64.9	Substantial Beneficial	Substantial Beneficial
R A Labone & Co Ltd	74.2	74.8	74.2	74.9	Negligible/ Slight Adverse	Negligible/ Slight Adverse
78 Rhindmuir Drive	71.9	72.0	72.8	74.3	Slight Adverse	Moderate Adverse
118 Bredisholm Road	63.7	62.9	64.1	64.3	Slight Beneficial	Slight Adverse
5 Ellismuir Road	60.8	60.0	61.1	61.0	Slight Beneficial	Slight Beneficial
43 Roslyn Drive	73.8	72.4	73.5	73.4	Moderate Beneficial	Slight Beneficial
Showcase Cinema, Barrbridge Road	69.6	70.0	68.9	71.0	Negligible/ Slight Adverse	Slight/ Moderate Adverse

Location	2010		2020		Proposed Scheme Significance of Impact (unmitigated at first floor level)	
	EDM	Do-so	EDM	Do-so	2010	2020
7 Collree Gardens	66.0	65.1	65.6	63.0	Slight Beneficial	Moderate Beneficial
Stakis Hotel, Strathclyde Business Park	67.8	67.5	67.8	68.2	Negligible/ Slight Beneficial	Negligible/ Slight Adverse
Woodhall Estate	63.6	65.4	63.7	65.4	Moderate Adverse	Moderate Adverse

12.5 Mitigation

As was stated in Paragraph 12.2.3 mitigation is to be considered where the significance of impact has been determined to be greater than “slight adverse”. Such impacts have been found to occur for the effective Design year, i.e. 2020 at the following sample properties; Carnbroe Mains Farm, 8 Milroy Gardens, Orchard Farm (North façade), Orchard Farm (South façade), Mill Bank/ (South façade), Mill Bank (North façade), Bankhead Farm, 51 Viewfield Road, Kirkwood Sports Barn, Braehead Cottage, 10 Crossview Place, 48 Rosebank Terrace, R A Labone & Co Ltd, 78 Rhindmuir Drive and Showcase Cinema, Chapelhall Football Pitches and Woodhall Estate. No mitigation has been considered for Orchard Park Farm as it is presently derelict. Mitigation is not possible for Braehead as there is no garden between the road and the southern elevation and the road and there is insufficient space available for effective noise mitigation.

The existing 4m high acoustic barrier situated approximately between chainage M8 e/b Ch 3200 - Ch 3400 has been included in the mitigation drawings, but not specified in the barrier locations below. This is because when the unmitigated noise models were being processed definitive data on the barrier location was not available. This was received in time to incorporate it into the mitigated noise model runs.

The recommended mitigation takes the form of 2m or 3m high acoustic screens relative to the ground level. The barriers must be at the very least 15kg/m^2 close boarded timber fencing. There must be no gaps in and between the timbers and this usually necessitates overlapping timbers. It is essential that there are no gaps between the base of the barrier and the ground on which it sits. The full detailed barrier specification for each of the barriers will be detailed in the Employers Requirement prepared for scheme construction should the scheme proceed. The barrier specification will comply with all relevant British Standards. The locations and height of the acoustics screens are as detailed as follows and are shown on Figure 12.6:

Swinton Area

A89 w/b to M8 w/b Houses to Rail Bridge	2m high
A8 e/b Ch 435 - Ch 620	2m high
A8 e/b Ch 620 - Ch 840	3m high

A8 e/b Ch 840 - Ch 1090	2m high
M8 e/b Ch 1175 - Ch 2520	2m high
Shawhead Area	
A725 s/b on slip from M8 w/b Ch -30 - Ch 230	2m high
M8 w/b Ch 1750 - Ch2300	2m high
M8 w/b Ch 2300 - Ch2500	3m high
M8 w/b Ch 2500 - Ch2800	2m high
M8 w/b Ch 4980- Ch 5190	3m high

Note: Farm has existing Bund at 2.5m high around hardstanding area to west of farm buildings.

APR w/b Ch 6970 - Ch 7380	2m high
APR w/b Ch 7575 - Ch 8165	2m high

Note Landscape Bund at 2m high Ch7820 to Ch8165

APR e/b Ch 6910 - Ch 8150	2m high
M8 e/b Ch 8825 - Ch 10010	2m high.

The resultant mitigated levels are as shown in Table 12.21 below with the associated derived significance of impact.

12.6 Residual Impacts

Residual impacts, i.e. impacts after mitigation has been considered, are as reported in Tables 12.16(a) and 12.16(b) for ground and first floor levels, respectively. As can be seen, by comparing the significance of impacts for ground floor levels for 2020 with and without mitigation it can be seen that there are improvements at 2 Rockcliffe Path, 8 Milroy Gardens, Woodhall Kennels (north and south facades), Mill Bank, Bankhead Farm, 51 Viewfield Road, Kirkwood Sports Barn, 78 Rhindmuir Drive, Showcase Cinema and Woodhall Estate. Of these properties only Bankhead Farm, Kirkwood Sports Barn remain above “slight adverse”. At Bankhead Farm the limits on practicable mitigation are that the receptor is elevated relative to the M8/A8 and the new M8 section moves closer. The new section of the road is partially in a cutting and 3m roadside barrier reduces in effectiveness as the road moves out of cutting and into embankment. At Carnbroe Mains Farm the mitigation has achieved a reduction of 10dB(A), which is a very significant improvement, however, the fact that the new route is close to the property, limits what can be achieved in practical terms.

Table 12.16(a) Proposed Scheme Significance of Impact for 2010 and 2020 Mitigated Levels ($L_{A10,18hr}$ dB(A)) Ground Floor

Receiver Location	2010 (Mitigated)*		2020 (Mitigated)*		Proposed Scheme Significance of Impact (mitigated at ground floor)	
	EDM	Do-so	EDM	Do-so	2010	2020
2 Rockcliffe Path	64.6	63.5	65.3	62.9	Moderate Beneficial	Moderate Beneficial
5 Doune Crescent	68.5	66.4	68.7	62.5	Moderate Beneficial	Substantial Beneficial
Carnbroe Mains Farm Cottage	60.9	68.7	60.3	66.0	Mod/Substantial Adverse	Substantial Adverse
27 Hillview Crescent	54.9	56.2	55.3	56.0	Moderate Adverse	Slight Adverse
8 Milroy Gardens	61.6	59.1	61.6	59.4	Moderate Adverse	Moderate Adverse
Woodhall Kennels (south façade)	61.8	59.8	62.0	59.3	Moderate Beneficial	Moderate Beneficial
Woodhall Kennels (east façade	61.8	59.8	62.0	59.3	Moderate Beneficial	Moderate Beneficial
Orchard Farm (north façade)	66.2	71.8	64.8	72.3	Substantial Adverse	Substantial Adverse
Orchard Farm (south façade)	58.6	76.4	59.7	76.9	Substantial Adverse	Substantial Adverse
Mill Bank (south façade)	55.2	65.4	54.4	62.5	Substantial Adverse	Substantial Adverse
Mill Bank (north façade)	57.1	62.6	56.3	60.6	Moderate Adverse	Moderate/Substa ntial Adverse
Bankhead Farm	59.7	62.2	58.6	61.6	Moderate Adverse	Moderate/ Substantial Adverse
51 Viewfield Road	60.6	59.8	60.0	60.9	Slight Beneficial	Slight Adverse
Kirkwood Sports Barn	59.2	59.6	58.5	60.3	Slight Adverse	Moderate Adverse
Braehead Cottage	63.2	79.5	62.3	80.1	Substantial Adverse	Substantial Adverse
10 Crossview Place	63.5	61.1	64.2	64.9	Moderate Beneficial	Slight Adverse
48 Rosebank Terrace	61.5	61.2	61.4	63.0	Slight Beneficial	Moderate Adverse
MSA (Britain) Ltd	73.7	66.8	73.8	70.4	Moderate/ Substantial Beneficial	Slight Moderate Beneficial
Dunlophiflex Fluid Power Ltd	76.1	65.0	75.5	69.0	Moderate/ Substantial Beneficial	Moderate/ Substantial Beneficial
Higherness Way, Coatbridge	70.5	61.1	69.9	64.2	Substantial Beneficial	Substantial Beneficial
R A Labone & Co Ltd	73.3	74.4	73.3	74.5	Slight/ Moderate Adverse	Slight/ Moderate Adverse
78 Rhindmuir Drive	67.1	66.7	68.0	68.9	Slight Beneficial	Slight Adverse
118 Bredisholm Road	63.0	62.2	63.4	63.7	Slight Beneficial	Slight Adverse

Receiver Location	2010 (Mitigated)*		2020 (Mitigated)*		Proposed Scheme Significance of Impact (mitigated at ground floor)	
	EDM	Do-so	EDM	Do-so	2010	2020
5 Ellismuir Road	59.5	58.9	59.8	59.8	Slight Beneficial	No Benefit
43 Roslyn Drive	73.1	71.6	72.9	72.7	Moderate Beneficial	Slight Beneficial
Showcase Cinema, Barrbridge Road	66.9	65.1	66.2	66.5	Slight Moderate Beneficial	Negligible/ Slight Adverse
7 Collree Gardens	65.1	64.4	64.9	62.0	Slight Beneficial	Moderate Beneficial
Kirkshaws Cemetery	78.5	68.6	77.9	72.0	Substantial Beneficial	Substantial Beneficial
Football Fields (x2) at end of Bredisholm Road (to west of cemetery)	64.2	64.3	63.8	62.9	Slight Adverse	Slight Beneficial
Orchard Farm Pond	67.4	66.7	74.5	67.4	Slight Beneficial	Substantial Beneficial
Chapelhall Football Ground	67.7	73.1	68.1	73.7	Substantial Adverse	Substantial Adverse
Douglas Support	59.1	72.2	58.1	72.9	Mod/Substantial Adverse	Mod/Substantial Adverse
Stakis Hotel, Strathclyde Business Park	65.1	64.7	65.1	65.3	Negligible/ Slight Beneficial	Negligible/ Slight Adverse
Woodhall Estate	62.7	61.4	62.7	61.4	Moderate Beneficial	Moderate Beneficial

*Only the DS is mitigated.

Table 12.16(b) Proposed Scheme Significance of Impact for 2010 and 2020 Mitigated Levels ($L_{A10,18hr}$ dB(A)) First Floor

Receiver Location	2010 (Mitigated)*		2020 (Mitigated)*		Proposed Scheme Significance of Impact at first floor(mitigated)	
	EDM	Do-so	EDM	Do-so	2010	2020
2 Rockcliffe Path	65.0	64.2	65.6	63.6	Slight Beneficial	Moderate Beneficial
5 Doune Crescent	68.9	66.7	69.0	62.9	Moderate Beneficial	Substantial Beneficial
Carnbroe Mains Farm Cottage	61.6	72.1	61.2	76.2	Substantial Adverse	Substantial Adverse
27 Hillview Crescent	57.0	57.9	57.4	57.7	Slight Adverse	Slight Adverse
8 Milroy Gardens	62.7	60.3	62.7	60.1	Moderate Beneficial	Moderate Beneficial
Woodhall Kennels (south façade)	62.9	60.8	63.2	60.5	Moderate Beneficial	Moderate Beneficial
Woodhall Kennels (east façade	62.9	60.8	63.2	60.5	Moderate Beneficial	Moderate Beneficial
Orchard Farm (north façade)	66.8	72.8	65.5	73.3	Substantial Adverse	Substantial Adverse

Receiver Location	2010 (Mitigated)*		2020 (Mitigated)*		Proposed Scheme Significance of Impact at first floor(mitigated)	
	EDM	Do-so	EDM	Do-so	2010	2020
Orchard Farm (south façade)	59.8	77.3	61.0	77.9	Substantial Adverse	Substantial Adverse
Mill Bank (south façade)	58.1	64.0	57.2	67.6	Substantial Adverse	Substantial Adverse
Mill Bank (north façade)	56.4	66.0	55.7	70.3	Substantial Adverse	Substantial Adverse
Bankhead Farm	60.0	61.2	58.8	63.6	Moderate Adverse	Moderate/ Substantial Adverse
51 Viewfield Road	60.8	60.4	60.2	61.4	Slight Beneficial	Moderate Adverse
Kirkwood Sports Barn	60.4	60.6	59.8	60.9	Slight Adverse	Moderate Adverse
Braehead Cottage	64.9	79.4	64.0	80.0	Substantial Adverse	Substantial Adverse
10 Crossview Place	65.3	63.4	65.9	67.2	Moderate Beneficial	Moderate Adverse
48 Rosebank Terrace	62.0	61.6	61.9	63.5	Slight Beneficial	Moderate Adverse
MSA (Britain) Ltd	74.0	67.2	74.0	71.1	Moderate/ Substantial Beneficial	Slight Moderate Beneficial
Dunlophiflex Fluid Power Ltd	76.0	65.3	75.4	69.2	Moderate/ Substantial Beneficial	Moderate/ Substantial Beneficial
Higherness Way, Coatbridge	70.9	61.8	70.3	64.8	Substantial Beneficial	Substantial Beneficial
R A Labone & Co Ltd	74.2	74.8	74.2	74.9	Negligible/ Slight Adverse	Negligible/ Slight Adverse
78 Rhindmuir Drive	71.9	70.1	72.8	72.1	Moderate Beneficial	Slight Beneficial
118 Bredisholm Road	63.7	62.9	64.1	64.3	Slight Beneficial	Slight Adverse
5 Ellismuir Road	60.8	60.0	61.1	61.0	Slight Beneficial	Slight Beneficial
43 Roslyn Drive	73.8	72.4	73.5	73.4	Moderate Beneficial	Slight Beneficial
Showcase Cinema, Barrbridge Road	69.6	66.4	68.9	68.0	Moderate Beneficial	Negligible/ Slight Beneficial
7 Collree Gardens	66.0	65.1	65.6	63.0	Slight Beneficial	Moderate Beneficial
Stakis Hotel, Strathclyde Business Park	67.8	67.5	67.8	68.2	Negligible/ Slight Beneficial	Negligible/ Slight Adverse
Woodhall Estate	63.6	65.4	63.7	62.5	Moderate Adverse	Moderate Beneficial

* Only the DS is mitigated

In general, where there are improvements in the noise climate it is the result of road geometry, the use of quieter road surfacing and, where deemed necessary, mitigation. For example at Doune Crescent the property benefits from the 2m acoustic screen as

illustrated in Figure 12.6. At Hillview Crescent the improvement on the EDM situation is because of the proposed scheme geometry (the M8 section will be in a cut and there is additional shielding as a consequence of the M8 to A725 w/b slip). Millroy Gardens has a dedicated 2m high noise mitigating barrier that reduced noise levels at ground floor and first floor by approximately 4dB(A) for the Design Year. There is also a 1.8dB(A) improvement at the ground floor level of Woodhall Kennels as a consequence of a 2m high roadside acoustic screen, whilst the improvement at the first floor is similar for the Year of Opening further improvements occur at Higherness Road and Kirkshaws Cemetery, which occur because the new M8 will be further away, in a cut and where the road comes out of cut there is a 2m roadside acoustic screen. Collree Gardens, which is at the extreme west end of the scheme, benefits by approximately 2dB in the Design Year, at ground floor level, because the M73 off ramp has a new lane added thereby splitting the flow such that half of the flow is closer to the embankment which results in an increased barrier effect.

The football park at Bredisholm Road is subject to a benefit, i.e. moving from “Moderate Adverse” to “Slight Adverse” for the Year of Opening. This is as a consequence of road side mitigation, as shown in Figure 12.6, and the migration of the main traffic flow southward to the new M8.

Some properties are subject to adverse impacts with the proposed scheme. Examples of these properties are Bankhead Farm where further mitigation is not practicable because of the elevated position of the property.

Orchard Farm is not being considered for mitigation as it is presently derelict. However, Orchard Park Pond, the recreational area, is subject to a substantial beneficial impact as a result of moving the main traffic flow south onto the new M8.

Millbank (north and south façades) do not benefit from the proposed scheme because the new M8 main line will move closer to the property than the existing A8 main line. The north façade is presently affected by the existing A8 and the south facade is sheltered. However, with the new scheme the volume of traffic on the A8 is reduced and the façade which is presently sheltered becomes exposed to M8 traffic. The road is in a cut and there is additional mitigation at the top of the cut, and whilst there is barrier attenuation at the south façade it is not sufficient to offset the noise due to the closer proximity of the new road.

Rosebank Terrace is subject to an adverse impact but, reference to Figure 12.6 shows there is breakout of road noise around the railway bridge at the bridge/road junction.

The recreational areas such as Douglas Support and Woodall Estate are all subject to adverse impacts because the main traffic flow is moved south of the existing M8 closer to these areas.

12.7 Nuisance

As was stated in Section 12.2.6 DMRB makes clear that because of the variability in individual responses, practical research has moved from the idea of explaining individual

attitudes or annoyance to noise and has instead adopted the concept of community annoyance ratings. It is therefore important to realise that the results of the nuisance assessment should not be related to individual annoyance response. The "nuisance assessment" provided in the DMRB summary Tables, included as Appendix 12.3, allow a comparison of changes in reported community noise nuisance level only. The results should not be considered in terms of the response likely at individual properties.

12.8 Cumulative Impacts

As was explained in Section 12.2.2 the cumulative assessment has been undertaken by comparing the predicted With-Scheme traffic flows against the flows associated with the Committed Do-Minimum (CDM) traffic network (which includes committed developments only). This is in effect a comparison of different baselines with the 2020 With-scheme, with-mitigation. The difference between the CDM and the EDM represents the cumulative impacts of all three proposals described in Section 12.2.2 together. This is best illustrated by comparing the sample properties in terms of the significance of impact for the Design Year, i.e. 2020, with mitigation against the CDM and EDM. The results are shown in table 12.17.

Table 12.17 Cumulative Impacts – Comparison of EDM and CDM Significance of Impacts (with mitigation) for 2020 ($L_{A10,18hr}$ dB(A)) Ground Floor

Receiver Location	Proposed Scheme Significance of Impact at ground floor (mitigated)	
	CDM 2020	EDM 2020
2 Rockcliffe Path	Moderate Beneficial	Moderate Beneficial
5 Doune Crescent	Substantial Beneficial	Substantial Beneficial
Carnbroe Mains Farm Cottage	Substantial Adverse	Substantial Adverse
27 Hillview Crescent	Moderate Adverse	Slight Adverse
8 Milroy Gardens	Moderate Beneficial	Moderate Beneficial
Woodhall Kennels (south façade)	Moderate Beneficial	Moderate Beneficial
Woodhall Kennels (east façade	Moderate Beneficial	Moderate Beneficial
Orchard Farm (north façade)	Substantial Adverse	Substantial Adverse
Orchard Farm (south façade)	Substantial Adverse	Substantial Adverse
Mill Bank (south façade)	Moderate/ Substantial Adverse	Substantial Adverse
Mill Bank (north façade)	Substantial Adverse	Mod/Substantial Adverse
Bankhead Farm	Moderate/ Substantial Adverse	Moderate/ Substantial Adverse
51 Viewfield Road	Moderate Adverse	Slight Adverse
Kirkwood Sports Barn	Moderate Adverse	Moderate Adverse
Braehead Cottage	Substantial Adverse	Substantial Adverse
10 Crossview Place	Slight Beneficial	Slight Adverse
48 Rosebank Terrace	Moderate Adverse	Moderate Adverse
MSA (Britain) Ltd	Slight Moderate Beneficial	Moderate Beneficial
Dunlophiflex Fluid Power Ltd	Moderate/ Substantial Beneficial	Moderate/ Substantial Beneficial
Higherness Way, Coatbridge	Substantial Beneficial	Substantial Beneficial

Receiver Location	Proposed Scheme Significance of Impact at ground floor (mitigated)	
	CDM 2020	EDM 2020
R A Labone & Co Ltd	Slight/ Moderate Adverse	Slight/ Moderate Adverse
78 Rhindmuir Drive	Moderate Adverse	Slight Adverse
118 Bredisholm Road	Slight Adverse	Slight Adverse
5 Ellismuir Road	No Benefit	No Benefit
43 Roslyn Drive	Slight Beneficial	Slight Beneficial
Showcase Cinema, Barrbridge Road	Negligible/ Slight Adverse	Negligible/ Slight Adverse
7 Collree Gardens	Moderate Beneficial	Moderate Beneficial
Kirkshaws Cemetery	Substantial Beneficial	Substantial Beneficial
Football Fields (x2) at end of Bredisholm Road (to west of cemetery)	Slight Beneficial	Slight Beneficial
Orchard Farm Pond	Substantial Beneficial	Substantial Beneficial
Chapelhall Football Ground	Substantial Adverse	Mod/Substantial Adverse
Douglas Support	Substantial Adverse	Substantial Adverse
Stakis Hotel, Strathclyde Business Park	Negligible/ Slight Adverse	Negligible/ Slight Adverse
Woodhall Estate	Moderate Beneficial	Moderate Beneficial

Table 12.17 illustrates that, as could be expected, there are no significant cumulative impacts as CDM and EDM significance of impacts remain constant at all sample properties with the exception of Hillview Crescent and Viewfield Road, where there are beneficial cumulative impacts. At Hillview Crescent this is because of the proposed scheme geometry (the M8 section will be in a cut and there is additional shielding as a consequence of the M8 to A725 w/b slip). At Viewfield Road the new route is further away.

12.9 Wider Network Assessment

DMRB requires that an assessment be made of all properties where there is an increase of 25% or a decrease of 20% in traffic flow. These percentage differences are equivalent to a 1dB change in noise level. However, as was described earlier, the operational noise was considered in terms of a Scheme Study Area, which comprised of the Core Study Area, i.e. 300m either side of the road centre line and the Wider Study Area, i.e. any area out with the 300m previously defined.

For the Core Study Area a detailed assessment was undertaken of all properties by the creation of three dimensional surface model and a CRTN calculation implemented by Cadna® noise prediction software. For the Wider Study Area the assessment was undertaken by first of all identifying all roads where road traffic generated noise levels were predicted to change (by +1dB, or -1dB) as a consequence of changes to traffic flows. The CRTN Basic Noise Level (BNL) for these roads was then calculated. This requires use of the flows, speeds and percentage of HGVs resulting from the Scheme. The Wider Network Analysis extended is shown in Appendix 12.4

The assessment of properties within the Wider Study Area was then undertaken by evaluation of the consequent change in population annoyed as per Scottish Transport Appraisal Guidance (STAG), see http://www.scot-tag.org.uk/stag/exec.htm). This was undertaken by a geographical analysis of population data to estimate the population within 50m of all identified links with a 1dB or more change within the Wider Study Area. The STAG tables are reproduced as Tables 12.18(a) and 12.18(b) for the Year of Opening (2010) and the Design Year (2020) respectively.

With the scheme in place, the results over the Wider Study Area (i.e. out with the Core Study Areas), show the net annoyance change in the design year. The results show that 64 fewer people, out of a total of 9,968 people (number of properties multiplied by 2.36) within the assessed Wider Network, will be annoyed by noise than would be annoyed by noise without the scheme in place.

Table 12.18(a): No. of Households Experiencing 'Do Minimum' & 'Do Something' Noise Levels (given in dBLeq) In Opening Year

No. of households experiencing 'Do Minimum' & 'Do Something' noise levels (given in dB_{Leq}) in Opening Year

Do Minimum \ Do Something	<45	45-47.9	48-50.9	51-53.9	54-56.9	57-59.9	60-62.9	63-65.9	66-68.9	69-71.9	72-74.9	75-77.9	78-80.9	81+
<45	0	0	0	0	0	0	0	0	0	0	0	0	0	0
45-47.9	0	0	0	0	0	0	0	0	0	0	0	0	0	0
48-50.9	0	0	0	0	0	0	0	0	0	0	0	0	0	0
51-53.9	0	0	0	0	0	0	0	0	0	0	0	0	0	0
54-56.9	0	0	0	0	0	0	0	0	0	0	0	0	0	0
57-59.9	0	0	0	0	0	4	0	0	0	0	0	0	0	0
60-62.9	0	0	0	0	0	95	311	0	0	0	0	0	0	0
63-65.9	0	0	0	0	0	0	87	728	49	0	0	0	0	0
66-68.9	0	0	0	0	0	0	0	219	620	14	0	0	0	0
69-71.9	0	0	0	0	0	0	0	0	268	743	10	0	0	0
72-74.9	0	0	0	0	0	0	0	0	0	330	484	4	0	0
75-77.9	0	0	0	0	0	0	0	0	0	0	54	188	0	0
78-80.9	0	0	0	0	0	0	0	0	0	0	0	2	5	0
81+	0	0	0	0	0	0	0	0	0	0	0	0	9	0

Table 12.18(b) No. of Households Experiencing 'Do Minimum' & 'Do Something' Noise Levels (given in dBLeq) in Design year

No. of households experiencing 'Do Minimum' & 'Do Something' noise levels (given in dB_{Leq}) in Design year

	Do Something	<45	45-47.9	48-50.9	51-53.9	54-56.9	57-59.9	60-62.9	63-65.9	66-68.9	69-71.9	72-74.9	75-77.9	78-80.9	81+
Do Minimum															
<45		0	0	0	0	0	0	0	0	0	0	0	0	0	0
45-47.9		0	0	0	0	0	0	0	0	0	0	0	0	0	0
48-50.9		0	0	0	0	0	0	0	0	0	0	0	0	0	0
51-53.9		0	0	0	0	0	0	0	0	0	0	0	0	0	0
54-56.9		0	0	0	0	0	0	0	0	0	0	0	0	0	0
57-59.9		0	0	0	0	0	4	0	0	0	0	0	0	0	0
60-62.9		0	0	0	0	0	0	181	55	0	0	0	0	0	0
63-65.9		0	0	0	0	0	0	95	474	118	0	0	0	0	0
66-68.9		0	0	0	0	0	0	0	95	775	51	0	0	0	0
69-71.9		0	0	0	0	0	0	0	3	188	932	24	0	0	0
72-74.9		0	0	0	0	0	0	0	0	4	132	790	14	0	0
75-77.9		0	0	0	0	0	0	0	0	0	0	48	215	0	0
78-80.9		0	0	0	0	0	0	0	0	0	0	0	9	7	0
81+		0	0	0	0	0	0	0	0	0	0	0	0	4	6

12.10 Swinton Roundabout : Localised Assessment

Towards the end of the M8 noise model run, it was decided that the design of the proposed roundabout at Swinton was to be altered. Consequently, a localised assessment was undertaken to determine whether or not the changes resulted in adverse effects on local properties in terms of the predicted noise levels. If the differences were adverse, a complete model rerun would be required.

12.10.1 Altered Scheme Design

Two alternative layouts were proposed for assessment. There proposals were considered as follows; the original design, an intermediate design and the current design. Minor changes to the Intermediate design of the Swinton roundabout resulted in the current alignment. The roundabout now sits at a slightly higher elevation with the connectors to the M8 moved further east to attach directly with the Baillieston Interchange via a new bridge. Also two bridges have been removed. The original, intermediate and current designs are shown in Figure 12.7a.

To determine the road traffic noise impact of the various Swinton Roundabout designs upon nearby properties, noise maps for each design were created and the output of each was analysed. Each of the noise maps were created in Cadna® noise mapping software. For each scenario the only changes made were to the alignment of the roads and the accompanying changes to the ground contours: the traffic flows, speeds and percentage of heavy goods vehicles remained constant for each scheme.

12.10.2 Swinton Model Rerun

To evaluate any potential change in predicted noise level as a consequence of the altered road design at Swinton, a new three dimensional model was required. Mouchel Fairhurst JV supplied three dimensional road design strings (polylines with three dimensional information as attributes) which were restructured and used as the basis for producing the required three dimensional surface model. This required the joining together of the various segments where the geometry was at a preliminary design stage. It is considered that the surface model and the connectors with the existing road network are good approximations, sufficient for the requirements of the noise model.

The new roundabout design also involves the removal of two existing bridges and the construction of a new bridge. As part of the creation of the three dimensional surface model, the new bridge was constructed and the existing ground, where the old bridges were removed, has been remodelled.

The alignment of feeder roads from existing roads to the intermediate and latest roundabout designs differs from the original design. Acoustically, this is most significant for the A89 feeder roads (i.e., the two roads closest to the properties at Swinton).

Further, as can be seen in Figure 12.7(a) there is little difference between the latest and intermediate road layouts. For the Intermediate design, these connecting roads, at their closest, are approximately 120m from residential properties at Swinton and, for the latest design, they are approximately 190m from residential properties. Since the road traffic

noise associated with the A89 feeder roads dominates at Swinton properties, these road alignment changes mean that there is little or no benefit acoustically for Swinton properties between the latest and intermediate road layout designs.

Therefore, by comparing Figure 12.7(b) with 12.7(c), it can be concluded that in terms of noise traffic noise levels at Swinton properties, due to road traffic noise, the latest and the intermediate road layouts are an improvement vis-à-vis the original design.

12.10.3 Results of the Model Run

A comparison of the noise levels associated with the original and intermediate Swinton Roundabout designs was undertaken, and a graphic illustrating the changes in noise levels between these two designs can be seen in Figure 12.7(d). In this graphic, buildings where the change in noise level is predicted to be less than 1dB are coloured black; buildings where the change in the design layout results in a predicted noise level change of greater than 1dB are coloured magenta; and for buildings where the noise level is predicted to decrease by at least 1dB are coloured light green. Not unexpectedly, since the intermediate road design results in the Swinton Roundabout being located further from residential properties, there are no buildings where there is an increase of 1dB or more when compared with the original design. Indeed, there are predicted to be 54 buildings where there is a predicted decrease in the noise level of at least 1dB. These buildings are located on Rhindhouse Place, Rhindhouse Road, Swinton Avenue, Crossview Avenue and Crossview Place, i.e. the buildings located closest to the proposed roundabout.

Therefore, it can be concluded that the intermediate Swinton Roundabout design is predicted to have less of a noise impact when compared with the original roundabout design. Moreover, as previously explained, since the change in design between the intermediate and current designs will result in little or no change in the noise levels at noise sensitive receptor locations it can be concluded that the current Swinton Roundabout design is also predicted to have less of a noise impact when compared with the original roundabout design. Although the properties Rhindhouse Place, Rhindhouse Road, Swinton Avenue, Crossview Avenue and Crossview Place will benefit by 1dB or more, a full reassessment was not considered necessary as there were no additional detrimental impacts.

12.11 Summary

The DMRB Summary Tables are included as Appendix12.3.

The noise impact of the proposed scheme has been assessed by means of the DMRB future year comparison; that is, assessing the difference in the noise levels for the Year of Opening (2010) and the Design Year (2020). The network has been considered in terms of a Core and Network, with the Core Network comprising a distance of 300m either side of the carriageway centrelines and the Wider Network covering all areas where ±1dB(A) changes or greater are predicted to occur (+25%, -20% changes in traffic flow). The traffic variables were supplied by SIAS as described earlier in the text.

In summary, with mitigation in place, the significance of impact for the selected sample properties is as shown in Table 12.19. This Table shows that of the 13 properties with a significance of impact greater than "slight adverse" 8 are residential (Mill Bank and Orchard Farm count as 4 entries in the table as a consequence of the different façade locations), 2 are open areas, 2 are industrial and 1 is an indoor sports building. Braehead Cottage is one of residential properties and, as was stated earlier, in Section 12.5, mitigation is not possible for Braehead Cottage as there is no garden area between the re-aligned M8 and the southern elevation and, as such, there is insufficient space available for effective noise mitigation. Orchard Farm is one of the remaining residential properties and no mitigation has been considered for Orchard Park Farm as it is presently derelict. Mitigation is provided for the properties represented by 48 Rosebank Terrace. However, as was previously stated, in Section 12.6, there is breakout of road noise around the railway bridge at the bridge/road junction. Again, as was previously stated in Section 12.6, at Bankhead Farm there is a limit on practicable mitigation for this property. This is because this receptor location is elevated relative to the M8/A8 and the new M8 section moves closer. The new section of the road at this location is partially in a cutting and therefore the 3m roadside barrier reduces in effectiveness as the road moves out of the cutting and into embankment. At Carnbroe Mains Farm the mitigation has achieved a reduction of 10dB(A), which is a very significant improvement, however, the fact that the new route is closer to this property, limits what can be achieved in practical terms.

Table 12.19 Summary of Significance of Impact at Sample Properties

Number of Affected Properties in Significance of Impact Categories		
Category of significance of impact	**Number at Ground Floor**	**Number at First floor**
Substantial Adverse I	6	6
Moderate/Substantial Adverse	3	1
Moderate Adverse	3	4
Slight/Moderate Adverse	1	0
Slight Adverse	5	2
No Benefit	1	0
Slight Beneficial	2	3
Slight/Moderate Beneficial	0	1
Moderate Beneficial	6	6
Moderate/Substantial Beneficial	1	1
Substantial Beneficial	4	2

The overall significance of impact, with the proposed mitigation in place, can be summarised as shown in Table 12.20. Overall, for the Core Network, there are some 340 properties at which the predicted significance of impact is greater than "slight adverse" and where acoustic barriers will reduce this impact to "slight adverse" or less. For the Wider Network the scheme shows very clear benefits for 2908 properties that will experience a 20% or greater reduction in flows with 1347 experiencing an increase in flow of +25%. There are 5 schools within the Wider Network; 3 of these will be subject to decreases in flow and with 2 being subject to increases in flow. The data reported in Table 12.13(b) also shows that a greater number of commercial/industrial properties will be subject to decreases in flow than will be subject to increase in flow.

Table 12.20 Summary of Significance of Impact for all Residential Properties

Number of Affected Properties in Significance of Impact Categories		
Category of significance of impact	**Number at Ground Floor**	**Number at First floor**
Substantial Adverse	68	55
Moderate/Substantial Adverse	277	398
Moderate Adverse	2283	2208
Slight/Moderate Adverse	0	0
Slight Adverse	1693	1685
No Benefit	258	270
Slight Beneficial	1200	1077
Slight/Moderate Beneficial	0	0
Moderate Beneficial	1671	1802
Moderate/Substantial Beneficial	1105	1106
Substantial Beneficial	505	454

A local road that yielded a high measured level has not been included in the strategic data provided by SIAS. This means that the model cannot be calibrated for the actual conditions at: Viewfield Road, Kirkshaws. In addition at Crossview Place at the Baillieston Interchange the road surface outside 10 Crossview Place would appear to have increased the traffic generated noise. However, the noise model remains valid at these locations for the comparison of the relative merits of the scheme.

Under the Noise Insulation (Scotland) Regulations 1975 some properties may be eligible for double glazing in order to further mitigate the impact of traffic noise due in part to the scheme. A count of (potentially) eligible domestic properties has been carried out and it has been determined that there are (potentially) of the order of 287 properties that may be deemed eligible in terms of NISR.

Under the requirements of DMRB, all properties that experience a change in noise level of 1 dB(A) or more must be classified into ambient noise level bands of below 50 dB(A), 50 to <60 dB(A), 60 to<70 dB(A) and ≥70 dB(A). It is estimated that under the proposed scheme over 7100 properties located in the study area will experience a change in noise level of this nature. In addition, it is estimated that approximately 9000 properties will experience a change in potential noise nuisance. For comparison the change in noise levels of at least 1dB, and the predicted number of properties experiencing a change in noise nuisance, are presented in Tables 12.20(a) and (b) for the preferred route and EDM, respectively.

Table 12.21(a) Summary of ±1dB Change: Preferred Route (2020)

	Residential	Industrial	Community
Increased Noise Level (>1dB)	5483	255	2
Decreased Noise Level (<-1dB)	1676	94	0
Increased Noise Nuisance	7906	379	3
Decreased Noise Nuisance	1051	77	3

Table 12.21(b) Summary of ±1dB Change Noise Effects: Enhanced Do Minimum (2020)

	Residential	Industrial	Community
Increased Noise Level (>1dB)	5370	253	2
Decreased Noise Level (<-1dB)	409	49	0
Increased Noise Nuisance	8223	407	6
Decreased Noise Nuisance	733	49	0

As can be seen in Tables 12.21(a) and (b) although the preferred route results in a slightly greater number of properties experiencing an increased noise level when compared with the EDM option, there is a significantly greater proportion of properties experiencing a decrease in noise levels for the preferred route. This is particularly true for residential properties. Moreover, the number of properties experiencing an increased noise nuisance is less for the preferred route than for the EDM and, the number of properties predicted to experience a decreased noise nuisance is greater for the preferred scheme. Accordingly and when considered together with the Wider Network results, it can be concluded that the preferred route benefits more properties, both in terms of noise levels and noise nuisance, than the EDM option.

With regards to the Wider Network Assessment it can be seen that with the scheme in place, the results over the Wider Study Area (i.e. out with the Core Study Areas), show the net annoyance change in the design year. The results show that 64 fewer people, out of a total of 9,968 people (number of properties multiplied by 2.36) within the assessed

Wider Network, will be annoyed by noise than would be annoyed by noise without the scheme in place. In effect the scheme does not make a significant different in terms of noise over the Wider Network Area.

Finally, both the intermediate and current Swinton Roundabout designs offer improvements over the original roundabout design and, since the changes in the intermediate and current roundabout designs occur away from noise sensitive receptor locations, either could be adopted with little or no difference in the resulting noise levels at noise sensitive receptor locations. The proposed roundabout alignment will result in additional benefits at approximately 53 properties in the vicinity of the realigned Swinton roundabout.

References

World Health Organisation, *Community Noise* 1999/2000

Watts, G.R. (1990) TRRL Research Report 246 *Traffic Induced Vibration in Buildings*

Baughan and Martin 1981, (see DMRB references)

Watts, G. R. (1984), *Vibration Nuisance from Road Traffic – results of a 50 site survey*

Design Manual for Roads and Bridges (DMRB); Volume 11, Section 3, Part 7 Traffic Noise and Vibration

Calculation of Road Traffic Noise (CRTN); Department of Transport Welsh Office, 1988

SDD Planning Advice Note 50, Annex A "*Controlling the Environmental Effects of Surface Mineral Workings*"

Scottish Transport Appraisal Guidance (STAG)
http://www.scot-tag.org.uk/stag/exec.htm.

13 Pedestrians, Cyclists, Equestrians and Community Effects

13.1 Introduction

The objective of this Chapter is to identify the routes used by pedestrians and others together with associated community facilities, to assess the effects of the proposed scheme upon them, and to identify any mitigation required along the line of the route between Baillieston and Newhouse.

13.2 Methods

This Chapter has been prepared in general accordance with the principles and techniques outlined in The Design Manual for Roads and Bridges (DMRB) Volume 11 (Environmental Assessment).

The assessment was based on a desk study of relevant plans and other published documents listed at Section 13.6 supplemented by walkover surveys to update and confirm site specific information, and surveys of pedestrian and cycle activity supplied by North Lanarkshire Council. Consultation with the following agencies was also undertaken:

- Scottish Rights of Way and Access Society (ScotWays);
- Sustrans;
- Scottish Natural Heritage;
- Central Scotland Forest Trust; and,
- North Lanarkshire Council (NLC).

The assessment examines current 'non-motorised' accessibility to services and facilities along the scheme corridor for local populations likely to be in greatest need to access them by using existing path networks and bus services. Populations of greatest need are identified with reference to:

- the distribution of 'zero car households' identified for census output areas from the 2001 Census of Population; and
- the location of Social Inclusion Partnership (SIP) areas. These are areas designated for social and economic investment, where symptoms of social deprivation (e.g. high incidences of population unemployment, long-term illness, and low income) are evident.

Locations of key services (i.e. employment, shops, schools, hospitals, train stations) were identified from publicly available postcode address sources. These key services include bus stops, locations of which were obtained from a database supplied by Strathclyde Passenger Transport. Associated bus service details were also obtained from this source.

Using these data the sensitivity of path networks to change was classified as either 'high', 'medium' or 'low' depending on a combination of the following factors:

- route status – i.e. national, regional, local/informal;
- general levels of current use by non-motorised users; and
- likely level of importance to local communities as a means of providing access to key facilities by non-motorised means.

In the context of these baseline conditions (reported in Section 13.3), a qualitative assessment was made of the scheme's likely impact on amenity value, safety and travel times for non-motorised journeys as a result of the proposed scheme (reported in Section 13.4). Using the results of traffic modelling exercise undertaken to support the scheme, a quantitative assessment of scheme impacts on bus journey times using routes directly affected by the scheme was also undertaken (also taken from the SPT bus service database). These are also reported in Section 13.4.

An assessment of the proposals designed to mitigate these impacts are presented in Section 13.5 with residual effects discussed in Section 13.6. Scheme impacts are defined as significant where the scheme design would sever existing links within an area identified as subject to either a High or Medium level of sensitivity to change. Scheme impacts are generally not considered significant within areas identified as subject to a low level of sensitivity.

The baseline path network within the study area is presented in Figures 13.1a -13.1e. These figures also identify general locations where networks of foot/cycleways exist contiguous to local roads in the area i.e. at the Chapelhall, Eurocentral, Shawhead junctions. These are not presented in full here but a more comprehensive review is presented in the 'Design Review of NMU Infrastructure for Compliance with the Disability Discrimination Act' MFJV Report 2006.

Figures 13.1a-13.1d also identify locations on the off-street path network where this network would be severed by the general scheme alignment. Figures 13.2a-d map the distribution of 'no-car' households, SIP areas and location of key facilities within the scheme corridor, also including the general alignment of the preferred route. Figures 13.3a-c summarise bus services affected by the proposed scheme. These are services that use bus stops near or on the affected road infrastructure and associated interchanges/junctions. Also shown are the general routes these services typically take.

Figures 13.4a-d presents the mitigation strategy with conceptual designs for proposed new mitigation infrastructure as listed in Table 13.4.

13.3 Baseline Conditions

13.3.1 National Routes

NCN 75 Glasgow to Edinburgh is a national cycle route that provides links from the Clyde coast to Edinburgh and Glasgow and also connects the north of Greater Glasgow to Loch

Lomond. Route 75 currently crosses the existing A8 by means of the A752 underpass at Bargeddie Junction. The route continues north and south of this underpass as a shared footway along the eastern edge of the A752 (Figure 13.1a).

There is a proposal by Sustrans, acknowledged in the current North Lanarkshire Council Local Plan, for a diversion of Route NCN 75 away from the existing route south of Bargeddie Junction (contiguous with the A752 carriageway) to follow instead the line of the existing SM05 Public Right of Way (Figures 13.1a and b and 13.2a) south to Viewpark.

Use of the cycleway is monitored by North Lanarkshire Council using automatic counters. The closest counter to the proposed M8 alignment is on the A752 near Uddingston. Counts from this and other locations on this route in the North Lanarkshire Council area are summarised in Table 13.1.

Table 13.1 Cycle Activity along NCN Route 75 in North Lanarkshire

Site	Minimum 7-day 24-hour Flow	Maximum 7-day 24-hour Flow
Near Coatdyke Street, Coatbridge	5	26
Near A89 Dual Carriageway	3	51
A752 Uddingston	11	22
Strathclyde Park, west	64	138
Strathclyde Park, east	46	122

Table 13.1 indicates relatively light daily levels of use of this route, with between 3 and 51 cycles per average day observed along the section of Route 75 affected by the scheme. Despite low levels of use, however, as part of the National Cycle Network, the sensitivity to change of this part of the M8 path network is considered to be high. There is a minimum requirement to ensure that the route diversion proposal described above is either not precluded by the scheme, or that a suitable alternative be provided.

13.3.2 Sub-regional Routes

The North Calder Heritage Trail between Summerlee Heritage Park in Coatbridge and Hillend Reservoir east of Caldercruix passes south of the settlement of Calderbank and approximately follows the route of the Monklands Canal and North Calder Water. This trail also shares part of the National Cycle Route 75 between Sikeside and Cairnhill, as well as the South Airdrie Path Network, which is an 8 km circular network of paths and cycle-ways that link the settlements of Calderbank, Cairnhill, Sikeside, Brownsburn, Gartlea and Chapelhall (Figure 13.1c).

The Heritage Trail and South Airdrie paths are components of a wider recreational network, linked to other local routes focused on Eurocentral Junction where pedestrians

and others are able to cross the existing A8 by means of shared use foot/cycleways (Figure 13.1c).

There are two key Council policies of importance to this sub-regional network:

- Leisure and Recreation policy LR7 (North Lanarkshire Monklands District Local Plan 1991) provides for development of a long distance footpath network (linked to the North Calder Heritage Trail), which follows a disused railway line east of the Shawhead junction and crossed by both the proposed motorway and realigned A8 (Figure 13.1c).
- Strategic highway upgrading of the A723/B799 is central to Transportation policy TR6-Ravenscraig Access Improvement (North Lanarkshire Southern Area Local Plan 2001) and indicates a proposed regional cycleway. The Local Authority would like this to be incorporated into the design for Chapelhall Junction.

At the very least, the proposed scheme should not preclude these proposals, or provide a suitable alternative. Council officers have also indicated an intention to extend the existing foot/cycleway infrastructure at Eurocentral to link into Newhouse Industrial Estate along Caledonia Way. A more detailed design review of this part of the network is presented in the 'Design Review of NMU Infrastructure for Compliance with the Disability Discrimination Act' MFJV Report 2006.'

Although there are no surveys available for these elements of the network, walkover surveys indicate that levels of use are low. Their status indicates that they are most appropriately defined as subject to a 'Medium' level of sensitivity to change.

13.3.3 Public Rights of Way

Public Rights of Way in Scotland are recorded in the National Catalogue of Rights of Way (CROW) compiled by the Scottish Rights of Way and Access Society (ScotWays) in partnership with Scottish Natural Heritage (SNH) and supported by the Local Authorities. CROW is not a definitive list or an exhaustive one but a common point of reference which also describes the legal status of rights of way (claimed, asserted, vindicated) and the principal user category where evidence of known use over 20 years is available. There are relatively few Public Rights of Way within the study area. CROW includes four, all of which have 'claimed' status and unknown user categories. These routes are referenced as SM04, SM05, SM06 and SM07 and shown on Figures 13.1a -13.3e.

SM04 provides a link off the A752, south of Bargeddie junction (Figure 13.1a). It provides access solely to open farmland between the A752 and the M73. Information from ScotWays states that *"It's hard to tell whether recreational walkers are welcome here … there is probably no public demand for the route… certainly anyone viewing the start at the A752 would not imagine that there was a route starting there."*

SM05 is a path off the Bargeddie Junction westbound on/off-slip which runs parallel to the A8 for approximately 800 metres before turning southwards, away from the A8 towards Viewpark. This is described by ScotWays as a "reasonably pleasant path with easy

accessibility" despite in parts suffering from fly tipped rubbish, poor maintenance and being partially blocked by a fallen tree. As described above, this route is intended for future use as part of Route 75 of the National Cycle Network.

Routes SM06 and SM07 have been disturbed and interrupted by development of the Eurocentral Industrial Park. ScotWays anticipates that they will be reinstated in the overall masterplan for the development. North Lanarkshire Council proposals to extend the existing foot/cycleway network at Eurocentral to provide links east to Newhouse Industrial Estate are likely to be the most appropriate means of achieving this.

The available evidence indicates that these routes are most appropriately defined as being subject to a 'Low' level of sensitivity to change. This is with the exception of SM05, which is intended to form part of Route 75 of the National Cycle Network (NCN) and would therefore be more appropriately included within the 'High' sensitivity classification for NCN Route 75 (cf: Section 13.3.1).

13.3.4 Other Local Routes and Path Networks

Other informal paths and tracks are numerous along the scheme corridor and are described here.

A network of paths and tracks exist for pedestrians and others between the settlements of Crosshill and Swinton to the west of the M73 and Bargeddie (via Bredisholm Road) to the north of the A8. The route includes two bridges across the M73 and A8 (Figure 13.1a). This network extends further east towards SM04, although they are severed by the existing A8 and the North Calder Water. This network functions primarily for agricultural vehicle access, and it also appears to be used in small numbers by members of the local community for mainly recreational purposes.

Another local network further east lies to the southwest of Shawhead Junction (Figure 13.1b) and south of the A8 – commonly referred to as the Douglas Support Estate. This network is linked to the A752 to the west (and hence NCN Route 75), and the A725 at Shawhead Junction to the east. This network includes a footway recently constructed as part of the completed road widening improvements to the A8, contiguous to the A8 between Kirkwood and Kirkshaw. This has established a continuous route from the A752 at Bargeddie Junction to the A725 at Shawhead Junction. The area is used for recreational purposes by local communities in the Viewpark area in particular.

A recent survey of activity in the area was provided by North Lanarkshire Council, taken from an 'Access and Recreation Impact Assessment' report submitted in support of a planning application for development of the area. The survey shows up to 60 people per day using this network. Reported use of the network included gun carrying, drug use, dog walking, motorcycling, cycling, jogging and 'going to work'. The assessment goes on to report that:

> "The site is currently unmanaged and as a result suffers from vandalism and the effects of anti-social behaviour. At present, there are in excess of 30 stolen and burnt–out vehicles abandoned in and around the site." (page 4).

East of the Douglas Support Estate the Shawhead Junction includes a discontinuous footway along the western side of the A752 providing for north-south pedestrian movement between Shawhead/Coatbridge to the north and Bellshill/Shirrel to the south. The link from this network to the Douglas Support Estate. The footway ends a few metres south of here and there is evidence of pedestrian use beyond this in the form of a worn track to Strathclyde Business Park. The Shawhead Junction also includes a footway alongside the B7070 North Road, which terminates where the A725 meets the B7070. There is no link between the A725 and B7070 footways.

This junction is a heavily used part of the local road network included in the scheme design proposals. Footways are generally narrow, discontinuous and unsuitable for shared use with other non-motorised users. Combined with the proximity of high traffic flows, the amenity of this route for pedestrians and others is poor and low levels of use are typical.

To the north of Shirrel, Carnbroe Road (Figure 13.1c) serves as an access road for Carnbroe Mains Farm and Orchard Farm. This is used also as a local footpath for recreational purposes. This route continues north of the A8 in the direction of Carnbroe, although it is currently severed by the A8.

Further east and north of the A8 there is a network of paths between the North Calder Heritage Trail, Eurocentral Interchange and Chapelhall Interchange (Figure 13.1d). A local foot/cycleway across Eurocentral Interchange is linked to the network of paths in open countryside between here and the Heritage Trail. These are subject to low levels of use for recreational purposes and not for agricultural access. There is a gated barrier between the Eurocentral Interchange and this path network.

East of Eurocentral (Figures 13.1d and 13.1e) are some short, isolated paths between the Chapehall community and the A8. These paths used to form part of a wider network, since severed by the existing A8.

The status and levels of use of all these routes indicates a 'Low' level of sensitivity to change in these terms.

13.3.5 Non-Motorised Accessibility to Services and Facilities

As shown by Figure 13.2a-d, key community facilities are particularly concentrated in the built-up area to the northwest of the Shawhead Interchange. There are several large schools, parks and recreation grounds and places of worship distributed throughout the area with a railway station located at Bargeddie. There is also a concentrated commercial development presence in Shawhead and Strathclyde Business Park. Shirrel Hospital lies to the southeast of Shawhead Junction and Coathill Hospital is located in Shawhead to the north.

Countryside associated with the Douglas Support Estate, North Calder Water, the Faskine and Woodhall Estate and parts of Carnbroe Estate and the routes through them are considered to function as community recreational facilities. This is a consequence of their close proximity to built-up areas and the lack of formal green open space within this part of North Lanarkshire.

Figure 13.2a-d also indicates a number of communities within the scheme corridor within Social Inclusion Partnership areas and with significant concentrations of 'no-car' households which are therefore likely to be more dependant than others on non-motorised forms of travel to access local facilities. Areas of particular note are:

- Bargeddie (Figure 13.2a, north of scheme corridor);
- Kirkwood (Figure 13.2b, north of scheme corridor);
- Shawhead (Figure 13.2b, north of scheme corridor);
- Shirrel (Figure 13.2b, south of scheme corridor); and
- Calderbank (Figure 13.2c, north of scheme corridor).

The concentration of these areas to the north of the scheme corridor is broadly consistent with the concentration of key facilities. This suggests that NMU links across the scheme corridor are of a Low level of sensitivity with regard to their importance to local communities, dependant on non-motorised travel, as a means of providing access to key facilities.

The exception is between Shirrel/Strathclyde Business Park to the South and Shawhead to the north where a 'Medium' level of sensitivity to network changes across the Shawhead interchange is apparent in these terms. This is due to the potential usefulness of NMU links across the interchange in reconnecting these relatively deprived communities, providing access to facilities in Shawhead, and job opportunities in Strathclyde Business Park.

Figure 13.3a-c indicated that the following bus services will be affected by the proposed scheme:

- A89/A8 through the Baillieston Interchange (Figure 13.3a) – Services '213' and '262' between Bargeddie and Crosshill;
- A725 and B7070 North Road through the Shawhead Junction (Figure 13.3b) – Services '201' and '202' between Shawhead and Shirrel; and
- B799 through the Chapelhall Junction (Figure 13.3c) – Services '200', '35' and '248'.

When viewed alongside Figure 13.2a, services along the A89 and A8 appear to be particularly important for the residents of Bargeddie where many have no access to private transport. Many 'no-car' households of Kirkwood and Shawhead will also rely on the services provided across the Shawhead Junction. This also applies to residents of Calderbank relying on services provided across the B799, although the highest

concentration of 'no car' households in Calderbank is relatively remote from currently available bus services.

Figures 13.3a and 13.3c also show that bus stop locations on the A8, A89 and along the B799, and used by these local services, would be affected by the Scheme proposals.

13.3.6 Summary

The preceding discussion presented an assessment of baseline conditions for non-motorised travel within the corridor affected by the proposed scheme, identifying the extent to which existing networks for non-motorised travel were sensitive to change with regard to route/network status, current levels of use, and importance to local communities as a means of providing access to key facilities. Table 13.3 summarises this review.

Table 13.2 shows that there are no networks or local areas within the scheme corridor considered to be subject to a 'High' sensitivity to change. Networks identified as subject to a 'Medium' level of sensitivity (three in total) are in areas with national, regional and local networks, which provide access to a number of key facilities and communities subject to social deprivation within the scheme corridor. Three other areas identified as subject to a 'Low' level of sensitivity are exclusively path networks of local status, with low levels of use providing limited or no access to key services for communities not clearly subject to social deprivation.

Table 13.2 Baseline Path Networks - Sensitivities to Change

Sensitivity	Area/Route	Comment	Figures
High	None	-	-
Medium	NCN Route 75 between Bargeddie and Kirkwood and along the A752. Also including SM05 Right of Way	Route of national importance, adjacent to communities subject to social deprivation, but subject to low levels of use	13.1a,13.2a 13.3a
	Routes between Shawhead and Shirrel /Strathclyde Business Park across the Shawhead A725/B7070 interchange, including NLC proposed long distance path.	Routes of local importance, linking Shawhead communities subject to social deprivation to the north with job opportunities to the south at Strathclyde Business Park. Currently subject to low levels of use but significant potential for more non-motorised trips. Bus services also in operation	13.1b-c, 13.2b, 13.3b

Sensitivity	Area/Route	Comment	Figures
	Path links south from the North Calder Heritage Trail via Calderbank and Eurocentral, including B799 corridor and related NLC proposal for regional cycleway along it	Route of regional importance with low levels of use, adjacent to Calderbank community subject to social deprivation with job opportunities south of the scheme corridor. Bus services also in operation.	13.1c-d,13.2c, 13.3c
Low	Path network across the M8 and M73 in southeast quadrant of Baillieston Interchange, linked to Bargeddie. Bus services between Bargeddie and Crosshill.	Path network of local importance subject to low levels of use, linked to single community subject to social deprivation. Bus services in operation along the A89/A8	13.1a, 13.2a. 13.3a
	Douglas Support Estate/Viewpark	Path network of local importance subject to low levels of use and linking local community to Strathclyde Business Park,	13.1b and 13.2b
	Isolated paths south of Chapelhall	Path network of local importance subject to low levels of use, with no existing links to key facilities or of benefit to any communities subject to social deprivation	13.d-e and 13.2d

13.4 Scheme Impact

Figures 13.1a-e identifies locations where the proposed scheme design will affect existing path links, with consequent potential for impacts on non-motorised users if no mitigation is provided.

At Locations 1 and 2 (Figure 13.1a) the area is defined above as having a low sensitivity to change and hence impacts are not considered be significant. Along the A89 north of Bargeddie and A8 west of Baillieston Interchange two bus stops will be affected by the scheme.

The scheme will also affect the existing NCN Route 75 along the A752 (Location 3). This is within an area defined as subject to a medium level of sensitivity to change. The unmitigated impact of this severance would therefore be significant.

Further east, as shown in Figure 13.1b, the scheme will sever three farm access tracks (Locations 4, 5 and 6) within the Douglas Support Estate network. This is defined as an area having low sensitivity to change and impacts will not be significant.

The path connection onto the Shawhead Interchange (Figure 13.1b, Location 7) will also be severed. The scheme will also affect existing provision for non-motorised users and bus services along the A725 and B7070 (although there are no bus stops on the existing junction). Within the same area, to the east of Shawhead Interchange, the scheme will impact upon the route of North Lanarkshire Council's proposed long distance path (between Locations 7 and 8) along the disused rail line, and sever two paths that also function as farm access tracks for Orchard Farm and Carnbroe Mains Farm (Locations 8 and 9). This area is of medium sensitivity to change and impacts are considered to be significant if no mitigation is provided. Locations 10, 11 and 12 on the fringe of this area will not experience any significant severance impacts.

The path (Location 13) linked to the shared foot/cycleway across Eurocentral Interchange will be affected. This area is defined as having medium sensitivity to change and the unmitigated impact is therefore considered to be significant.

Locations 14 and 15 (Figure 13.1d) are part of a route already severed by the A8 and not known to be subject to significant levels of use or considered to be of great utility for local communities. Scheme impacts here are therefore not considered to be significant. However, given North Lanarkshire Council's Local Plan commitment (Policy TR6) for access improvements along the B799, there will be a need to ensure the retention of a north-south axis of movement in this general area within an area defined above as subject to a medium level of sensitivity to change.

At Location 16 there are paths that currently do not experience significant levels of use which would be severed by the scheme. These paths have the potential in the future to provide an important link between the high numbers of 'no-car' households in Calderbank and North Lanarkshire Council's proposed access improvements across the B799.

Severance at Location 17 is considered insignificant in the context of its generally low level of sensitivity to change. Figure 13.3c shows that bus stops on the B799 which will be affected by scheme proposals at this location.

Changes to bus service journey times likely to arise as a result of the proposed scheme are presented in Table 13.3, derived from the PARAMICS simulation of the M8 scheme traffic network. These indicate small changes for the services discussed above during a typical weekday morning peak period along the affected routes. Slightly quicker journeys are predicted along the A89/A8 and A725. Slightly slower journeys are predicted along the B799. No significant changes are likely to arise beyond a morning peak period.

In the context of overall bus service timetables the changes indicated are not considered particularly significant and bus travellers are unlikely to experience a significant reduction in their level of access to key services and locations as a result.

Table 13.3 Traffic Journey Time Changes (nearest minute) at Baillieston (A89/A8), Shawhead (A725) and Chapelhall (B799)

Peak Period	Location	Difference
Morning (0700-1000)	Baillieston Interchange, A89/A8	-1 eastbound No change westbound
	Shawhead, A725	-2 northbound No change southbound
	Chapelhall, B799	+ 1 northbound No change southbound
Inter Peak (1000-1600)	A89/A8	No change all directions
	A725	
	B799	
Evening (1600-1900)	A89/A8	
	A725	
	B799	

13.5 Mitigation

The principal objective of mitigation in the context of non-motorised access and community severance is to provide relief from potential negative effects of the scheme proposals in areas of high or medium levels of sensitivity to change where significant impacts are expected to arise.

Figure 13.4a-d defines the locations of mitigation proposals as listed in Table 13.4.

Table 13.4 Mitigation Proposals – Conceptual Designs

Figure Reference	Location
13.4a	A – Bargeddie to Crosshill
	B – A752 and proposed SMO5 section of NCN Route 75
13.4b	C – Showcase Cinema Footbridge
	D, E – Bankhead and Shawhead Farm
	F, G, H – Shawhead Interchange
13.4c	J - Orchard Farm
	K – A8 near Carnbroe
	L - Eurocentral
13.4d	M – Chapelhall Interchange

At Location A, agricultural accommodation bridges are to be provided close to their existing locations, which will serve to retain non-motorised access, although the scheme is identified as having a relatively insignificant impact. No significant changes in amenity or journey times are anticipated for existing non-motorised users of these paths/tracks. Existing bus stops on the A89 (north east of the Baillieston Interchange) and the A8 (west of the Baillieston Interchange) will be relocated along the same route to maintain bus service access in these areas.

At Location B, the A752 will be reconfigured to provide for the continuation of NCN Route 75 along its current path.

Between Locations A and B and parallel to the southern side of the proposed M8 a new 3m wide shared pedestrian/ cycle footpath will be built. It is envisaged that this will form part of a new east-west path which will reconnect the multiple communities currently divided by the A8: Swinton, Crosshill, Bargeddie, Kirkwood, Viewpark, Kirkshaws, Shawhead, Shirrel, Carnbroe, Calderbank and Newhouse and employment opportunities such as in the Strathclyde Business Park, Eurocentral and the Newhouse Industrial estate.

The reconfigured underpass at Location B will be linked to a new crossing of the existing A8 westbound on/off-slip and will also incorporate a new path to accommodate a realigned SM05 and the proposed relocation of NCN Route 75 between Locations B and C. The path between B and C will also form part of the proposed east-west path. At Location C a new pedestrian footbridge will be provided to link the area to south of the M8 known as the Douglas Support Estate and the communities of Viewpark and Shirrel and employees within the Strathclyde Business Park with the Showcase Cinema area via the continuation of the path to Location E.

It is envisaged that the path and footbridge across the M8/ A8 will present a significant journey time savings for NMU's when compared to the original indirect route making it more attractive to the individual. These proposals are anticipated to result in improvements in non-motorised journey times for access to/from Kirkwood and the Showcase Cinema area. The footbridge will be designed according to DMRB design guidance BD 29/04 'Design Criteria for Footbridges', which incorporates requirements to provide for visually and mobility-impaired users.

Further agricultural accommodation bridges suitable for shared use by agricultural vehicles and non-motorised users alike are to be provided at Locations D and E within an area considered to be subject to an insignificant level of impact. The bridge at Location D will cross the proposed scheme (which is in cutting) with no significant changes in gradient or location and therefore no significant impacts on journey time or amenity. Users of the route at Location E will experience changes in gradient with potentially slight deteriorations in amenity and journey time as a result.

Between locations E and H, through the area known as the Douglas Support Estate, it is currently proposed to route the path along existing paths. These paths provide connections to Viewpark and the rear of Strathclyde Business Park.

Detailed designs for non-motorised user access across and along the Shawhead Interchange are in development. Key elements are:

- at-grade (signal-controlled) pedestrian crossing of the A725/Kirkshaws Road junction (Location F);
- 3m foot/cycleway along the A725 (western edge) and across the A8 separated from the road by a 1m verge;
- a 3m wide pedestrian/cycle bridge with access ramps across the new A725/B7070/A8 slip road junction (Location G);
- 3m foot/cycleway along the B7070 and across the new A8 separated from the road by a 1m verge.
- A new 3m wide pedestrian/cycle bridge across the A725 linked to the path into the area known as the Douglas Support Estate, connecting with the east-west path and the new link along the B7070 (Location H), connecting the area of Shirrel, linked to a further section of 3m wide pedestrian/cycleway south along the A725 (western edge) to the proposed new access road serving an extension of the Strathclyde Business Park.

An additional ramp will be established from the north east corner of the bridge at Location G which will connect with a continuation of the east-west path running parallel to the downgraded A8 until it intersects with the Carnbroe Farm access road to the west of Location K and the Motherwell to Cumbernauld rail line. The path then utilises a short section of the existing rural road, where it bridges over the rail line to the south side of a new footbridge at Location K.

Taken together, these measures will provide for improved amenity for non-motorised users of these routes with:

- new paths where there are currently none;
- wider paths on some existing sections;
- verge separation from road traffic on carriageways;
- crossing facilities where there are currently none; and,
- connections between communities and employment areas.

Bridge sections of the route (Locations G and H) will include ramps for disabled access in compliance with Disability Design Guidance incorporated in DMRB guidance (BD 29/04) on footbridge design.

East of the Shawhead interchange at Location J, it is proposed to provide a further accommodation bridge to retain existing agricultural access. This will serve as a shared use pedestrian/cycle route as an alternative to the alignment proposed by North Lanarkshire Council for a long distant path, linked to Orchard Farm and linked to a further crossing of the existing A8 at location K. The bridge at J will be provided above the

scheme in cutting and will not introduce new gradients and no deterioration in journey time or amenity will therefore arise. The bridge at Location K is a new piece of infrastructure which will improve general access and link the community of Carnbroe to the new east-west path. Discussions with North Lanarkshire Council indicate that this provision will be used to introduce a new network of paths to link communities and job opportunities in this area.

The east-west path continues from Location K and parallel to the road which passes under the proposed M8 to the east. The path then continues to an at-grade crossing of the southern roundabout of the Eurocentral Interchange (Location L) and the existing facilities at this point.

At Location L, a conceptual design re-incorporating the current foot/cycleway and associated links is in development. The new infrastructure is expected to result in slight but insignificant (given low levels of existing use) deteriorations in amenity and journey time where larger roundabouts require to be negotiated. The introduction of the east-west path connecting with communities to the west is expected to more than adequately mitigate for this.

The east-west path then continues along the existing Shared use foot/ cycle way through Eurocentral to the B799 (Location M) which links with Newhouse Industrial Estate and the community of Newhouse.

At Location M, and consistent with the Local Plan commitment for access improvements along the B799, a path along what will be the old B799 will be provided for non-motorised users. This will link into a realigned path north to Calderbank and the North Calder Heritage Trail. This may result in slight deteriorations in journey time and amenity. Redesign of the B799 will also incorporate the relocation of existing bus stops along it,

13.6 Residual Impacts

Taking into account the mitigation proposals described and presented above, Table 13.5 presents the residual impacts of the scheme on non-motorised travel within the scheme corridor. These are expressed as positive, neutral or negative in terms of route amenity and journey times.

Based on this qualitative balance of positive, neutral and negative residual effects of the proposed scheme, an overall positive effect is anticipated. Some negative effects are anticipated at Chapelhall and Eurocentral, but for the scheme overall, these are considered to be significantly outweighed by proposals for non-motorised infrastructure associated with the current and the proposed Route 75 of the National Cycle Network, and the new east-west path connecting the communities of Swinton, Crosshill, Bargeddie, Kirkwood, Viewpark, Kirkshaws, Shawhead, Shirrel, Carnbroe, Calderbank and Newhouse and employment opportunities such as in the Strathclyde Business Park, Eurocentral and the Newhouse Industrial estate.

Table 13.5 Impact Significance and Residual Impacts after Mitigation

Figure Reference	Location	Impact Significance	Residual Impacts
13.4a	A	Not Significant	Neutral
	B	Significant	Positive
13.4b	C	Significant	Positive
	D	Not Significant	Neutral
	E	Not Significant	Neutral
	F	Significant	Positive
	G		
	H		
13.4c	J	Significant	Neutral
	K	Significant	Positive
	L	Significant	Negative
13.4d	M	Significant	Negative
Overall Residual Impact		**-**	**Positive**

13.7 References

The Design Manual for Roads and Bridges Volume 11 Environmental Assessment (2003): *The Highways Agency, The Scottish Executive Development Department, The National Assembly of Wales and The Department of the Environment for Northern Ireland.*

The Design Manual for Roads and Bridges Volume 2 Highway Structures: Design. BD 29/04 Design Criteria for Footbridges.

The Disability Discrimination Act 1995: *The Stationery Office Limited*.

North Lanarkshire (Monklands District) Local Plan 1991 (Finalised First Alteration September 1996): *North Lanarkshire Council Planning and Environmental Department.*

North Lanarkshire Southern Area Local Plan (Finalised draft 1998 modified June 2001): *North Lanarkshire Council Planning and Environmental Department.*

Glasgow Finalised Draft City Plan (Parts One, Two and Three)(2000): *Glasgow City Council 2000*

SmartWays – A Guide to walker and cyclist friendly routes around North Lanarkshire (2004): *North Lanarkshire Partnership*

(CROW) The National Catalogue of Rights of Way: The Scottish Rights of Way and Access Society (ScotWays)

A8 Trunk Road-Baillieston to Newhouse Major Maintenance: Environmental Statement (August 2001): Environmental Resources Management

Douglas Support Estate: Access & Recreation Impact Assessment (2003)

14 Vehicle Travellers

14.1 Introduction

This chapter outlines the assessment undertaken to determine the potential effects of the scheme on the quality of driving conditions for vehicle travellers. In this respect, the potential change to views from the road and effects of the scheme on driver stress are examined.

'View from the road' is defined as the extent to which travellers, including drivers, are exposed to the different types and quality of scenery through which a route passes.

'Driver stress' relates to three main components, namely frustration, fear of potential accidents and uncertainty relating to the route being followed. The level of stress incurred by a driver may be affected by many factors, including variations in skill, experience and knowledge of the roadway amongst others. Frustration may occur due to the driver's inability to drive at a particular desired speed consistent in terms of the general standard of the road, whilst the level of uncertainty may be raised by lack of route knowledge, the likelihood of pedestrians and poor signage/sight.

14.2 Methods

14.2.1 Baseline Methods

Information regarding existing baseline conditions was gathered through a desk-based review of available data, specifically OS map data and a site visit, in particular the landscape effects and conceptual landscape design proposals.

14.2.2 Impact Assessment Methods

This assessment has been carried out using the guidelines set out in DMRB Volume 11, Section 3, Part 9.

Possible effects upon vehicle travellers are considered in terms of both the route corridor landscape and visual value and the magnitude of impact.

14.2.3 Corridor Value

The value, or status, of the corridor through which the proposed route passes was determined as detailed in Table 14.1 below. With regard to views from the road, a number of aspects need to be considered in determining sensitivity including: the types of scenery and landscape; the extent of traveller's views; the quality of the landscape; and the presence of features of particular interest or prominence and should be read in conjunction with chapter 11 Landscape Effects.

Table 14.1 Definition of Corridor Value.

Value or Sensitivity	Criteria
High	The traveller experiences extensive views of a high quality landscape, area of unique landscape character or prominent features of particular interest.
Medium	The traveller is exposed to partial/intermittent views of a high quality landscape (or extensive views of a moderate quality landscape), area of unique/distinctive landscape character or features of interest.
Low	The traveller is exposed to views of an area of low quality landscape/unremarkable or degraded landscape character or has heavily restricted views/no view of the surrounding landscape regardless of quality.

14.2.4 Impact Magnitude

The severity, or magnitude, of impact was assessed independently of the site value and assigned to one of the categories listed within Table 14.2 below.

Table 14.2 Impact Magnitude Criteria.

Criteria	Definition
Major positive or negative	A major alteration in views from the road or in driver stress such that the driving experience is significantly affected.
Moderate positive or negative	An alteration in views from the road or in driver stress such that the driving experience would be diminished or enhanced - but to a minor degree.
Slight positive or negative	Minimal alteration in views from the road or in driver stress such that there would be a measurable change but this would not significantly affect the driving experience either positively or negatively.
Negligible	Very little appreciable change in views from the road or in driver stress and not considered to have any noticeable effect on the driving experience.

14.3 Baseline Conditions

14.3.1 Views from the Road

The existing A8 passes through a gently undulating landscape varying in local value from low to high. The route corridor does not have any nationally or regionally designated landscapes. Similar, there are no highly significant or prominent features of visual interest along the route corridor. However, landscapes that are not of a quality to warrant national or regional designation may be of great local amenity value, in particular natural features, semi-natural vegetation, local parks and gardens in urban areas. A full description of the landscape character and quality is contained in Chapter 11 Landscape Effects. The existing road lies predominately at ground level without dramatic changes in height on embankments or in cuttings. Views vary from fragmented farmland where the

discontinuous remains of agricultural land are located close to the built urban edge of the existing A8 corridor, and open views across the River Valley between Bargeddie, Kirkwood and Shawhead. The motorway route then passes through plateau farmland at Newhouse. The landscape is interspersed with widespread evidence of former and current industrial activity including derelict sites and disused railways and, more recently, commercial developments (Chapter 8 Land Use). A description of the baseline views from the road is further explained in the text below and can be seen in the associated Photo View Points and Landscape Effects Figures – Landscape Quality, Sheets 1 – 5 (Figures 11.3 a - e).

Baillieston to Bargeddie (Sheet 1 of 5 – Figure 11.3a)

Heading east, driver views from the existing A8 are divided between the built up urban fringe to the north of Baillieston and an undulating rural landscape to the south. The corridor passes through an area of high landscape quality. Travelling west of the Ballieston junction there are views of the built up area of Swinton to the south and open rural landscape to the north. Refer to Photo Viewpoints 1 and 2 (Figures 11.4 and 11.5).

Bargeddie to Kirkwood (Sheets 1 of 5 & 2 of 5 – Figures 11.3 a - b)

South of Bargeddie, there are partial open views across primarily high quality landscape and arable/grazed fields from the Baillieston junction, where the A752 travels under the existing A8. North of the route there are intermittent views of the built up areas of Bargeddie and Kirkwood. Refer to Photo Viewpoints 3 and 4 (Figures 11.6 and 11.7).

Kirkwood to Shawhead (Sheets 2 of 5 & 3 of 5 – Figures 11.3 b - c)

South of Kirkwood there is partial views of the built up area of Kirkwood and Shawhead and Kirkwood Cemetery. The driver experiences open views travelling through a corridor of medium to high landscape quality and arable/grazing land.

At Shawhead views are a mixture of low to high quality urban and rural landscape. The Kirkshaws and Shawhead urban area is the most built-up section of the survey area. It is dominated by light industry, the southwest suburbs of Coatbridge, the Showcase Cinemas complex and Kirkshaws Cemetery. Refer to Photo Viewpoints 5 – 6 (Figures 11.8 and 11.9).

Shawhead to Eurocentral (Sheets 3 of 5 & 4 of 5 – Figures 11.3 c - d)

The existing crossing of the A725 road and North Calder Water are screened by the associated riparian woodland. Between Shawhead and Eurocentral views become increasingly rural to the north and south, and vary from low to medium in landscape quality. Refer to Photo Viewpoints 7 – 10 (Figures 11.10 – 11.13).

Eurocentral to Newhouse (Sheets 4 of 5 & 5 of 5 – Figures 11.3 d - e)

At Eurocentral commercial developments dominate low quality views to the south. Farmland, woodland and estate planting appear again on both sides of the existing route as far as the suburban outskirts of Chapelhall of varying landscape value, where industrial development borders the road. The Newhouse Junction section is located at

the eastern end of the survey area. Its landscape is that of flat-lying agricultural land affording fairly high quality open views. A significant area of conifer plantation lies to the northeast of the section. To the south lies a mixture of farmland and long abandoned industrial workings. Refer to Photo Viewpoints 11 – 16 (Figures 11.14 – 11.19).

The following major and minor highways have been identified as crossing, or passing near to the proposed M8 and so are likely to experience changed views as a result of the upgrade.

- M73 Baillieston ;
- A89 (Connects Swinton and Bargeddie);
- A752 (Bargeddie);
- A725 (Shawhead);
- B799 (Chapelhall);
- A73 (Newhouse); and
- Bredisholm Road.

As discussed in Chapter 11 Landscape Effects, the landscape surrounding the route corridor has been assessed as varying between low, medium and high landscape quality (at a local level) at different locations. High quality landscape areas are largely situated to the south of the existing A8 (Refer to Landscape Effects – Landscape Quality; Figures 11.3 a - c) where industrial and urban development has not had the deleterious impact that has occurred elsewhere.

14.3.2 Driver Stress

The combination of functions fulfilled by the A8 trunk road compounds the problems of accommodating high levels of local, regional and long distance traffic with sub-standard road layouts and junction configurations.

The section of the A8 under consideration currently comprises a dual carriageway stretch of road recently subject to a major maintenance improvement scheme (A8 Trunk Road Baillieston to Newhouse Major Maintenance Environmental Statement). Using the guidance provided in the DMRB Volume 11, Section 3, Part 9, Chapter 4, the combination of high traffic volumes and speeds along the existing A8 is anticipated to result in a **High** level of driver stress.

14.4 Predicted Impacts

14.4.1 Views from the Road

A summary of the impacts of views from the proposed M8 route are set out below, divided into route sections as for the baseline description for ease of reference.

At identified points along the route the proposed roads will cause a significant loss of vegetation and tree planting. Points where this loss of planting is likely to occur and

driver views are altered will be referred to in the text below and can be seen in the associated Photo View Points and Conceptual Environmental Mitigation, Sheets 1 -7 (Figures 20.1 a – g).

Baillieston to Bargeddie (Sheet 1 of 7 – Figure 20.1f)

The new roundabout and junction improvements at Baillieston will create new views of the surrounding rural and semi-urban landscape. However views from the new roundabout and APR to the east of the junction and resulting landform (cutting) towards Bargeddie are of obscured built up residential areas and low quality open landscape, which will be partially screened by a acoustic barrier following the top of the cutting. Significant loss of vegetation and planting will occur where improvements are due to take place around the new junctions at Crosshill and Bargeddie. Drivers will experience more open views of landscape to the south - east travelling along the APR west of Bargeddie. Refer to Photo Viewpoints 1 – 2 (Figures 11.4 – 11.5)

Bargeddie to Kirkwood (Sheets 1 of 7 & 2 of 7 – Figures 20.1 a - b)

Views west of the A752 looking south will be accentuated and the road made more prominent where the M8 passes over the A752. Views north from the M8 will however be obscured by acoustic barriers. East of the A752 and west of Kirkwood Cemetery drivers will experience enclosed views of the proposed acoustic barrier on either side of the M8. Potential new vantage points will be obscured by acoustic barriers where the road is on embankment. Between the A8 and the proposed motorway driver views will be largely obscured where woodland screening is proposed along the route. Where new pedestrian structure bridges cross the M8 drivers will experience views of raised structures. Refer to Photo Viewpoints 3 – 4 (Figures 11.6 and 11.7).

Kirkwood to Shawhead (Sheets 2 of 7 & 3 of 7 – Figures 20.1 b - c)

At Kirkwood views from the M8 will be altered due to the main motorway being raised over Luggie Burn. Acoustic barriers on either side of the proposed M8 will obscure driver views of the built up areas of Kirkwood and open views beyond Luggie Burn. Views further along the motorway after the cemetery will be mostly obscured where the road varies in elevation and passes through cuttings. Woodland planting on the cuttings will help to mitigate the landscape and create improved driver views travelling through this section of the route. Refer to Photo Viewpoints 5 – 6 (Figures 11.8 – 11.9).

Shawhead to Eurocentral (Sheets 3 of 7 to 5 of 7 – Figures 20.1 c - e)

At Shawhead the new junction will interrupt current views from the A8. Views from the APR and the local network south will be interrupted by the line of the new motorway and associated junction slip roads. The associated road junction improvements will raise parts of the roads on embankment to accommodate the various road crossings and slip roads. Approximately 600 metres east of the Shawhead Junction the proposed road crosses the North Calder Water, and as a result the landform would be raised by over 10 m, creating new views of nearby industrial works and open views of landscape towards Shirrel. Woodland planting and acoustic barriers on the north and west side of Shawhead Junction seek to screen embankments and cuttings and will obscure driver views out from the Shawhead Junction. Driver views east of the junction then become

partially obscured by an acoustic barrier at Carnbroe Mains Farm south of the M8 and a further barrier on the north side of the M8 between Carnbroe Farm and Orchard Farm.

Drivers will experience views of footbridges at the new junction and along the route of the M8 east of the Shawhead junction. Refer to Photo Viewpoints 7 – 10 (Figures 11.10 – 11.13).

Eurocentral to Newhouse (Sheets 5 of 7 & 7 of 7 – Figures 20.1 e - g)

There will be increased views of Eurocentral from the new road, slip roads, bridges and roundabouts where the motorway follows the existing route of the A8. East of Eurocentral drivers will experience partially enclosed views created by the proposed acoustic barrier on the north side of the M8 and on the south side of the M8 immediately west of Chapelhall. As a result of the new junctions at Chapelhall the associated local roads will be raised on embankment. Drivers will experience increased views of the industrial estate, residential built form and arable/ grazing land. East of Chapelhall a further acoustic barrier on the north side of the M8 will obscure views in to the open landscape and nearby built up areas. Significant loss of vegetation around the new junctions, slip roads, bridges and along the route corridor will create more open views towards Eurocentral and Calderbank.

The mitigation strategy will look to address adverse visual effects of new bridges, associated embankments and acoustic barriers around the Chapelhall Interchange. A combination of sensitive land cover and landform design will minimise views from the road. Refer to Photo Viewpoints 11 – 16 (Figures 11.14 – 11.19).

14.4.2 Driver Stress

The new route will result in the provision of motorway plus an All Purpose Road (APR) thereby taking through traffic away from the local network and relieving congestion and driver stress both on the APR, local network and on the new section of motorway by reducing fear of potential accidents and relieving frustration and uncertainty over journey times.

Drivers will experience improved views into the open countryside where the new motorway passes through medium to high quality landscape setting and where the route is elevated above existing ground level.

The overall effect of the new route upon driver stress is likely to be beneficial compared to the existing situation and is assessed as **moderate**.

During the construction phase driver stress may increase for a temporary period where localised traffic management is set in place through working areas, primarily where new junctions are constructed on the motorway and the APR. Traffic management may cause slower traffic flows, increase driver uncertainty with regard to journey times and heighten fears of vehicle break-down or accidents. However, most construction activity will take place offline and during the construction phase there will be relatively low levels of disruption as vehicles continue to use the existing A8.

14.5 Mitigation

Mitigation of the potential impacts on driver views is also discussed in Chapter 11 Landscape Effects, and may include:

- appropriate and sensitive bridge design where new watercourse crossings and pedestrian bridges are proposed to create a visual feature that makes a positive contribution to local views;
- earthworks design - including the creation of embankments and cuttings are proposed to be least extensive as possible and sensitively undertaken in order to reduce final visual appearance;
- appropriate seeding/planting of earthworks to reflect surrounding vegetation;
- planting of hedgerows, and roadside vegetation and the establishment of tree screens where new junctions, slip roads and crossing points are proposed along the route of the motorway;
- planting of trees lost due to the required land take for the scheme; and
- screening of acoustic barriers where appropriate is proposed to minimise adverse visual effects.

Driver stress will also be ameliorated by appropriate design, landscaping and planting along the motorway and APR, along with suitable road layouts, furniture, lighting and signage designed to improve confidence in route selection and decision making at junctions.

The Scheme will improve journey times, facilitate intra-regional movement and local access, will reduce driver stress and frustration on the A8. More detailed mitigation is considered in Chapter 11 Landscape.

14.6 Residual Impacts

Whilst the gradual re-establishment of vegetation will reduce potential scarring impacts for the proposed route, the change in road will have permanent effects in relation to driver views where the road passes through cuttings and over embankments. There will be increased interruption of views from the APR and in the vicinity of the new motorway and APR junctions, however current views are generally across undesignated landscape of variable quality, fragmented by past and current development. Views will be retained out to the countryside at specific points along the route, as discussed in the text above. These can be summarised, except where acoustic barriers are proposed, as views to the north of the A8 route corridor at Swinton, and between Shawhead and Newhouse, and more significantly potential views to the south of the A8 route corridor from Bargeddie to Eurocentral. Vegetation and planting will also screen the driver's views where roads pass through significant cuttings and embankments. This will result in varied driver views along the proposed route corridor between Baillieston and Newhouse.

The proposed road will result in a positive impact on driver stress on both local users and users of the new section of motorway by addressing the current and anticipated future congestion and difficulties arising from the existing mixing of local and through traffic.

14.7 Summary Evaluation

Based on the local value of the route corridor, the proposed mitigation methods and enhanced driver views in to the open countryside the motorway is expected to result in a net positive impact with regard to driver stress once construction has been completed.

14.8 References

Design Manual for Roads and Bridges Volume 11 Environmental Assessment (1993, amended and updated 2003), The Highways Agency, The Scottish Executive Development Department, The National Assembly of Wales and The Department of the Environment for Northern Ireland.

15 Water Quality and Drainage

15.1 Introduction

This Chapter provides an assessment of water quality and drainage issues associated with the proposed upgrade of the existing A8 between Baillieston to Newhouse to motorway standard. It describes the existing hydrology, drainage and surface water environment in the vicinity of the proposed scheme, provides an evaluation of potential effects on these aspects resulting from development of the new road, and outlines various methods for managing the quantity and quality of surface water runoff during construction and operation of the proposed scheme. Groundwater issues are discussed in Chapter 16 of this report.

15.1.1 Background

Development activities on any catchment should be placed in the context of the catchment and its existing ecological and hydrological properties prior to undertaking the work. Unmanaged runoff from developments can have serious adverse effects that may degrade the ecological, hydrological and water quality of watercourses. Historically, developments have resulted in reduction of water quality and in some cases resulted in habitat loss for wildlife and reduced the ability of watercourses to meet their natural functions.

The Scottish Environment Protection Agency (SEPA) is the environmental regulator responsible for protecting 'controlled waters' in Scotland. They have statutory powers and duties for protection and monitoring of the quality of controlled waters. Controlled waters are defined in law and are essentially all waters, either above or below ground, which are neither in the drinking water supply pipe or the sewerage network.

Regulatory pressure is being increasingly focused on engineering activities under the ambit of the Water Framework Directive (WFD). Consideration of the environmental and social impacts of engineering activities in the vicinity of the water environment will play an important consideration in future planning, design and implementation of engineering works in Scotland.

The WFD through the Water Environment and Water Services (Scotland) Act 2003 provides regulatory controls over a wide range of activities in order to protect and improve Scotland's water environment.

The Act outlines SEPA's duties to:

- protect and improve the water environment;
- promote efficient water use;
- have regard to the social and economic impacts of exercising its functions;
- act in the best way to contribute to the achievement of sustainable development;
- promote sustainable flood management; and

- co-ordinate the delivery of its functions with others.

The Controlled Activities Regulations (CAR), which came into force on the 1st April 2006 will have a significant impact on developers, engineers, planners and owners involved in existing or future water abstractions, discharges, impoundments, river works or any other activity that will affect the water environment.

15.1.2 Development Scenarios

This Chapter considers the potential impacts of the Scheme as follows:

- A8 upgrade to motorway standard without drainage mitigation: this involves construction of a new motorway with no provision for mitigation measures for surface water quality and quantity; and
- A8 upgrade to motorway standard with drainage mitigation: this involves construction of a new motorway with provision for mitigation measures for surface water quality and quantity.

For a detailed analysis of the above, reference should be made to sections 15.4, 15.5 and 15.6.

15.2 Methods

15.2.1 Baseline Methods

Baseline conditions were identified through desk studies and site walk-over investigations. This included consultations with statutory consultees such as North Lanarkshire Council (NLC) and SEPA, review of relevant data and published material relating to the local and wider hydrological environment. The data collected and sources of information are listed in Table 15.1.

Table 15.1 Sources of Information for Hydrology and Surface Water Quality

Topic	Source of Information
Climate	
Rainfall	Flood Estimation Handbook CD ROM (2000) The Centre for Ecology and Hydrology, Wallingford
Surface Waters	
Water Quality	Historical water quality sampling, 2004, SEPA Discharge & Sewerage, 2004, SEPA
Hydrological Regimes	Recorded flow data, 2004, SEPA

15.2.2 Consultations

Consultations with NLC and SEPA were undertaken and summarised as follows:

Consultation with NLC identified a number of aspects relating to hydrology and drainage. These included:

- flood risk assessment and drainage impact assessment in relation to the new roads;
- prevention of adverse effects on the watercourse from the road outfalls and introduction of a limited discharge; and
- provision of attenuation storage at the road outfalls.

NLC made references to the requirements of the WFD and CAR and the need to meet legislative requirements, for example licensing of works affecting watercourses, which has a significant impact on developers, engineers, planners and owners involved in existing or future activities that will affect the water environment.

Consultation with SEPA provided the information as detailed in Table 15.1. In connection with works to existing watercourses, references were made to SEPA's publication entitled 'Ponds, Pools and Lochans' which provides advice on how to maximise ecological values and the amenity potential of urban watercourses, particularly regarding SUDS. SEPA also referred to River Restoration Centre works and techniques. SEPA discourage culverting of the watercourses, however, if culverting is required design should be in accordance with best practice, which permits the passage of fish and other aquatic fauna under normal conditions. SEPA requires the free passage of fish at all time.

15.2.3 Impact Assessment Methods

Guidance Documents

The water quality and drainage assessment has been carried out in accordance with the Design Manual for Road and Bridges (DMRB), (1998); volume 11; Environmental Assessment, section 3; Environmental Assessment Techniques, Part 10; Water Quality and Drainage.

In consideration of planning authority requirements, the assessment of flood risk has been carried out in accordance with Scottish Planning Policy 7 (SPP7): Planning and Flooding.

The assessment of the road physical structure within the flood plain has been carried out in accordance with DMRB (1995); volume 4; Geotechnics and Drainage, section 2; Drainage, Part 1, HA 71/95; The Effect of Flooding of Road Construction on Flood Plains.

Although Volume 4 DMRB (1995) recommendations for hydrological assessments are based on the Flood Studies Report (FSR) (1975), this assessment of the design floods has been carried out in accordance with the Flood Estimation Handbook (FEH). The FEH was published in January 2000 by the Centre for Ecology and Hydrology, Wallingford

(formerly the Institute of Hydrology), a component body of the Natural Environment Research Council which is the successor to the FSR and Flood Studies Supplementary Reports (FSSR), also published by the Institute of Hydrology. The FSR was the recognised method in the UK for estimation of flood flows from the time of its publication in 1975 until the publication of the FEH.

Surface water pollution prevention and mitigation measures have been developed based on the following:

- discussions with SEPA;
- current good practice for road drainage including DMRB (2001); Volume 4; Geotechnics and Drainage, section 2; Drainage, Part 1, HA 103/01, Vegetative Treatment Systems for Road Runoff;
- sustainable Urban Drainage Systems (SUDS) as set out in CIRIA Report C521 "Sustainable Urban Drainage Systems – Design Manual for Scotland and Northern Ireland"; and
- guidance contained within the SEPA publications entitled: "Watercourses in the Community" and "Ponds, Pools and Lochans".

During the completion of this document certain guidance documentation has been updated:

Guidance Utilised	Updated Guidance
DMRB (1998); Vol.11 Section 3 Part 10	DMRB (2006) Vol.11 Section 3 Part 10 (HA 216/06)
CIRIA Report C521	CIRIA (2007) Report C697 "The SUDS Manual"
DMRB (2001) Vol.4 Section 2 Part 1 (HA 103/01)	DMRB (2006) Vol. 4 Section 2 Part 1 (HA 103/06)
DMRB (1995) Vol. 4 Section 2 Part 1 (HA 71/95)	DMRB (2006) Vol. 4 Section 2 Part 1 (HA 71/06)

Investigation has been carried out as to the implications of these specific updates on the assessments undertaken; no significant variation in results has been identified through the implementation of revised guidance criteria over those initially implemented. Therefore references presented in this report maintain their validity and have not been replaced with current reference details.

Impact Assessment Criteria

Impacts were assessed based on the sensitivity or value of the receiving watercourse and the predicted magnitude of the impacts. The criteria used to assess the sensitivity of surface water features and impact magnitude are defined in Tables 15.2 and 15.3. The significance of the predicted impact is then defined as far as possible at this stage of option development using a combination of the magnitude and sensitivity as described in Table 15.4.

Table 15.2 Criteria to Assess the Sensitivity of Surface Water Features

Sensitivity	Definition
High	Hydrological characteristics considered susceptible to relatively small changes and associated with sites of international biological importance including Ramsar Sites, Special Protection Areas (SPAs), Special Areas of Conservation (SACs, including candidate sites); hydrological characteristics associated with sites of national biological importance including Sites of Special Scientific Interest (SSSIs), and watercourses and water bodies of a high water quality (Scottish Environment Protection Agency River Classification Scheme Class A1 and A2).
Medium	Hydrological characteristics considered reasonably tolerant of change associated with sites of local biological importance including Local Nature Reserves (LNRs), non-statutory sites of importance for nature conservation, non-statutory nature reserves; and watercourses and water bodies of moderate water quality (Scottish Environment Protection Agency River Classification Class B).
Low	Watercourses and water bodies of poor water quality (Scottish Environment Protection Agency River Classification Class C and D) considered potentially tolerant of substantial change.

Table 15.3 Criteria to Assess the Magnitude of the Predicted Impact on Surface Waters

Magnitude	Definition
High	Significant change in water quality baseline conditions from the base line either by a relatively high amount for a long-term period or by a very high amount for an episode such that watercourse ecology is greatly changed. Equivalent to downgrading from Class A to C or D, or from B to D.
Medium	Noticeable change in water quality baseline conditions that may be long-term or temporary. Results in a change in the ecological status of the watercourse. Equivalent to downgrading one class, for example from A to B.
Low	Minor change in water quality baseline conditions with a minor temporary nature such that watercourse ecology is slightly affected. Equivalent to minor but measurable change within a class.
Negligible	Very slight change in water quality baseline conditions such that there is no detectable effect upon the watercourse's ecology. No change in classification.

Table 15.4 Criteria to Assess the Significance of the Predicted Impact on Surface Water Quality

Magnitude	Sensitivity		
	Low	Medium	High
High	Moderate	Substantial	Substantial
Medium	Slight	Moderate	Substantial
Low	Negligible	Slight	Moderate
Negligible	Negligible	Negligible	Slight

15.3 Baseline Conditions

15.3.1 Rainfall

According to the FEH CD-ROM, the annual average rainfall for the North Calder Water catchment is about 970mm.

15.3.2 Existing Surface Water Features

The following watercourses are situated within the scheme area. These are all tributaries of the North Calder Water and their catchment boundaries are shown in Figure 15.1. From west to east, Baillieston to Newhouse, these are listed below and shown on Figure 15.2.

- North Calder Water; (main branch);
- Unnamed Burn 1 (South of Bargeddie);
- Luggie Burn;
- Unnamed Burn 2 (South of Kirkshaws);
- Red Burn;
- Shirrel Burn;
- Unnamed Burn 3 (North East of Eurocentral);
- Unnamed Burn 4 (South of Chapelhall);
- Kennel Burn; and
- Shotts Burn.

There are also several local drainage channels, pools and ponds along the route corridor.

The North Calder Water

The A8 falls within the catchment area of North Calder Water, a major tributary of the River Clyde with a total catchment area of about 130km^2. The North Calder Water rises in the Black Loch area to the north east of Airdrie, an area which is characterised by predominately rural land use. It flows into the Hillend Reservoir before it continues in west and south-westerly directions towards Airdrie and passes through the eastern and southern boundary of the town. It then flows along the eastern boundary of Coatbridge and meanders in a westerly direction in the valley between Coatbridge and Uddingston, then in the valley between eastern part of Glasgow and Uddingston. It joins the River

Clyde at Maryville. Within the A8 corridor the North Calder Water is joined by tributaries of the Kennel, Shirrel, Red and Luggie Burns as well as several unnamed minor tributaries. Within the scheme area, The North Calder Water flows in a natural channel with winding meanders, pools and shoals. The channel bed consists of stones with gravel shoals and rifts and some boulders. The slopes of channel banks vary and are generally covered with dense brush, shrubs and trees.

Unnamed Burn 1 (south of Bargeddie)

The Unnamed Burn 1, south of Bargeddie emerges from an existing culvert under the local rail line between Baillieston and Bargeddie south of the A8. It flows for around 200m approximately parallel to the existing A8 before turning south passing under a dismantled railway embankment. The watercourse is culverted for approximately 230m under the field to the south of the dismantled railway before flowing a further 120m in an open channel to join the North Calder Water. The burn channel is relatively straight with only minor pools and rifts. The bed material consists of gravels, stones, cobbles and few boulders. The channel banks are steep and high and are overgrown with trees and shrubs. The total catchment area of the Unnamed Burn 1, as far downstream as its confluence with the North Calder water is about 1.9km^2. The natural catchment drainage paths have been altered by construction of the Baillieston Junction. The explorer map of the area shows that a small urban area of Baillieston falls within the catchment area of the burn. The existing Baillieston Junction also falls within its catchment. The Baillieston Surface Water Sewer, which drains part of the M8 motorway to the west of the Baillieston Junction discharges into the Burn.

Luggie Burn

The total catchment area of the Luggie Burn as far downstream as its confluence with the North Calder water is about 25.4km^2. It rises in an area of disused open cast mining to the north east of Airdrie. It has a significant mixed rural and urban catchment draining urban areas of Glenmavis, Gartsherrie and Coatbridge. The burn emerges from twin concrete box culverts under the A8, each with approximate dimensions of 2m high by 2.5m wide, some 150m east of the existing A8 Bargeddie Junction. The Burn approaches the North Calder in a relatively uniform channel. The channel bed consists of gravel, stones and a few boulders. Immediately downstream of the A8 the channel banks are vertical concrete and masonry walls. Further downstream the banks are heavily overgrown with vegetation and shrubs and some trees.

Red Burn

The total catchment area of the Red Burn as far downstream as its confluence with the North Calder water is approximately 1.8km^2. Red Burn rises in the Bellshill area draining an industrial area of Bellshill and an urban area of Viewpark.

Unnamed Burn 2 (south of Kirkshaws)

The total catchment area of the unnamed Burn 2, to the south of Kirkshaws as far downstream as its confluence with the North Calder water is approximately 0.6km^2. The

burn emerges from an existing culvert under the A8 south of Old Monkton Cemetery, it flows for around 400m, passing under a minor access track, before joining the North Calder Water in a relatively straight and uniform channel. The channel bed consists of silt and small gravels. The channel banks are heavily overgrown with vegetation. The natural catchment drainage paths have been altered over the years by housing development and construction of the local road network to the north of the A8.

Shirrel Burn

The total catchment area of the Shirrel Burn as far downstream as its confluence with the North Calder Water is approximately 16.6km^2. The Burn rises in the Hareshaw area taking runoff from the urban areas of Pickerstonhill, Newarthill, Yett, New Stevenston, Holytown, Hattonrigg, Shirrel as well as rural areas.

Unnamed Burn 3 (North East of Eurocentral)

The total catchment area of the Unnamed Burn 3, to the west of Heatherly Lea Covert (north of the A8) and east of an existing pond as far downstream as its confluence with the North Calder Water is about 1.2km^2. The Unnamed Burn 3 appears to originate from a small rural catchment to the south of the existing A8. The burn flows in an open channel to the north of A8 in a northerly direction in a small channel of approximately 1m width and about 1m depth for about 500m before joining the North Calder Water. The channel bed material consists of silt and gravels and some weeds. The banks are overgrown with grassland and scrub areas.

Unnamed Burn 4 (south of Chapelhall)

The total catchment area of the Unnamed Burn 4, south of Shawhead Junction as far downstream as its confluence with the Shirrel Burn is about 1.9km^2. The burn emerges from an existing culvert south of the junction and flows in southerly direction towards Shirrel Burn. The burn drains part of the urban area of Holytown before it joins the Shirrel Burn to the south.

Kennel Burn

The total catchment area of the Kennel Burn as far downstream as its confluence with the North Calder water is approximately 1.7km^2. The Burn rises around the existing M8 junction 6 draining part of the urban area of Chapelhall and Newhouse industrial area. The riverbed material generally consists of silt and gravel. The banks comprise overgrown grassland and scrub areas.

Shotts Burn

The total catchment area of the Shotts Burn as far downstream as its confluence with the North Calder water is approximately 17.4 km^2. The Burn rises to the west of the existing M8 junction 5 and runs in westerly direction draining the village of Salsburgh before joining Clattering Burn.

Pools and Ponds

There are several small ponds present within the proposed corridor of M8 which are located at the following locations from west to east, Baillieston to Newhouse: Figures 10.1a to 10.3e, Chapter 10 Ecology and Nature Conservation, show pond locations.

- a small pond to the south west of the Shawhead junction (NGR 720, 628);
- three small ponds to the south east of the Eurocentral junction. Two are located to the north west of the Eurocentral development (NGR 759, 621) and one is situated to the south east of the development (NGR 764, 615);
- a pond to the north of the Eurocentral Junction (NGR 760, 626);
- another pond to the west of the Eurocentral junction on the north side of the existing A8 (NGR 752, 624); and
- a small pond to the north of the existing A8 on the Kennel Burn (NGR 780 616).

15.3.3 Existing Floodplain and Flooding

The hydrological maps of the area produced by The Centre for Ecology and Hydrology at Wallingford (formerly Institute of Hydrology) show a narrow floodplain along the margins of the North Calder Water south of the existing A8 between Shawhead and Bargeddie junctions. These areas may be inundated by a depth of water up to 2m during a 100 year flood event. Along parts of Shirrel Burn, a narrow zone along the burn margins may be inundated by up to 2m depth of water during a 100 year flood event. The map provides an indication of the extent of flooding and is not based on the hydraulic assessment of the watercourses.

15.3.4 Surface Water Quality

SEPA's Water Quality Classification

SEPA's Water Quality Classification is based on a five point scale and includes all rivers with a catchment area of 10km^2 or more and specific smaller rivers where known pollution problems exist. This is called the "classification network". The classification network is divided into river stretches based on confluences and pollution pressures. Every stretch is assigned a monitoring point where chemical and/ecological surveys are taken and the aesthetic appearance recorded. The quality or "class" of a length of river is calculated from the monitoring point results.

Current and Historical Water Quality

Historical water quality data were provided by SEPA:

- Bargeddie Bridge and Bellshill on the North Calder Water for the period 1961 to 2004;
- Calderpark Gauging Station on the North Calder Water for the period January 1999 to June 2004 (copper and zinc only); and

- Calderpark Gauging Station on the North Calder Water for the period August 1975 to December 2000 (miscellaneous data from SEPA website harmonized with the monitoring data - http://www.sepa.org.uk/data/hm/index.htm).

A summary of historical water quality results is illustrated in Table 15.5.

Table 15.5 Historical Water Quality within the North Calder Water

Determinant	At Bargeddie Road Bridge (NS 7052 6320) for the Period 1961-2004	At Bellshill Road Bridge (NS 7328 6196) for the Period 1963-2004
PH (pH Units)	7.7[1] (6.5-9.4)[2]	7.6[1] (6.3-9.0)[2]
Suspended Solid	29.5[1] (2-340)[2]	23.2[1] (1-582)[2]
Alkalinity	146.3[1] (22-300)[2]	136.0[1] (40-700)[2]
BOD (ATU)	9.9[1] (0.8-45)[2]	7.1[1] (0.7-65)[2]
Ammonia	3.7[1] (0.01-49.4)[2]	2.8[1] (0.01-164.6)[2]
Nitrate (max)	2.2[1] (0.1-11)[2]	1.9[1] (0.004-12.7)[2]
Nitrate (min)	0.2[1] (0.01-3.2)[2]	0.1[1] (0.005-8.2)[2]
Hardness	208[1] (49.5-484)[2]	166[1] (48-380)[2]
Chloride	53.7[1] (11-254)[2]	47.9[1] (12-364)[2]
Electrical conductivity	567.58[1] (195 – 1170)[2]	493.98[1] (130 – 1068)[2]
Copper[3]	6.28[1] (2.44 - 28.52)[2]	
Zinc[3]	21.44[1] (4.28 - 88.92)[2]	

N.B. Results are expressed in mg/l unless stated.
[1] Average values
[2] Values within brackets indicate typical ranges
[3] Data from Calderpark Gauging Station (NS6810662406) for the period January 1999 to June 2004

The raw data from SEPA summarised in Table 15.5 above indicate the range of values, however trends presented by the actual raw data (not shown above) illustrate a general improvement in water quality both at Bargeddie Bridge and Bellshill Road Bridge.

The recorded period at Calderpark is relatively short but appears to demonstrate a reduction in levels of copper and zinc. Harmonized monitoring data indicate a reduction in levels of zinc, lead, copper, chromium, cadmium, orthophosphate, nitrate, nitrite and Ammoniacal nitrogen since 1975. There is insufficient data to draw conclusions on trends in levels of fluoride or phosphorus. Nickel levels have risen. Data also indicate an improvement in water quality.

In summary over the data collection period for the three monitoring stations:

- Slight increase in pH: **slight deterioration.**
- Reduction in suspended solids: **improvement.**
- Slight reduction in hardness: **neutral.**

- Reduction in BOD: **improvement.**
- No significant change in ammonia: **neutral.**
- Reduction in nitrate: **neutral.**
- No significant change in Chloride: **neutral.**
- Reduction in electrical conductivity: **improvement.**
- Reduction in all metals apart from nickel: **improvement.**
- Increase in nickel: **deterioration.**
- Ammonia EQS is exceeded on all occasions in the last 2 years of monitoring data.

Stricter controls over discharging waste waters to surface waters, improvements in industrial efficiency and therefore quality of waste waters, reduction in acidity of rainwater, reduced industrial activity and better water management in general over the last 40 years for which data are available will have led to the improvements in water quality.

Environmental Quality Standards (EQSs) have been derived under the requirements of the Dangerous Substances Directive which classifies substances as List I and List II. Standards for List I substances have been defined in 'daughter' Directives to the EC Dangerous Substances Directive. The Dangerous Substances Directive required that standards for List II substances are derived by the member states. The UK has set EQSs for List II substances. For the most part EQSs are defined as maximum concentrations of determinants allowed in water however in some cases they are more general quality objectives expressed in words relating to the use of the environment. These might be that the water should be suitable for the passage of migratory fish at all times or suitable for the abstraction of drinking water for example.

Mean levels of each determinant in conjunction with mean water hardness from data over the last 2 years are below their respective EQS with the exception of Ammonia. Some levels are approaching their respective EQS, particularly chromium, copper, lead, nickel and zinc.

15.3.5 Fisheries

Consultation with the Clyde River Foundation revealed that there are minimal technical data available regarding the presence of fish species in the River Clyde and its tributaries. Although it appears that there are no formally designated fisheries along the North Calder Water, the Shirrel Burn or the Kennel Burn, it is possible that migratory species from the River Clyde may utilise the North Calder Water during their life cycle.

The Clyde River Foundation has received a grant to carry out survey works on the River Clyde tributaries, one of which is the North Calder Water. More detailed information regarding the North Calder Water may therefore be available for consideration during future detailed design work by the Contractor and implementation of the scheme.

15.3.6 Contamination

A preliminary desk study investigation of the M8 – Baillieston to Newhouse identified a number of potentially contaminating former land uses[25] within the route corridor; however there are only very few instances of these potentially contaminated sites in the vicinity of the North Calder Water or its tributaries and these are:

- Industrial estate and "works" at East Shawhead.
- Early 20th century railway south of East Shawhead on east side of A725.
- Late 19th century railway south of East Shawhead on west side of A725.

Such potentially contaminated land may impact on surface waters by migration of heavy metals and or hydrocarbons via groundwater flow. Further discussion of potentially contaminated land investigations is contained in Chapter 16, Geology and Soils.

15.3.7 Sensitivity of Surface Water Features

The sensitivity of the surface water features in the vicinity of the proposed scheme has been determined as follows using the criteria in Table 15.2:

- According to SEPA River Classification 1996-2003 the North Calder Water at Bargeddie and Bellshill road bridges is classified as Class 'B' (fair quality) and is thus considered to be of medium sensitivity;
- Luggie Burn - classified as Class 'C' of poor quality and thus considered to be of low sensitivity;
- Red Burn - classified as Class 'D' and therefore considered to be of low sensitivity;
- Shirrel Burn - classified as Class 'B' and thus considered to be of medium sensitivity;
- Kennel Burn - classified as Class 'C' and thus considered to be of low sensitivity. It has been reported that a long-term fly tipping problem exists on the Kennel Burn. Cooperation between SEPA, landowners and the local authority has resulted in reduction in the amount of non-sewage derived debris. Unsatisfactory combined sewer overflows (CSO) in the area are also due to be upgraded by early 2006; and
- Shotts Burn - classified as Class 'A2' of good quality and therefore considered to be of high sensitivity.

Under the WFD, which encompasses all surface and ground waters, there is a requirement that natural water features in the vicinity of the proposed scheme will reach good ecological status by 2015. The status of water will be assessed using a range of parameters, which include chemical, ecological, physical and hydrological measures,

[25] These sites are identified on Drawing No M8MFJV/ST2/FG/G/0007 in the Mouchel Fairhurst Desk Study Report No M8MFJV/04 (December 2003).

which will be used to give a holistic assessment of ecological health. Some water bodies may be designated as artificial/heavily modified and will have less stringent targets to meet. Certain sections of the North Calder Water and its tributaries may fall within this category; however these areas will still need to demonstrate 'good ecological potential' by the year 2015.

15.3.8 Existing Sewerage and Road Discharges

Sewerage Discharges

Information regarding consent to discharge in the study corridor was provided by SEPA and this indicated a number of existing discharge consents to the North Calder Water as follows:

- East Shawhead sewage pumping station has an emergency overflow (WPC/W/2467);
- Combined Sewer Overflow Drumgate, Coatbridge, by-pass sewer, Drumpark, Coatbridge (WPC/W/9325);
- Mossend Eurocentral Development, Motherwell (WPC/W/9415);
- WM Grant & Son Ltd. Strathclyde Business Complex, Bellshill, Lanarkshire (WPC/W/9364); and
- Vibroplant Ltd., Coatbrdige, Bargeddie, Glasgow (WPC/W/2471).

Road Discharges

The existing A8 road drainage system consists of filter drains, carrier drains and slot drains. The existing runoff drains into the local watercourses with no provisions for attenuation of treatment.

The existing outfall locations between Baillieston to Newhouse junctions are shown in Table 15.6.

Table 15.6 Existing A8 Road Drainage Outfall Locations

NGR	Location & Comment	Watercourse
698, 636	Approx. 750m West of Bargeddie Junction.	Unnamed Burn 1 (south of Bargeddie)
710, 632	At the confluence with unnamed burn 2 south of Kirkshaws.	North Calder Water
739, 625	Approx. 600m east of Shawhead Junction	North Calder Water
752, 624	Approx. 500m west of Eurocentral Junction discharging into existing SW sewer.	North Calder Water
792, 620	Newhouse Junction, north east corner of the junction discharging into an existing ditch.	Shotts Burn

15.3.9 Estimated Flows in the Watercourses

Surface Water Quantity

Recorded peak flow data for three locations on the North Calder Water were provided by SEPA. These were flow gauging stations at Hillend (NS 828 678), Calderbank (NS 765 624) and Calderpark (NS 681 625).

The flow calculations have been carried out in accordance with FEH methods. The river flow gauging station on the North Calder Water at Calderpark is situated approximately 600m upstream of its confluence with The River Calder. This gauging station appeared to represent a more realistic dataset for the North Calder Water catchment in relation to the proposed road development. A pooling group containing gauged catchments from the FEH database similar to the catchment of North Calder at Calderpark was created. A growth curve was created from the catchments in the North Calder pooling group. This appeared not to fit the recorded data. Therefore, a growth curve was created using single site analysis at Calderpark gauging station.

The estimated Qmed (Qmed is the median annual maximum flood, this is the flood which is exceeded once every two years on average), values for the sub-catchments were obtained by the single site data transfer method, from the Calderpark gauge data as outlined in FEH Volume 3. The calculated growth curve was applied to the estimated Qmed of the various catchments under study to calculate the 1 in 100 year and 1 in 200 year peak flows at the sites.

Average 95 percentile flows (Q_{95}) were estimated using the methodology set out in the "Institute of Hydrology, Report 101, Low Flow Estimation in Scotland", 1987.

The estimated flows in the North Calder Water at two locations and its tributaries are summarised in Table 15.7.

Table 15.7 Estimated Flows

Name of the Site	Low Flow (Q_{95}) (l/sec)	Median Flow 2Year $(Qmed)_{s,adj}$ (m^3/sec)	100Year Peak Flows (m^3/sec)	200Year Peak Flows (m^3/sec)
Unnamed Burn 1 (south of Bargeddie)	3.1	1.0	3.5	4.3
Bargeddie - North Calder Water	263	33.3	117.4	144.4
Luggie Burn	44.5	10.9	38.4	47.2
Unnamed Burn 2 (Kirkshaws)	0.8	0.3	1.0	1.2
Red Burn	2.8	0.9	3.1	3.8
Shawhead - North Calder Water	197	23.7	83.3	102.4
Shirrel Burn	22.5	6.8	24.2	29.8
Unnamed Burn 3 North-west of Eurocentral	1.8	0.4	1.3	1.6
Unnamed Burn 4 South of Chapelhall	3.0	0.9	3.3	4.1
Kennel Burn	2.7	0.8	3.0	3.6
Shotts Burn	18.6	4.6	16.1	19.8

15.4 Predicted Impacts

15.4.1 Do-Nothing Scenario

This scenario involves no new road construction. However, traffic levels will continue to grow with consequential increased risk of pollution and spillage from the existing network. The existing drainage from the A8 will remain without any attenuation facilities. The catchment area may be subject to other types of development, the effects of which cannot be predicted but it is anticipated that any development would be required to incorporate adequate drainage systems. It is assumed that no significant changes to existing water quality and quantity would occur under this scenario, however increased traffic on the existing roads over time is likely to increase the risk of accidental spillages and contaminated runoff to surface waters to some degree.

15.4.2 Scheme Drainage Outfalls

Mainline Proposed Outfalls

The proposed outfalls are located at approximate mainline road chainages 750, 2050, 4850, 6300, 7600, 9500 and 10400, as shown on Figure 15.2.

- **Outfall 750 (SUDS Basin 1)** – The runoff from the proposed M8 motorway (M8) would discharge into the culverted section of the Unnamed Burn Number 1 to the south. The Burn also takes the runoff from Baillieston Surface Water Sewer which

drains part of the M8 motorway to the west of the Baillieston junction. The Unnamed Burn Number 1, emerges from an existing, approximately 1200mm, circular culvert beneath the existing railway line. It flows in an easterly direction for about 70m, before flowing in a south-easterly direction for about 130m before entering an existing culvert. The watercourse enters a culvert under the dismantled rail line and extends for about 220m under the field to the south of the dismantled rail line and emerges to the south of the farm access track and flows south for a distance of about 140m before discharging into the North Calder Water. The size of this culvert could not be determined as it was covered by a trash screen. The watercourse generally flows in a relatively steep sided slope channel, approximately 1.5m deep with overgrown trees and shrubs. There is an existing road drainage outfall of approximately 450mm diameter at this location.

- **Outfall 2050 (SUDS Basins 4)** – The runoff from M8 would discharge into the North Calder Water to the south. At this location, on the right hand side of the river, the land is relatively flat. On the opposite side, the riverbank is a rock cliff approximately 6 to 8 m high. The river flows in north-westerly direction. There is an existing A8 drainage outfall of approximately 525mm diameter at this location.
- **Outfall 4850 – (SUDS Basin 6)** – The runoff from M8 would discharge into the North Calder Water to the south of M8. At this location, the river channel lies at the bottom of a steep sided valley. The east side of the river valley is relatively steeper than the west side. The west side of the riverbank, flattens out slightly at the edge of the river.
- **Outfall 6300 – (SUDS Basin 7)** – The runoff from M8 would discharge into the existing Scottish Water sewer. The existing sewer drains the existing surface runoff from the Eurocentral into the North Calder Water to the North. There is marshland to north and an existing pond to the west. The land to the west generally slopes towards the pond. There is a small watercourse to the east of the existing pond which flows in northerly direction towards the North Calder Water in a small channel approximately 1m wide and less than 1m deep.
- **Outfall 7600 – (SUDS Basin 9) -** The runoff from M8 would discharge into the North Calder Water. The route of the outfall to the North Calder follows the alignment of existing access tracks and is adjusted to avoid land currently designated as Ancient Woodland
- **Outfall 9500 – (SUDS Basin 13)** - The runoff from M8 would discharge into the Kennel Burn to the south of M8. At this location the Burn is culverted beneath the existing fields. After emerging from the culvert, it runs in a north-westerly direction discharging into the North Calder about 1.6km away. At this location the west bank of the burn is relatively steep with the channel some 3 to 4 meters below the top of the bank and with a less steep east bank. The Burn enters another culvert to the north of an existing building about 250m away. The size of the culvert could not be identified during survey, as the inlet was submerged under water. The culvert is approximately 500m long. The culvert appears to pass under the existing car park of an industrial estate before it emerges through a circular culvert of approximately 975mm diameter on the west side of the existing B799 road, immediately north of the existing roundabout.

- **Outfall 10400 – (SUDS Basin 14) -** The runoff from M8 would discharge into a small ditch at the north eastern of the roundabout. The ditch flows in northerly direction towards the Shotts Burn about 600m away a tributary of the Clattering Burn, itself a tributary of the North Calder Water.

All Purpose Roads Proposed Outfalls

Mainline chainages are used to describe the locations of the outfalls for proposed All Purpose Roads (APR).

- **Outfall 0 – (SUDS Basin 16) –** The runoff from APR would discharge into the Baillieston Surface Water Sewer to the north which eventually discharges into the North Calder. The layout of the proposed Swinton Roundabout is constrained and influenced by the existing road alignments and infrastructure in this location. A total of 10 Roundabout options and 4 Signalised Junction options were subsequently developed as alternatives to the originally proposed layout. Option selection was based on consultations with Transport Scotland Standards Branch and the local community. Physical and environmental constraints were also taken into account, including the location of the Baillieston Surface Water Sewer, adjacent woodland to the north and west, which currently provides screening for residential areas, existing electric pylons, and the requirement to minimise land take of recreational ground and potential development land to the south.
- **Outfall 760 – (SUDS Basin 2) –-** The runoff from APR would discharge into the culverted section of Unnamed Burn Number 1 to the south following the same route as M8 runoff at this location.
- **Outfall 6460- (SUDS Basin 8) –** The runoff from APR would discharge into the existing Scottish Water sewer which drains the runoff from the Eurocentral into the North Calder to the North.
- **Outfall 8500 – (SUDS Basin 10) -** The runoff from APR would discharge into an existing ditch to the north of the junction which eventually discharges into the Kennel Burn to the North about 600m away via road ditches and an existing ditch.
- **Outfall 10520 – (SUDS Basin 15) -** The runoff from APR would discharge into a small ditch to the north east of the junction. The ditch flows in northerly direction towards the Shotts Burn about 600m away. The burn is a tributary of the North Calder Water.

M8 Junctions Proposed Outfalls

Shawhead

- **North of M8 –** The new roads north of the junction mainly drains into the proposed drainage system for the M8. Small section of the new road would drain into the existing M8 road drainage.
- **South of M8, A725 outfall 150 (SUDS Basin 5) -** SUDs Pond Number 5 has been relocated to a new position as shown on Figure 15.2. The need for this has arisen due to engineering and other development constraints at the original location and the only feasible alternative location for this SUDS facility was identified as an area

of land on the north side of the North Calder Water. The relocated SUDS facility has been designed to achieve the required treatment and attenuation volumes within the constraints of the local topography whilst minimising encroachment on an area of designated SINC/ancient woodland. The new location has no significantly different impact on water quality or quantity compared with the original position. At this location, the river channel lies on relatively gently sloping riverbanks.

Chapelhall

- **North of M8, B802, outfall 200 (SUDS Basin 11) -** The new roads and a roundabout further away from the M8 north of the junction would discharge into the Kennel Burn to the North about 200m away via an existing ditch. Small sections of the new roads would drain into the existing B799 and B802 road drainage to the north. The new roads and a roundabout closer to the M8 drain into the proposed M8 drainage system.
- **South of M8, B799, outfall 0 (Zero), (SUDS Basin 12)** - The new roads and a roundabout further away from the M8 would discharge into the Shirrel Burn to the south about 100m away. The new roads and a roundabout closer to the M8 drain into the proposed M8 drainage system.

Newhouse Roundabout

- **M8, Outfall 10400, (SUDS Basin 14) -** The new roundabout development shares the same outfall as M8 runoff and would discharge into the existing ditch to the north east of the junction.

15.4.3 General Impacts without Mitigation

This section describes predicted impacts without the incorporation of mitigation measures. Drainage design will adopt current Highway Agency standards and aim to achieve water quality objectives now applicable in the UK as a result of the Water Framework Directive. Potential impacts relate to both water quality and water quantity:

- road surface runoff, and impacts on the quality of receiving waters;
- physical impacts of the scheme upon surface waters, including, potentially, new structures within watercourse and the floodplain.
- during construction (disruption of watercourses/surface water features due to construction activities is also addressed in Chapter 9);
- accidental spillages on the road (pollution risk);
- flooding; and
- groundwater flows (groundwater is addressed in Chapter 16).

15.4.4 Impacts on Watercourse Quality

According to DMRB, the impact of routine road runoff can be assessed using the concentrations of dissolved copper and total zinc in receiving waters as indicators. These

metals have been used as indicators of the level of impact as they are generally the main metallic pollutants associated with road drainage and can be toxic to aquatic life.

The assessment assumes that there is no current road drainage from the existing road network into the watercourses and therefore represents a worst-case scenario. The existing currently drains into watercourses without drainage attenuation as described in section 15.3.8. A preliminary conceptual drainage design was devised to identify impacts without mitigation assuming that run-off from the scheme would discharge to the existing drainage system where applicable and that all drainage will ultimately drain into the North Calder Water. This preliminary drainage design contains no mitigation measures to treat runoff but allows drainage outfalls to be identified.

The assessment method takes into account water quality and Environmental Quality Standards (EQS) for the Protection of all Freshwater Life relating to the receiving watercourses. As previously indicated, EQSs are principally ecological standards, specified for a range of parameters at levels required to protect aquatic life.

EQS for freshwater vary with water hardness, as hardness affects the solubility of metals. The relevant EQS for the protection of freshwater aquatic life provided by SEPA are given in Table 15.8. The revised values given for zinc are not yet statutory but are used by Regulatory Authorities.

Table 15.8 Environmental Quality Standards for the Protection of all Freshwater Life

Parameter	Hardness	EQS
Copper (dissolved)	0 - 50 mg/l $CaCO_3$ 50-100 mg/l $CaCO_3$ 100-150 mg/l $CaCO_3$ 150-200 mg/l $CaCO_3$ 200-250 mg/l $CaCO_3$ >250 mg/l $CaCO_3$	1 µg/l 6 µg/l 10 µg/l 10 µg/l 10 µg/l 28 µg/l
Total Zinc (revised values)	0 - 50 mg/l $CaCO_3$ 50-100 mg/l $CaCO_3$ 100-150 mg/l $CaCO_3$ 150-200 mg/l $CaCO_3$ 200-250 mg/l $CaCO_3$ >250 mg/l $CaCO_3$	8 µg/l 15 µg/l 15 µg/l 50 µg/l 50 µg/l 50 µg/l

Source: SEPA, 2003

Assessment requires data on the upstream concentrations of dissolved copper and total zinc in each watercourse, an indication of receiving water hardness, an estimate of the road surface area to be drained to each outfall, the run-off coefficient of the road scheme, traffic flow data and the 95 percentile flow (Q_{95}) of the receiving watercourse. In the absence of flow data to calculate Q_{95}, the Q_{95} was estimated using the Institute of Hydrology methodology as stated above, and shown in Table 15.7.

Where actual values of water hardness were unavailable, a level of between 100-150mg/l was assumed as recommended by DRMB.

In accordance with the Wallingford Procedure, Design and Analysis of Urban Storm Drainage, the runoff coefficient (V) consists of volumetric runoff coefficient (V_C) and routing runoff coefficient (V_R), ($V= V_C \times V_R$). The volumetric runoff coefficient is affected by whether the impervious and pervious areas are considered or the impervious areas alone. The routing runoff coefficients vary with the shape of the time-area diagram (shape and slope of the catchment) and peakedness of the rainfall profile. The runoff coefficient would not be the same for every drainage outfalls on the drainage system but they would be similar. DMRB assumes 50% (0.5) of incidental rain would reach the discharge point. However, it also points out that a more realistic value would be in excess of 70% (0.7). However, calculated coefficient of runoffs for the drainage networks varied between 0.64 and 0.80.

The annual average daily traffic figures are for the design year 2020 assuming low traffic growth rates (Scenario 2 – see Chapter 2 Traffic Assessment for further details). Details of the impacts on the water quality and risk of accidental spillage calculations are given in Appendix 15.1.

Surface runoff without mitigation would cause serious pollution to the watercourses of the North Calder Water catchment downstream of the proposed road outfalls resulting in potential long term effects on aquatic fauna and fishery. The uncontrolled discharge of surface runoff from the construction site may result in effects on the biota of watercourses resulting from the deposition of suspended solids and formation of a sediment layer on the watercourse bed. Once these sediments layers are formed they are not readily displaced by spates and may form compact layers on the bed of the stream. This will alter the nature of the substrate from a sandy stony environment to a sediment crust which can permanently affect habitats, and thus the type of flora and fauna within the watercourse.

The cumulative effects of pollution would result in the North Calder Water being effectively downgraded to a lower classification. Furthermore, as stated above the uncontrolled discharge of road surface runoff could result in an increase in the risk of flooding to existing development downstream.

The assessment does not take into account the effect of the existing A8 outfalls, which are described in Table 15.6.

Tables 15.9, 15.10 and 15.11 show the road drainage length and area and compares the 1 in 2 years greenfield runoff of the catchment and 1 in 2 year peak flow together with 1 in 5 year peak flow of the surface runoff at the proposed outfall locations. It shows excessive increase in the rate of flow for the same rainfall return period due to paved areas. Smaller peak flow for the same road drainage area indicates a longer time of concentration (Tc).

Table 15.9 Surface Runoff at the Proposed Outfall Locations for M8

Outfall and SUDS Basin Reference No.	Road Drainage Length (m)	Road Drainage Area (ha)	1 in 2 year Peak Greenfield Runoff (l/sec)	1 in 2 year Peak Flow (l/sec)	1 in 5 year Peak Flow (l/sec)
Outfall 750 SUDS Basin 1	1250	8.7 (Tc=12.3min)	23.4	579	691
Outfall 2050 SUDS Basin 4	3600	22.7	37.8	523	596
Outfall 4850 SUDS Basin 6	750	4.5	12.2	387	438
Outfall 6300 SUDS Basin 7	2000	8.8	23.8	639	743
Outfall 7600 SUDS Basin 9	1900	13.7	37.0	416	501
Outfall 9500 SUDS Basin 13	800	6.1	16.6	268	310
Outfall 10400 SUDS Basin 14	1650	5.2	14.0	348	429

Table 15.10 Surface Runoff at the Proposed Outfall Locations for APR

Outfall and SUDS Basin Reference No.	Road Drainage Length (m)	Road Drainage Area (ha)	1 in 2 year Peak Greenfield Runoff (l/sec)	1 in 2 year Peak Flow (l/sec)	1 in 5 year Peak Flow (l/sec)
Outfall 0 SUDS Basin 16	1900	1.8	5.9	212	264
Outfall 760 SUDS Basin 2	800	3.8	10.4	310	375
Outfall 6460 SUDS Basin 8	4400	10.3	27.9	586	712
Outfall 8500 SUDS Basin 10	4450	7.3	19.6	416	505
Outfall 10520 SUDS Basin 15	2200	5.3	14.2	328	405

Table 15.11 Surface Runoff at the Proposed Outfall Locations for Junctions

Outfall and SUDS Basin Reference No.	Road Drainage Length (m)	Road Drainage Area (ha)	1 in 2 year Peak Greenfield Runoff (l/sec)	1 in 2 year Peak Flow (l/sec)	1 in 5 year Peak Flow (l/sec)
A725, outfall 150 SUDS Basin 5	1350	5.0	13.5	342	428
B802, outfall 200 SUDS Basin 11	750	3.2	8.5	278	339
B799, outfall 0 SUDS Basin 12	700	2.8	7.5	245	298

Tables 15.12, 15.13 and 15.14, for the M8, APR and Junctions respectively, show the impact of the total zinc and dissolved copper on the watercourses. The analysis shows the magnitudes of increase on the total zinc and dissolved copper are low for North Calder Water, but high for the Kennel Burn and Shotts Burn, without mitigation in place.

Table 15.12 Predicted Impact of Total Zinc and Dissolved Copper on the Receiving Watercourses Without Mitigation for M8.

Outfall and SUDS Basin Reference No.	Sensitivity	Parameter	EQS (µg/l)	U/stream Conc. (µg/l)	D/stream Conc. (µg/l)	Increase (µg/l)	Magnitude+	Significance
Outfall 750, SUDS Basin 1	Medium	Copper	10	3.52	5.44	1.92	Low	Slight
		Zinc	50	21.4	29.7	8.3	Low	Slight
Outfall 2050, SUDS Basin 4	Medium	Copper	10	3.52	6.51	2.99	Low	Slight
		Zinc	50	21.4	34.0	12.6	Low	Slight
Outfall 4850, SUDS Basin 6	Medium	Copper	10	3.52	6.19	2.67	Low	Slight
		Zinc	50	21.4	32.4	11.0	Low	Slight
Outfall 6300, SUDS Basin 7	Medium	Copper	10	3.52	9.62	6.10	Low	Slight
		Zinc	50	21.4	46.5	25.1	Low	Slight
Outfall 7600, SUDS Basin 9	Medium	Copper	10	3.52	7.91	4.39	Low	Slight
		Zinc	50	21.4	39.8	18.4	Low	Slight
Outfall 9500, SUDS Basin 13	Low	Copper	10	3.52	95.05*	91.53	High	Moderate
		Zinc	50	21.4	400.4*	379.0	High	Moderate
Outfall 10400, SUDS Basin 14	High	Copper	10	3.52	24.34*	20.82	High	Substantial
		Zinc	50	21.4	107.1*	85.7	High	Substantial

* Exceeds EQS

Level of magnitude is decided in relation to the existing EQS level. Not exceeding existing EQS, the impact is assessed to be LOW, slightly exceeding the EQS value, the impact is assessed to be MEDIUM, significantly exceeding the existing EQS, the impact is assessed to be HIGH

Table 15.13 Predicted Impact of Total Zinc and Dissolved Copper on the Receiving Watercourses Without Mitigation for APR

Outfall and SUDS Basin Reference No	Sensitivity	Parameter	EQS (µg/l)	U/stream Conc. (µg/l)	D/stream Conc. (µg/l)	Increase (µg/l)	Magnitude+	Significance
Outfall 0, SUDS Basin 16	Medium	Copper	10	3.52	3.81	0.29	Low	Slight
		Zinc	50	21.4	22.57	1.17	Low	Slight
Outfall, 760, SUDS Basin 2	Medium	Copper	10	3.52	3.84	0.32	Low	Slight
		Zinc	50	21.4	22.4	1.0	Low	Slight
Outfall 6460, SUDS Basin 8	Medium	Copper	10	3.52	5.10	1.58	Low	Slight
		Zinc	50	21.4	26.8	5.4	Low	Slight
Outfall 8500, SUDS Basin 10	Low	Copper	10	3.52	39.26*	35.74	High	Moderate
		Zinc	50	21.4	158.0*	136.6	High	Moderate
Outfall 10520, SUDS Basin 15	High	Copper	10	3.52	8.20	4.68	Low	Moderate
		Zinc	50	21.4	35.3	13.9	Low	Moderate

* Exceeds EQS

Level of magnitude is decided in relation to the existing EQS level. Not exceeding existing EQS, the impact is assessed to be LOW, slightly exceeding the EQS value, the impact is assessed to be MEDIUM, significantly exceeding the existing EQS, the impact is assessed to be HIGH

Table 15.14 Predicted Impact of Total Zinc and Dissolved Copper on the Receiving Watercourses Without Mitigation for Junctions

Outfall and SUDS Basin Reference No	Sensitivity	Parameter	EQS (µg/l)	U/stream Conc. (µg/l)	D/stream Conc. (µg/l)	Increase (µg/l)	Magnitude+	Significance
A725 outfall 150, SUDS Basin 5	Medium	Copper	10	3.52	5.06	1.54	Low	Slight
		Zinc	50	21.4	28.1	6.7	Low	Slight
B802 outfall 200, SUDS Basin 11	Low	Copper	10	3.52	18.54*	15.02	High	Moderate
		Zinc	50	21.4	73.2	52.8	High	Moderate
B799, outfall 0, SUDS Basin 12	Medium	Copper	10	3.52	8.07	4.55	Low	Slight
		Zinc	50	21.4	40.8	19.4	Low	Slight

* Exceeds EQS

Level of magnitude is decided in relation to the existing EQS level. Not exceeding existing EQS, the impact is assessed to be LOW, slightly exceeding the EQS value, the impact is assessed to be MEDIUM, significantly exceeding the existing EQS, the impact is assessed to be HIGH

Drainage from the M8 and APR

The runoff from the proposed outfalls at Chainage 750 (M8) and 760 (APR) eventually drains into the North Calder about 400m downstream. The outfalls at chainages 2050 and 4850 will drain directly into North Calder Water where as the outfall at chainage 6300 (M8), 0 (zero) (APR) and 6460 (APR) will drain into the Existing Scottish Water sewer which eventually discharges into North Calder Water about 600m to the north. The outfall at chainage 7600 drains into the North Calder Water about 550m to the north. Based on SEPA's information the water quality of North Calder Water is assessed to be Class B (fair). The water quality information obtained from SEPA for North Calder Water at Calderpark Gauging Station downstream of the proposed outfalls indicates the water hardness is 208 mg/l with the concentrations of dissolved copper and total zinc being 2.53µg/l and 15µg/l respectively. For the purpose of this analysis, the upstream concentrations of dissolved copper and total zinc were assumed to be similar. EQS, which the river levels were compared to, were taken to be 10µg/l for dissolved copper and 50µg/l for total zinc levels.

The runoff from the proposed outfall at chainage 8500 (APR) and 9500 (M8) drains into the Kennel Burn and eventually joins the North Calder about 1.6km downstream. No recorded water quality information is available for the Kennel Burn. As recommended by DMRB volume 11, a hardness value of 100-150 mg/l was therefore used. As Kennel Burn is a tributary of North Calder Water the dissolved copper and total zinc concentrations were taken to be the same as the ones measured at the Calderpark Gauging Station on North Calder Water. In this case the EQSs for dissolved copper and total zinc were taken to be 10µg/l and 15µg/l respectively.

The runoff from the proposed outfall at chainage 10400 (M8) and 10520 (APR) drains into the Shotts Burn a tributary of the North Calder. No recorded water quality information is available for the Shotts Burn. Again, as recommended by DMRB volume 11, a hardness value of 100-150 mg/l was therefore used. The dissolved copper and total zinc concentrations were taken to be the same as the ones measured at the Calderpark Gauging Station on North Calder Water. Again, the EQSs for dissolved copper and total zinc were taken to be 10µg/l and 15µg/l respectively.

Table 15.15 summarises impacts without mitigation for the M8.

Table 15.15 Summary of Impact Without Mitigation for M8

Outfall and SUDS Basin Reference No.	Significance (see Table 15.4)
Outfall 750 (SUDS Basin 1)	Slight Significance
Outfall 2050 (SUDS Basin 4)	Slight Significance
Outfall 4850 (SUDS Basin 6)	Slight Significance
Outfall 6300 (SUDS Basin 7)	Slight Significance
Outfall 7600 (SUDS Basin 9)	Slight Significance
Outfall 9500 (SUDS Basin 13)	Moderate Significance
Outfall 10400 (SUDS Basin 14)	Substantial Significance

Table 15.16 summarises impacts without mitigation for the APR.

Table 15.16 Summary of Impact Without Mitigation for APR

Outfall and SUDS Basin Reference No.	Significance (see Table 15.4)
Outfall 0 (SUDS Basin 16)	Slight Significance
Outfall 760 (SUDS Basin 2)	Slight Significance
Outfall 6460 (SUDS Basin 8)	Slight Significance
Outfall 8500 (SUDS Basin 10)	Moderate Significance
Outfall 10520 (SUDS Basin 15)	Moderate Significance

Drainage from Junctions

Shawhead - The runoff from the new road to the south of M8 at proposed A725 chainage 150 drains into the North Calder Water. The water quality information which was obtained from SEPA as described for mainline road chainage outfall 660 was used.

Chapelhall - The runoff from the new road to the south of M8 at proposed B799 chainage 0 (Zero) drains into the Shirrel Burn and the runoff from the roads to the north of M8 at proposed B802 chainage 200 drains into an existing ditch which finally drains into Kennel Burn. No recorded water quality information is available for the Shirrel Burn. Again, as recommended by DMRB volume 11, a hardness value of 100-150 mg/l was therefore used. As the Burn is a tributary of North Calder Water the dissolved copper and total zinc concentrations were taken to be the same as the ones measured at the Calderpark Gauging Station on North Calder Water with the EQSs of 10μg/l and 15μg/l for copper and zinc respectively.

Table 15.17 summarises impacts without mitigation for Junctions.

Table 15.17 Summary of Impact Without Mitigation for Junctions

Outfall and SUDS Basin Reference No.	Significance (see Table 15.4)
A725, outfall 150 (SUDS Basin 5)	Slight Significance
B802, outfall 200 (SUDS Basin 11)	Moderate Significance
B799, outfall 0 (SUDS Basin 12)	Slight Significance

The results, as summarised in Table 15.15, 15.16 and 15.17 for the M8, APR and Junctions respectively, show that the impact on the North Calder Water quality without SUDS mitigation measures would be of slight significance, moderate significance for Kennel Burn and moderate to substantial significance for Shotts Burn.

15.4.5 Physical impacts on watercourses

Due to the nature of the proposed road horizontal alignment the following watercourses will be affected:

- The entire open channel section of the Unnamed Burn 1 south of Bargeddie over a length 280m between mainline road chainages 600-850 will be removed and 130m of the culverted section will be abandoned. The Baillieston Surface Water Sewer, which drains part of the M8 motorway to the west of the Baillieston

junction and discharges into the Burn between mainline road chainages 500-850 over a length of 260m will be diverted and join the culverted section of the burn south of the proposed road.

- Luggie Burn (extension to existing culvert), east of Bargeddie Junction at mainline road chainage 1700, immediately upstream of its confluence with the North Calder Water, will be culverted over a length of 80m where it is crossed by the motorway and associated earthworks. Downstream of the proposed culvert the Burn will continue through its existing open channel.
- Unnamed Burn 2, south of Kirkshaws at mainline road chainage 2400 immediately downstream of the existing A8 culvert crossing will be diverted parallel to the proposed road over a length of 230m before it crosses the proposed road in culvert at chainage 2170. The diversion joins the existing watercourse immediately downstream of the culvert.
- Kennel Burn, east of Chapelhall Junction at mainline road chainage 9500. The burn currently runs through a culvert for about 430m, which will be affected by the proposed road. The scheme will allow the burn to be diverted in an open channel for a length of about 400m before it crosses the proposed road at chainage 9210.
- Bothwellshields culvert, which carries the existing A8 over Shotts Burn, will be retained to carry the existing M8, and widened on the north and south sides to carry new APR distributor roads.

In addition, the existing small pond on Kennel Burn NGR 780, 616 mainline chainage 9250 will be affected; this is discussed in Chapter 10 Ecology and Nature Conservation.

All of the above activities will require licensing by SEPA under the Controlled Activities Regulations with the exception of very minor work with a low risk to the environment.

15.4.6 Potential Impacts During Construction

The risk associated with the following may potentially result in pollution of nearby watercourses without appropriate mitigation/controls in place:

- general site clearance, such as stripping vegetation and topsoil from the working area leaving exposed ground surfaces susceptible to erosion;
- high silt loadings; this could arise from construction traffic movements over exposed wet temporary haul roads, thereby disturbing exposed ground and releasing silt into the surface water runoff;
- untreated, large stockpiles of topsoil on site can slough off into watercourses during rainfall, thereby creating pollution; and
- accidental spillage of fuel and oils from the engineering plant and machinery and concrete liquors contaminating the nearby watercourses.

Once construction commences, runoff from the construction site may result in pollution of the watercourse(s) downstream of the works. During construction and formation of the

road profile, the runoff from the works will gather to discharge at the lowest point on the profile of the proposed road. These locations eventually could be used as the permanent locations for the road drainage outfalls.

The reaches of the watercourses which are considered to be at risk of contamination (and hence require protection measures to be set in place) are:

- North Calder Water, mainline road chainage 750, situated to the east of the existing A8 Baillieston junction;
- North Calder Water mainline road chainage 2050, situated to the east of the existing A8 Bargeddie junction;
- North Calder Water mainline road chainage 4850, situated to the south of the existing A8 east of Shawhead junction;
- Unnamed Burn 3 mainline road chainage 6400, situated to the north of the proposed road east of the existing pond;
- North Calder Water mainline road chainage 7600, situated midway between Eurocentral and Chapelhall junctions;
- The Kennel Burn mainline road chainage 9500, situated midway between Chapelhall and Newhouse junctions;
- The Shotts Burn road chainage 10400, situated to the north of the Newhouse roundabout;
- Kennel Burn, mainline road chainage 8500, situated to the north of the Chapelhall junction;
- Unnamed Burn 4 to the south of Chapelhall; and
- Shotts Burn, mainline road chainage 10520, situated north of the Newhouse roundabout.

<u>Shawhead</u>

- North Calder Water to the north of the junction.

<u>Chapelhall</u>

- Kennel Burn to the north of the junction about 200m away;
- Unnamed Burn 4 to the south of the junction; and
- Shirrel Burn to the south of the junction about 100m away.

The early establishment of temporary drainage facilities will reduce the risk of pollution problems during construction. In addition, construction operations should adopt best working practices. Guidance on surface water protection during development is provided by SEPA in the form of Pollution Prevention Guidelines (PPG). These notes provide a basis for the assessment of impacts and the design of surface water treatment, in addition to consultation with the local SEPA Environmental Protection Team. Relevant PPGs comprise:

- PPG 1: General Guide to the Prevention of Water Pollution;
- PPG 2: Above Ground Oil Storage Tanks;
- PPG 5: Works in, near or liable to affect watercourses; and
- PPG 6: Working at Construction and Demolition Sites.

Appropriate site specific measures will be required during the construction period to ensure that the Contractor implements and then monitors the recommendations contained within the above guidelines, including the selection of suitable facilities and methods to prevent accidental pollution and to respond effectively to unforeseen events. These measures will be set out in the Environmental Management Plan (EMP).

15.4.7 Accidental Spillage on the Road (Permanent works)

Spillages resulting from individual accidents are potentially the most serious source of contaminants associated with roads. Accidental spillages can range from minor losses of fuel from vehicles to major losses from fractured tanker vehicles, but their effects can be serious because of the unpredictable nature of materials involved.

CIRIA Report 142 explains that the liquids which are carried in large quantities present a high potential for serious pollution following accidental spillage including:

- petrol, diesel fuel, oils, other liquid hydrocarbons and chemicals;
- acids and caustic solutions;
- toxic wastes;
- inert slurries;
- sewage sludge; and
- products that can cause high biological loadings e.g. sugar and dairy products.

A risk assessment of a serious spillage causing pollution has been undertaken according to DMRB. Detailed calculations are provided in Appendix 15.1. The method is based on a number of assumptions such as emergency service response times and runoff coefficients, and therefore provides an estimate of the risk. Predicted traffic flows are based on the 2020 Scenario 2 (Low Growth), 24 Hr AADT (7 day) Flows. It is assumed that the emergency services would take less than 20 minutes to respond.

Serious spillage rates were estimated based on Table 3.2 in Volume 11 DMRB (page A3/4). The type of junction was assumed to be either a motorway rural with no junction (serious accidental spillages per million HGV km/yr = 0.0014) or a rural motorway with slip road (serious accidental spillages per million HGV km/yr = 0.0023). The length of road in each category was calculated from the option layout drawings.

The assessment includes a calculation of the risk of a pollution incident for discharge to two categories of watercourses. According to DMRB, these are aquifers and sensitive watercourses, and all other receiving waters. This risk is measured against acceptable thresholds for each category, predicted spillage risks of 1 in 100 years for ‘aquifers’ and

sensitive watercourse and 1 in 50 years for 'all other receiving watercourses'. For the purposes of this assessment, the North Calder Water and its tributaries are included in the category of 'all other receiving watercourses'.

The results indicate that spillage risk is within acceptable limits under the current conceptual design, which includes emergency spill storage containment features and shut-off valves to prevent spills reaching either the SUDs basins or the receiving watercourses. However the Contractor will be required to discuss and agree with SEPA any further mitigation measures that may be required for the specimen design.

The results are summarised in Tables 15.18, 15.19 and 15.20. The analysis shows that the risk of accidental spillage to category of 'All other receiving watercourses' is within the threshold acceptability of 2%. All of the outfalls, as currently designed, fall well within the threshold of acceptability of 1 in 50 years.

Table 15.18 Summary of Spillage Risk Assessment, Without Mitigation for M8

Watercourse Category	Outfall and SUDS Basin Reference No.	Threshold of Acceptability (1 in Years)	Calculation for Spillage Risk (1 in Years)	Within Acceptable Limits?
All other receiving watercourses	Outfall 750 (SUDS Basin 1)	1 in 50	1 in 370	Yes
All other receiving watercourses	Outfall 2050 (SUDS Basin 4)	1 in 50	1 in 189	Yes
All other receiving watercourses	Outfall 4850 (SUDS Basin 6)	1 in 50	1 in 457	Yes
All other receiving watercourses	Outfall 6300 (SUDS Basin 7)	1 in 50	1 in 216	Yes
All other receiving watercourses	Outfall 7600 (SUDS Basin 9)	1 in 50	1 in 303	Yes
All other receiving watercourses	Outfall 9500 (SUDS Basin 13)	1 in 50	1 in 858	Yes
All other receiving watercourses	Outfall 10400 (SUDS Basin 14)	1 in 50	1 in 378	Yes

Table 15.19 Summary of Spillage Risk Assessment, Without Mitigation for APR

Watercourse Category	Outfall and SUDS Basin Reference No.	Threshold of Acceptability (1 in Years)	Calculation for Spillage Risk (1 in Years)	Within Acceptable Limits?
All other receiving watercourses	Outfall 0 (SUDS Basin 16)	1 in 50	1 in 99	Yes
All other receiving watercourses	Outfall 760 (SUDS Basin 2)	1 in 50	1 in 3563	Yes
All other receiving watercourses	Outfall 6460 (SUDS Basin 8)	1 in 50	1 in 159	Yes
All other receiving watercourses	Outfall 8500 (SUDS Basin 10)	1 in 50	1 in 561	Yes
All other receiving watercourses	Outfall 10520 (SUDS Basin 15)	1 in 50	1 in 1885	Yes

Table 15.20 Summary of Spillage Risk Assessment, Without Mitigation for Junctions

Watercourse Category	Outfall and SUDS Basin Reference No.	Threshold of Acceptability (1 in Years)	Calculation for Spillage Risk (1 in Years)	Within Acceptable Limits?
All other receiving watercourses	A725, outfall 150 (SUDS Basin 5)	1 in 50	1 in 526	Yes
All other receiving watercourses	B802, outfall 200 (SUDS Basin 11)	1 in 50	1 in 655	Yes
All other receiving watercourses	B799, outfall 0 (SUDS Basin 12)	1 in 50	1 in 282	Yes

15.4.8 Flooding and Drainage Impacts

Initial assessments show that the road construction does not impinge on the floodplain of the North Calder Water during 1 in 200 year flood return period including the effect of climate change. Hence there is no floodplain storage loss as the result of the new road development.

The uncontrolled discharge of surface runoff from road drainage to existing watercourses during storm events has the potential to cause localised flooding and increase the risk of flooding downstream with consequential damage and disturbance to residential and commercial properties.

It is anticipated that the addition of road drainage into the North Calder Water and its tributaries without mitigation measures, such as flood storage and attenuation, could result in a significant flood impact during heavy rainfall events. Mitigation measures at the proposed road outfalls would be required to minimise the potential flood impact. A drainage impact assessment has therefore been carried out to evaluate the risk of flooding to the existing properties downstream. The 1 in 2 years greenfield runoff and 1 in 2 years road peak discharges were estimated for each outfall in order to compare the likely impact on flooding. These are presented in sections 15.5.3 and 15.5.7.

15.5 Mitigation

15.5.1 General Drainage Mitigation for the Proposed Road Scheme

The overall drainage strategy has been developed in accordance with DMRB and Sustainable Urban Drainage (SUDS) design manual and Planning Advice Note (PAN) 61 advice on good practice and other relevant information.

The main objective is to treat and control runoff as near to the source as possible thus protecting downstream habitats. The objective of the mitigation measures is to convey surface water run-off from the road surface to a receiving watercourse without increased risk of flooding downstream and detrimental effect on water quality and associated ecosystems. Mitigation measures include those that aim to prevent, reduce or offset potential effects using SUDS

The road drainage strategy will be the positive integration of SUDS features, with the three principal objectives of SUDS, including:

- **Amenity and wildlife** - to integrate with the overall habitat and environmental strategies.
- **Water quantity** - to control the effects of road runoff on the receiving watercourses and therefore mitigate the downstream flood risk.
- **Water quality** - to protect downstream water from point source, diffuse and accidental contamination.

The contractor will be required to discuss, in detail, all proposals for drainage with SEPA, and meet their requirements, including obtaining necessary licences under the Controlled Activities Regulations (see 15.1.1 above).

15.5.2 Road Surface Runoff

The Construction Industry Research and Information Association (CIRIA) Report 142 describes road surface runoff as a complex matrix of inter-related substances. It divides pollutants from road drainage discharges into the following six categories:

Sediments – '*Sediment is simply defined as material that settles to the bottom of a liquid.'*

Hydrocarbons – 'In the report the term hydrocarbons is used to mean organic compounds containing only carbon and hydrogen, particularly the petrochemical derived group which includes petrol, fuel, oils, lubricating oils and hydraulic fluids'.

Metals – **'***The above report indicates that the majority of studies on metals in road runoff have concentrated on lead, cadmium, copper, zinc and iron'.*

Salt and nutrients – '*Salt and nutrients are defined as those generally neutral materials that occur as soluble compounds and have a direct polluting effect upon vegetable matter either by reducing or extinguishing conditions conducive to propagation or by accelerating growth to the detriment of the balance of the environment'.*

Microbial – '*Microbial activity is mainly associated with the particulate material derived from the decay of organic matter or finely divided solids that harbour bacteria or viruses. Significant microbial populations are transported with wind blown soils'.*

Others – '*Substances which do not readily fit into the other classes. Examples of these materials are pesticides and herbicides.'*

High concentrations of pollutants can accumulate during prolonged dry spells or drought, and are then released by rainfall and consequently impact on water quality due to low flows in the watercourses at this time.

DMRB Volume 11 recommends initial assessment of the concentrations of dissolved copper and total zinc concentrations in receiving waters in order to assess the impact of road runoff and to determine whether mitigation is needed.

The A8 corridor lies within the catchment area of the North Calder Water. As a result, there is potential risk of pollution from the collective effects of the motorway surface runoff, its junctions and associated extension of the local road network outfalls within the catchment. The pollution may be more pronounced in the small tributaries because of the small flows in the tributaries which offer little or no dilution.

15.5.3 Mitigation for Surface Runoff Quantity

The uncontrolled discharge of surface runoff from road drainage to existing watercourses during storm events has the potential to cause localised flooding and increased risk of flooding downstream with consequential damage and disturbance to residential and commercial properties.

The 'allowable' discharge rate for the North Calder Water Catchment was estimated using the recommended empirical methods. This rate was then used to estimate the greenfield runoff for the proposed road section and then calculating the required volume of attenuation storage. The lower the runoff value, the greater the attenuation required. In accordance with DMRB guidance the attenuation basins will be designed to cater for a 1 in 100 flood event. For the preliminary designs peak discharge rates were limited to the allowable 1 in 2 year 'greenfield' runoff.

Following discussion with North Lanarkshire Council (NLC), further attenuation will be provided in the designed freeboard to accommodate 1 in 200 flood events. Overflow structures will be incorporated into the attenuation design to allow discharge for extreme events and in emergency conditions. Overland flow routes will be provided for more extreme events allowing safe discharge of the runoff towards the watercourse.

Table 15.21 shows the associated methods and calculated 1 in 2 year greenfield runoff rates for the North Calder Water catchment.

Table 15.21 Methods of Calculation for 1 in 2 year Greenfield runoff for the North Calder Water Catchment.

Method	Formula	Greenfield Runoff (l/sec/ha)
Poots and Cochrane	$1 = 0.0136\ (AREA)^{0.866}(RSMD)^{1.413.}(SOIL)^{1.521}$	2.45
FSSR No6 Institute of Hydrology	$1 = 0.00066\ (AREA)^{0.92}(SAAR)^{1.22}(SOIL)^{2.0}$	3.64
Report No124, Institute of Hydrology	$1 = 0.00108(AREA)^{0.89}(SAAR)^{1.17}(SOIL)^{2.17}$	3.19
Modified Rational Method	$Q_p = 3.61 \bullet C_v \bullet i \bullet A$	3.51
FEH QMED	$QMED_{rural}=1.172(AREA)^{AE}(SAAR/1000)^{1.560}(FARL)^{2.642}(SPRHOST/100)^{1.211}(0.0198)^{RESHOST}$	3.36
FEH transfer method using recorded data for North Calder Water	-	2.70

Comparing the above results, the 2 year greenfield runoff rate (2.7 l/sec/ha) from the FEH transfer method using recorded data for North Calder Water was selected for use in estimating the required volume of detention basins at each road outfalls.

15.5.4 Mitigation for Surface Runoff Quality

The SUDS features proposed for road runoff accord with CIRIA Report C521 and will include:

- **source controls**, as the first level of treatment, i.e. filter drains, swales to provide a means of slowing the runoff rate and treatment of the surface water by filtration (if acceptable), settlement and biodegradation; and.
- **site controls**, as the second level of treatment, where required, i.e. detention basins and swales.

Where possible the SUDS proposals will use source control methods to provide localised attenuation and treatment of surface water runoff from the road prior to discharge into the watercourses. Detention and extended detention basins will be used for the control and treatment of runoff from roads. These will be designed to retain water for a prolonged period during and after storm events, providing conditions for settlement of suspended solids and other pollutants and attenuation of storm water runoff.

The removal efficiencies of the various treatment systems are given in Table 15.22. In addition, the risk of spillage causing pollution at any outfall can be reduced by 65% compared to that calculated without spillage mitigation measures, for every treatment system incorporated into the drainage design (DMRB, 1998).

Table 15.22 Treatment Systems Efficiency

Treatment System	Removal Efficiency (%)						Reduction in Spillage Risk (%)
	Zinc (Total)	Copper (Dissolved)	Iron	Lead	Suspended Solids	Hydro-carbons	
Gully/Carrier Pipe System	10 – 30						
Combined Filter/French Drains	70-80	10-30	80-90	80-90	80-90	70-90	65
Swales/ Grassed Ditch	70-90	50-70	90+	80-90	60-90	70-90	65
Sedimentation Lagoon/ Settling Pond	60-80	20-30	90+	80-90	60-90	70-90	65
Sedimentation Tanks & Oil Separators	30-50	<10	30-40	40-60	30-80	40-99	65

Source: DMRB (1998) Design Manual for Roads and Bridges: Water Quality and Drainage, Volume 11, Section 3, Part 10, Table 2.2

Copper and zinc are used as indicators of the level of impact as they are generally the main metallic pollutants associated with road drainage and can be toxic to aquatic life.

15.5.5 Surface Water Management Train Proposals

The 'management train approach' would be central to the proposed road surface water drainage strategy. The main objective is the treatment and control of runoff as near to the source as possible protecting downstream habitats.

The objective of the mitigation measures outlined below is to convey surface water run-off from the road surface to a receiving watercourse without detrimental effect on water quality and associated ecosystems. Mitigation measures include those that aim to prevent, reduce or offset potential effects.

Mitigation measures to reduce the risk of adverse impacts comprise solutions, which would be aimed at the source of the impact. Using SUDS can reduce the risk of causing deterioration in water quality. This includes the choice of route location and road alignment to avoid impacts. For example the avoidance of important/sensitive water features where possible.

Table 15.23 Surface Water Management Train for M8

Treatment Level	SUDS Technique
Management and Prevention	Good Housekeeping,
Source Control	Swales Filter drains
Site Controls	Swales Oil Interceptors Spillage containments Silt forebays Extended Detention Basins with permanent wet pool

*The arrow indicates the progression of SUDS facilities from source control to site control

Filter Drains

Filter drains will be used along the length of the proposed road including approach roads at the junctions. Filter drains consist of a perforated pipe laid in a trench backfilled with gravel and will be constructed along the terrestrial part of the road. Filter drains will be used to convey road surface runoff to the discharge point and to filter out pollutants including suspended solids, hydrocarbons, iron, copper and zinc. They will also provide attenuation of flows by reducing the velocity of the runoff. Piped carrier drains are required in some locations to transfer discharge from filter drains to ditches. There will not be any provision for filter drains on the bridge decks of structures across the North Calder Water as this is not technically feasible. It is anticipated that combined gullies/kerb/channel drains, specifically designed for use in bridge decks will be used.

Catch pits

Catch pits consist of manholes with shallow depth (about 200mm) sumps. They are designed to trap sediments and other debris and retain a proportion of the suspended solids present in the runoff and settle out hydrocarbons and metals. Catch pits will be located at regular spacing, not more than 100m with longer intervals in exceptional circumstances along the filter drains and at the junctions of carrier drains.

Road Gullies

Road gully pots will be used at the kerbed sections of the roads such as junctions. Gully pots function in a similar manner to catch pits and consist of an inlet grille at road level, a pot and an outlet pipe. The pot extends below the level of the outlet pipe. Road gullies and carrier drain systems would filter out pollutants such as zinc, copper, iron, lead, suspended solids and hydrocarbons.

Swales

Road swales will be used along the bottom of the road embankments and, prior to the road drainage entering a watercourse. Swales have significant pollutant removal potential.

Swales are low-lying vegetated channels that drain water evenly off impermeable areas. Rainwater runs in sheets through the vegetation alongside the swale, which slows and filters the flow. They are designed to convey water, but can also provide the benefits of infiltration, detention and treatment of runoff. Incorporation of check dams or pools can slow flows, increase attenuation and promote deposition of suspended solids.

Oil or Chemical Containment

In order to eliminate the risk of oil or chemical spillage from collisions or accidents involving transport tankers reaching the watercourse, storage containment with a maximum volume of 20m^3 will be introduced at the road outfalls prior to discharging into the SUDS basins. This is likely to be in the form of a long lined swale or a storage feature. During an emergency event the outlet would be blocked while the surface of the road is washed and drained. The spillage would then be pumped into a tanker for safe transportation and disposal.

Extended Detention Basins

Extended detention basins will be provided for attenuation and treatment of the road runoff, prior to discharge into the watercourse.

Extended detention basins are designed to retain water for a prolonged period during and after storm events, providing conditions for settlement of suspended solids and other pollutants and attenuation of storm water runoff. Extended detention basins have significant pollutant removal potential.

Maximum depths during extreme storm events will be up to 3.0m. Shallow sided slopes provide a gradual transition from ground level to the base of the structure with a low flow channel conveying normal flows. Ecological value and diversity can be promoted through micro-wetland areas in the base of the basins.

15.5.6 Erosion Protection

Where required, erosion protection measures will be used to minimise damage to the banks and bed of receiving watercourses at the outfalls from the extended detention basins. Soft engineering techniques will be introduced to minimise the environmental impacts, including stone pitching and reinforced grass.

15.5.7 Flood Risk

Initial assessments show that the road construction does not impinge on the floodplain of the North Calder Water during 1 in 200 year flood return period including the effect of climate change. Hence there is no floodplain storage loss as the result of the new road development.

15.5.8 Watercourse Diversion

Due to the nature of the horizontal alignment of the proposed road, diversion of sections of the following watercourses will be required as shown on Figures 15.4.

15.5.9 Physical Impact of the Proposed Road

As a matter of good practice crossing of watercourses, either by fording or culverting, will be avoided where possible. The watercourses that will be directly and physically affected by the road (i.e. requiring a culvert crossing/widening or minor diversion) will be protected during the construction and operation phases. The Environmental Management Plan (EMP) will include measures to protect watercourses during construction activity in and around them in line with SEPA requirements and best practice guidance.

The proposed diversions under the road will be through bottomless arched culverts, 2m wide by 1.4m high, maintaining the natural substrate of the watercourse and allowing free passage for fish. The culverts will incorporate otter ledges and freeboard above 1 in 100 year flood level to ensure safe passage for wildlife even during high flow conditions.

Initial assessment of the proposed diversions showed no significant impacts on the water levels upstream or downstream of the diversions.

An extension to the existing Luggie Burn culvert will be required to carry the M8 over the watercourse. This structure will comprise a single span precast arch structure with footings out with the existing watercourse and wing walls designed to avoid encroachment of earthworks into the watercourse, thereby protecting in-stream habitat.

Bothwellshields culvert, which carries the existing A8 over Shotts Burn, will be retained to carry the existing M8, and widened on north and south sides to carry new APR distributor roads. This will take the form of a culvert, approximate diameter 3.6 metres, to match existing construction, and will incorporate design features to permit free passage for fish and otters in line with current best practice.

Further hydraulic assessment is likely to be necessary as part of the development of the Contractor's specimen design. Such assessment should adopt the hydraulic software described in the Engineering Assessment carried out for this Scheme.

15.5.10 Baillieston Surface Water Trunk Sewer Diversion (BSWTS)

Due to the nature of the horizontal alignment of the proposed road about 370m of the existing Baillieston surface water trunk sewer upstream of its outfall into Unnamed Burn 1 between mainline road chainages 500-850 will require diversion.

15.5.11 Drainage Assessment

Attenuation of peak flows to 1 in 2 year greenfield runoff rates will be achieved through the use of SUDS attenuation basins. Initial assessment of the capacity of the watercourses using Manning's equation indicated that the discharges from the SUDS basins would not increase the risk of flooding downstream of the point of outfalls. However, further drainage assessment is likely to be required during the development of the Contractor's specimen design, in particular at the following locations:

- CCTV survey of the existing culvert at mainline road chainage 750 to evaluate its condition; and
- CCTV survey of the existing culvert on the Kennel Burn at mainline road chainage 9500 to evaluate its condition.

15.5.12 Surface Water Management

During Construction

The existing large and small watercourses, field drains or any other source of surface water runoff will be intercepted and temporarily re-routed around or culverted through the site. Settling ponds will be provided for runoff discharges from the construction site to intercept eroded particles prior to entry into the watercourses. During construction works there is a potential risk of high volumes of runoff from heavy rainfall. Measures will be provided for safe routes to direct the runoff towards an area for storage with overflow into the nearest watercourse.

Where avoidance of watercourses is not possible, temporary watercourse crossings will be provided for the Kennel Burn and Luggie Burn in the form of large diameter, bottomless arch culverts as previously described. The North Calder water, being a much larger feature, will be crossed by a temporary bailey bridge structure, thereby avoiding, as far as possible, disturbance to the banks and bed of the watercourse. Working within watercourses or on banks will be avoided as a general good practice measure to protect in-stream and bankside habitats.

Permanent Road Drainage

SUDS techniques as stated in Table 15.23 will be used for permanent road drainage systems. Extended detention basins will be provided at mainline road chainages 0 (zero) at Swinton, 750, 2050, 4850, 6300, 7600, 9500, 10400, 10520 and at Shawhead Junction south of M8, at A725 chainage 150, Chapelhall Junction South of M8 at B799 chainage 0 (zero) and Chapelhall Junction north of M8 at B802 chainage 200.

The SUDS facilities at the outfalls will include, an oil interceptor, a spillage containment structure (defence against accidental spillage of harmful liquids and chemicals etc. on the road) and a forebay basin with 20% of the volume of the basin to provide for settlement of coarse silts. The basin will provide attenuation with additional volume[26] for further improvement of water quality. Figure 15.3 shows the general arrangement of SUDS facilities at the outfalls, which may vary depending on the location.

Tables 15.24, 15.25, and 15.26 show details of site controls at the proposed outfall locations.

[26] Of 1 x V_t

Table 15.24 M8, Details of Site Controls

Outfall and SUDS Basin Reference No.	Road Drainage Length (m)	Road Drainage Area (ha)	Impervious Fraction (%)	Volume of Forebay (m^3)	100year Attenuation Storage (m^3)	Treatment Volume Vt (3Vt/4Vt) (m^3)	Allowable 2years Greenfield Discharge (l/s)
SUDS Basin 1	1250	8.66	47	840	3450	735	23.4
SUDS Basin 4	2650	22.70	48	2260	9480	1830	61.0
SUDS Basin 6	800	4.53	62	550	2300	430	12.2
SUDS Basin 7	1950	8.84	72	1200	5030	940	23.8
SUDS Basin 9	1900	13.7	67	1650	6840	1400	37.0
SUDS Basin 13	800	6.13	65	720	2960	615	16.6
SUDS Basin 14	900	5.17	61	620	2580	490	14.0

Table 15.25 APR, Details of Site Controls

Outfall and SUDS Basin Reference No.	Road Drainage Length (m)	Road Drainage Area (ha)	Impervious Fraction (%)	Volume of Forebay (m^3)	100year Attenuation Storage (m^3)	Treatment Volume Vt (3Vt/4Vt) (m^3)	Allowable 2years Greenfield Discharge (l/s)
SUDS Basin 16	1900	1.8	55	190	800	202	6.0
SUDS Basin 2	800	3.83	49	290	1110	350	10.4
SUDS Basin 8	2100	10.33	62	940	3770	910	27.9
SUDS Basin 10	2100	7.28	62	800	3300	700	19.6
SUDS Basin 15	800	5.26	44	530	2230	400	14.2

Table 15.26 Junctions, Details of Site Controls

Outfall and SUDS Basin Reference No.	Road Drainage Length (m)	Road Drainage Area (ha)	Impervious Fraction (%)	Volume of Forebay (m^3)	100year Attenuation Storage (m^3)	Treatment Volume Vt (3Vt/4Vt) (m^3)	Allowable 2years Greenfield Discharge (l/s)
SUDS Basin 5	1050	5.01	52	510	2160	410	13.5
SUDS Basin 11	680	3.16	56	320	1290	290	8.5
SUDS Basin 12	490	2.79	63	320	1320	270	7.5

15.6 Health and Safety Considerations

As part of the specimen design to be developed by the Contractor, and in accordance with DMRB, 2001, volume 4a, a health and safety risk assessment would need to be carried out where the SUDS ponds and wetlands are used for amenity and recreational purposes by the general public. Health and safety risk assessments would also need to be carried out in the future in relation to the road operators and the Contractor implementing the final design.

15.7 Residual Impacts

15.7.1 Proposed Road

The introduction of SUDS will reduce the concentrations of pollutants and suspended solids entering the watercourses. The predicted residual impacts on water quality with the mitigation measures in place are given in 15.27, 15.28 and 15.29 below, with the detailed calculations shown in Appendix 15.1.

Table 15.27 Predicted Impact of Total Zinc and Dissolved Copper on the Receiving Watercourses With Mitigation, M8

Outfall and SUDS Basin Reference No.	Sensitivity	Parameter (µg/l)	EQS (µg/l)	Upstream Conc. (µg/l)	Conc. Without Mitigation (µg/l)	Conc. With Mitigation (µg/l)	Residual Increase Due to Scheme (µg/l)	Magnitude+	Significance
SUDS Basin 1	Medium	Copper	10	3.52	5.44	4.12	0.60	Low	Slight
		Zinc	50	21.4	29.7	21.4	0.0	No Change	-
SUDS Basin 4	Medium	Copper	10	3.52	6.51	4.43	0.91	Low	Slight
		Zinc	50	21.4	34.0	21.3	0.1	Low	Slight
SUDS Basin 6	Medium	Copper	10	3.52	6.19	4.36	0.84	Low	Slight
		Zinc	50	21.4	32.4	21.5	0.10	Low	Slight
SUDS Basin 7	Medium	Copper	10	3.52	9.62	5.44	1.92	Low	Slight
		Zinc	50	21.4	46.5	23.0	1.60	Low	Slight
SUDS Basin 9	Medium	Copper	10	3.52	7.91	4.90	1.38	Low	Slight
		Zinc	50	21.4	39.8	22.6	1.20	Low	Slight
SUDS Basin 13	Low	Copper	10	3.52	95.05*	32.42* / 9.64+	28.90+ / 6.12+	High / Low+	Moderate / Negligible+
		Zinc	50	21.4	400.4*	45.5	24.10	Low	Negligible
SUDS Basin 14	High	Copper	10	3.52	24.34*	10.04	6.52	Low	Moderate
		Zinc	50	21.4	107.1	26.4	5.0	Low	Moderate

+ Based on higher % of efficiency, see Table 15.22
* Exceeds EQS
Level of magnitude is decided in relation to the existing EQS level. Not exceeding existing EQS, the impact is assessed to be LOW, slightly exceeding the EQS value, the impact is assessed to be MEDIUM, significantly exceeding the existing EQS, the impact is assessed to be HIGH

Table 15.28 Predicted Impact of Total Zinc and Dissolved Copper on the Receiving Watercourses With Mitigation, APR

Outfall and SUDS Basin Reference No.	Sensitivity	Parameter (µg/l)	EQS (µg/l)	Upstream Conc. (µg/l)	Conc. Without Mitigation (µg/l)	Conc. With Mitigation (µg/l)	Residual Increase Due to Scheme (µg/l)	Magnitude+	Significance
SUDS Basin 16	Medium	Copper	10	3.52	3.81	3.60	0.08	Low	Negligible
		Zinc	50	21.4	22.57	21.37	-0.03	-	-
SUDS Basin 2	Medium	Copper	10	3.52	3.84	3.61	0.09	Low	Slight
		Zinc	50	21.4	22.4	21.4	0.0	No Change	-
SUDS Basin 8	Medium	Copper	10	3.52	5.10	3.98	0.46	Low	Slight
		Zinc	50	21.4	26.8	21.4	0.0	No Change	-
SUDS Basin 10	Low	Copper	10	3.52	39.26*	13.86* / 4.62+	10.34 / 1.1+	Medium[a] / Low+	Slight / Negligible+
		Zinc	50	21.4	158.0	22.1	0.7	Low	Negligible
SUDS Basin 15	High	Copper	10	3.52	8.20	4.85	1.33	Low	Moderate
		Zinc	50	21.4	35.3	21.0	-0.4	-	-

+ Based on higher % of efficiency, see Table 15.22
* Exceeds EQS
Level of magnitude is decided in relation to the existing EQS level. Not exceeding existing EQS, the impact is assessed to be LOW, slightly exceeding the EQS value, the impact is assessed to be MEDIUM, significantly exceeding the existing EQS, the impact is assessed to be HIGH

Table 15.29 Predicted Impact of Total Zinc and Dissolved Copper on the Receiving Watercourses With Mitigation, Junctions

Outfall and SUDS Basin Reference No.	Sensitivity	Parameter (µg/l)	EQS (µg/l)	Upstream Conc. (µg/l)	Conc. Without Mitigation (µg/l)	Conc. With Mitigation (µg/l)	Residual Increase Due to Scheme (µg/l)	Magnitude+	Significance
SUDS Basin 5	Medium	Copper	10	3.52	5.06	3.99	0.47	Low	Slight
		Zinc	50	21.4	28.1	21.4	0.0	No Change	-
SUDS Basin 11	Low	Copper	10	3.52	18.54*	7.85	4.33	Low	Negligible
		Zinc	50	21.4	73.2	21.1	-0.3	-	-
SUDS Basin 12	Medium	Copper	10	3.52	8.07	4.90	1.38	Low	Slight
		Zinc	50	21.4	40.9	22.2	0.8	Low	Slight

* Exceeds EQS

Level of magnitude is decided in relation to the existing EQS level. Not exceeding existing EQS, the impact is assessed to be LOW, slightly exceeding the EQS value, the impact is assessed to be MEDIUM, significantly exceeding the existing EQS, the impact is assessed to be HIGH

The analysis shows that, with the proposed SUDS mitigation measures in place, the predicted concentrations of dissolved copper and total zinc are substantially reduced.

A precautionary approach to the analysis has been taken, based on the lower removal efficiency as shown in Table 15.22. The results show that there will still be some residual effect on levels of dissolved copper and total zinc in the surface runoff from road drainage, with mitigation in place. All outfalls are within the EQS for dissolved copper and total zinc, with the exception of Outfall/Basins 10 and 13.

At Outfall/Basin 13, mitigation measures will substantially reduce the predicted dissolved copper concentration from 95.05 (no mitigation) to 32.42µg/l (with mitigation). Residual concentrations of dissolved copper at this location will still exceed the EQS (10µg/l) based on the conservative lower removal efficiency rate. Mitigation measures reduce total zinc from 400.4 to 45.5µg/l, but the figures still show a 24.1µg/l residual increase over the upstream concentration due to the scheme. There is however no exceedence of the total zinc EQS.

A recalculation using the higher level of removal efficiency (described in Table 15.22) shows the EQS for dissolved copper will be within EQS both for Outfall/Basin 10 and 13.

The assessment assumes that there is no current road drainage from the existing road network into the watercourses and therefore represents a worst-case scenario. At present the existing A8 road surface runoff discharges into the watercourses with no treatment. The proposed road development will reduce the extent of un-attenuated drainage into the watercourses from the existing A8 paved areas by providing drainage controls and treatment for runoff from the APR as well as the M8 and Junctions. Introduction of SUDS treatment facilities will improve the quality of the surface runoff discharge overall.

Temporary watercourse crossings (to be bottomless arch culverts for minor watercourses and a bailey bridge structure or similar for the North Calder Water) will provide some protection of stream beds during the construction phase; the benefits of which should outweigh the negative environmental impact of the temporary crossing so long as the stream bed and bankside areas are adequately protected through both the design of the temporary feature and its use during the construction phase. The method to be adopted by the Contractor for temporary crossings will be agreed with SEPA in advance of any on-site works.

The impacts are summarised in Table 15.30, 15.31 and 15.32.

Table 15.30 Summary of Impact With Mitigation for M8

Outfall and SUDS Basin Reference No.	Significance (see Table 15.4)	
SUDS Basin 1	Slight Significance	
SUDS Basin 4	Slight Significance	
SUDS Basin 6	Slight Significance	
SUDS Basin 7	Slight Significance	
SUDS Basin 9	Slight Significance	
SUDS Basin 13	Moderate Significance	Negligible Significance+
SUDS Basin 14	Moderate Significance	

+ Based on higher % of efficiency, Table 15.22

Table 15.31 Summary of Impact With Mitigation for APR

Outfall and SUDS Basin Reference No.	Significance (see Table 15.4)	
SUDS Basin 16	Negligible Significance	
SUDS Basin 2	Slight Significance	
SUDS Basin 8	Slight Significance	
SUDS Basin 10	Slight Significance	Negligible Significance+
SUDS Basin 15	Moderate Significance	

+ Based on higher % of efficiency, Table 15.22

Table 15.32 Summary of Impact With Mitigation for Junctions

Outfall and SUDS Basin Reference No.	Significance (see Table 15.4)
SUDS Basin 5	Slight Significance
SUDS Basin 11	Negligible Significance
SUDS Basin 12	Slight Significance

The analysis shows that the impact on the North Calder Water quality with SUDS mitigation measures in place would remain of slight adverse significance, and of moderate significance (for lower removal efficiency) and negligible significance (for higher removal efficiency) for Kennel Burn with Class 'B' water quality but will reduce the impact on Shotts Burn with class A2 water quality to moderate significance.

From the results it appears that the proposals will not have any effect on the water quality of the North Calder Water and Kennel Burn. However, it is important to note that although the method of assessment shows no change, assessing each parameter at the outfalls individually, it can be seen that the reductions in dissolved copper and total zinc are substantial compared to the scheme without SUDS mitigation.

15.8 Effect of Climate Change

It is generally accepted that future climate in the UK is likely to be different compared to present day and it will vary from one part of the UK to another. However, there is uncertainty over the magnitude of future climate change. In response to the lack of definitive projections, the UK Climate Impacts Programme (UKCIP) which is funded by the Department of the Environment, has been investigating the potential impacts of climate change in the United Kingdom. It has produced assessments of the potential

impacts based on rates of increase in global greenhouse gas emissions consistent with the projections of the Intergovernmental Panel on Climate Change (IPCC).

In 1998 the UKCIP published their Technical Report No. 1 entitled “Climate Change Scenarios for the United Kingdom”. Revised scenarios referred to as the UKCIP02 scenarios were published at the end of April 2002. The UKCIP02 scenarios are based on new global emission scenarios published in 2000 by the Intergovernmental Panel Report on Emission Scenarios, and utilise global climate modelling carried out by the Hadley Centre of the Meteorological Office, using their most recently developed climatic models.

In 2003, Babtie Group carried out a review of the implications of projected climate change in relation to the levels of protection offered by Scottish river and coastal flood prevention schemes. The work built on earlier work carried out by Babtie Group for the Scottish Executive (SE) using the UKCIP98 Climate Scenarios (Babtie Group, 2001), and updates the report from that study in the light of the information presented in the UKCIP02 Report on Climate Change Scenarios for the UK (Hulme *et al*, 2002).

In 2005, SE published a report entitled ‘Scottish Road Network Climate Change Study’, (SRNCCS) which recommended that consideration should be given to revising the parameters for the design storm. The report stated that this could be done on an immediate basis by simply changing the design storm from 1 in 1 year to 1 in 2 years for design and 1 in 5 years to 1 in 10 years for surcharge, whilst continuing to take account of any available historical information.

It recommended that, alternatively, further assessment could be carried out using climate change modelling to provide guidance on the extents of future 1 in 1 year and 1 in 5 years events. In either case it is important that drainage systems are designed to meet the desired performance level and there is a risk that the drainage systems being designed under current guidelines may not achieve that objective.

The above report recommended that where a choice of drainage system is available, preference should be given to systems that provide capacity and take account of sustainable drainage techniques.

No particular recommendations were made in relation to the volume of the attenuation basins and limit of discharge at the outfalls.

In order to assess the likely impact of climate change on the proposed M8 road drainage network, the conceptual design for a representative section of the drainage network at road chainage 2050 was analysed. The drainage model was set up in accordance with the existing DMRB hydrological design criteria. (1 in 1 year for design and 1 in 5 year for surcharge). A 1 in 2 year event peak flow was then applied to this drainage system to estimate the impact on the capacity provided. The system was then checked against the 1 in 10 year storm to determine the extent of increased surcharge (SRNCCS recommendation). Similar analysis was also carried out using rainfall figures adjusted to reflect the potential impact of climate change in years 2020, 2055 and 2080.

The impact of climate change on attenuation storage was assessed by comparing results for a 1 in 200 year storm event with the 1 in 100 year design standard currently recommended within the DMRB (SRNCCS recommendation). Again, a comparison was also carried out using rainfall figures adjusted to reflect the potential impact of climate change in years 2020, 2055 and 2080.

In the absence of guidelines for calculating the impact of climate change on the predicted average 95 percentile flow (Q_{95}), the impact of the climate change on the water quality assessed by assuming that the percentage reduction in flow Q_{95} of the receiving watercourse will be the same as that of the summer rainfall assuming the summer condition would produce the lowest flow Q_{95} and hence provide more conservative results.

The drainage area investigated covers a total of 24ha including the road embankment cuttings and central reserves. The initial drainage network analysed comprised 104 carrier and filter pipes with diameters ranging from 150mm and 600mm.

The following drainage elements were examined:

- The flow capacity of the carrier pipes.
- The volume of storage provided to attenuate flows.
- The quality of road surface runoff discharging to the receiving watercourses.

This study provides a quantitative approach to understanding the impact of the climate change on the road drainage systems. It is recommended that the results of the investigation are used as a guide for the design of the new road drainage systems serving the proposed M8 Baillieston to Newhouse scheme.

The analysis showed:

1. That the impact of the climate change on the capacity of the road drainage systems can be resolved by selectively increasing pipe sizes. The length of affected pipework varies and should be determined by hydraulic assessment.
2. Comparison with 'climate change' adjusted 2020, 2050 and 2080 flows suggests that a network design in accordance with SRNCCS recommendations (changing the design storm from 1 in 1 year to 1 in 2 year) would maintain current operating standards well beyond 2050 but not to 2080.

   Climate change will increase the surcharged length of the drainage network (DMRB design criteria: level of surcharge above the soffit of the pipes with no surface flooding at the manholes). Increasing the design standard from 1 in 5 years to 1 in 10 years in line with SRNCCS recommendations would maintain current operating standards to 2080 and beyond.
3. The required volume of the attenuation storage is predicted to increase due to the effect of climate change. Adopting a 1 in 200 year design standard instead of the

current DMRB design standard of 1 in 100 year would maintain current operating standards well beyond 2050 but not to 2080.

4. Increases in dissolved copper and total zinc concentrations are predicted due to reduction of low flows resulting in a potential; reduction in water quality in receiving watercourses.

Given the high levels of uncertainty associated with climate change prediction, a precautionary approach is generally recommended. The following design standards are thus recommended for adoption for this scheme and have been incorporated into the conceptual design:

- road drainage to be designed to cater for 1 in 2 year rainfall event and checked for surcharge for 1 in 10 year storm event years in line with SRNCCS recommendations;
- attenuation storage to be designed to cater for 1 in 100 year rainfall event. Further attenuation should be provided in the designed freeboard to accommodate a1 in 200 flood event; and
- design of the surface water (SUDS) treatment facilities to mitigate against the potential adverse impact on the aquatic environment due to increased levels of the pollutants associated with road use and low flows.

15.9 Evaluation

The evaluation which is made here is limited to the effect of the physical impact of the proposed road alignment on the local water bodies, floodplain of the watercourses and surface runoff quality. Ecological and hydrogeolical/groundwater impacts, analysis and assessments, are addressed in Chapters 10 and 16 respectively.

15.9.1 Water Quantity and Quality

Predicted impacts of total zinc and dissolved copper without, and with, mitigation are shown in Tables 15.12, 15.13, 15.14 and 15.27, 15.28, 15.29. Examination of the results shows reduced magnitude of impact from high to low for basins 13 and 14, high to medium and low for basin 10, low to no change for basins 1, 2, 8 and 15. This will result in an improvement to the quality of the water in the relevant watercourses.

The analysis shows that the introduction of mitigation measures, including SUDS, will reduce to acceptable levels the impact of the road runoff on the peak flows in the watercourse. The mitigation measures will reduce or eliminate impacts of road runoff on water quality and will avoid cumulative effects downstream.

SUDS source controls, such as filter drains and swales will provide initial treatment by slowing runoff rates and filtration. At the drainage outfalls, oil interceptors will prevent oil entering the watercourse, while additional provisions are included in the form of oil containments for defence against accidental spillage of harmful liquids on the road. Silt forebays and extended detention basins/ponds with a permanent wet pool will provide attenuation of the runoff, allowing settlement of suspended solids and other potential

pollutants. The wetland areas in the base of the basins will develop biodiversity value over time as they are colonised by aquatic and marginal species of plants and animals.

SUDS features provide attenuation of surface runoff and protection for existing watercourses, and treatment of runoff for improved water quality. It is essential that these measures incorporated into future design development so that it meets sustainable drainage objectives.

The Contractor will be required to give due consideration to the recommendations contained within this document. The Contractor will be required under the contract to ensure that appropriate and effective mitigation measures are set in place (including for example measures to encourage otter and other wildlife movements and to ensure free passage of fish).

15.9.2 Risk of Accidental Spillage

The spillage risk assessment and threshold of acceptability for category of 'All other receiving watercourses' are within the threshold of acceptability of 2%, for both with and without mitigation. However, introducing SUDS facilities significantly reduces any risks to watercourses from accidental spillage on the road. Tables 15.33, 15.34 and 15.35 summarise the calculation of spillage risk with mitigation in place for the M8, APR and Junctions respectively.

Table 15.33 Summary of Spillage Risk Assessment, With Mitigation for M8

Watercourse Category	Outfall and SUDS Basin Reference No.	Threshold of Acceptability (1 in Years)	Calculation for Spillage Risk (1 in Years)	Within Acceptable Limits?
All other receiving watercourses	SUDS Basin 1	1 in 50	1 in 875	Yes
All other receiving watercourses	SUDS Basin 4	1 in 50	1 in 444	Yes
All other receiving watercourses	SUDS Basin 6	1 in 50	1 in 1081	Yes
All other receiving watercourses	SUDS Basin 7	1 in 50	1 in 510	Yes
All other receiving watercourses	SUDS Basin 9	1 in 50	1 in 716	Yes
All other receiving watercourses	SUDS Basin 13	1 in 50	1 in 2030	Yes
All other receiving watercourses	SUDS Basin 14	1 in 50	1 in 894	Yes

Table 15.34 Summary of Spillage Risk Assessment, With Mitigation for APR

Watercourse Category	Outfall and SUDS Basin Reference No.	Threshold of Acceptability (1 in Years)	Calculation for Spillage Risk (1 in Years)	Within Acceptable Limits?
All other receiving watercourses	SUDS Basin 16	1 in 50	1 in 234	Yes
All other receiving watercourses	SUDS Basin 2	1 in 50	1 in 8433	Yes
All other receiving watercourses	SUDS Basin 8	1 in 50	1 in 376	Yes
All other receiving watercourses	SUDS Basin 10	1 in 50	1 in 1328	Yes
All other receiving watercourses	SUDS Basin 15	1 in 50	1 in 4461	Yes

Table 15.35 Summary of Spillage Risk Assessment, With Mitigation for Junctions

Watercourse Category	Outfall and SUDS Basin Reference No.	Threshold of Acceptability (1 in Years)	Calculation for Spillage Risk (1 in Years)	Within Acceptable Limits?
All other receiving watercourses	SUDS Basin 5	1 in 50	1 in 1246	Yes
All other receiving watercourses	SUDS Basin 11	1 in 50	1 in 1549	Yes
All other receiving watercourses	SUDS Basin 12	1 in 50	1 in 688	Yes

15.10 References

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Centre for Ecology and Hydrology (formerly Institute of Hydrology), (1999), Flood Estimation Handbook. Wallingford.

CIRIA Report C521 (2000) “Sustainable Urban Drainage Systems - Design Manual for Scotland and Northern Ireland”.

Planning Advice Note (PAN) 61, (2001), Planning and Sustainable Urban Drainage Systems.

Scottish Planning Policy 7 (SPP7) (2004), Planning and Flooding, The Scottish Office, Environment Department.

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Highway Agency Design Manual for Roads and Bridges (DMRB), Volume 4a, Geotechnics and Drainage.

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Design and Analysis of Urban Storm Drainage (1981), The Wallingford Procedure, Volume 1, Principles, Methods and Practice

Scottish Executive 2003, Environment Group Research Report 2003/05, Climate Change: Review Of Levels Of Protection Offered By Flood Prevention Schemes Ukcip02 Update

Scottish Executive (2005) Scottish Road Network Climate Change Study

16 Geology and Soils

16.1 Introduction

This section outlines the assessment undertaken to determine the potential impacts on geology and soils of the proposed scheme option during, the construction and operation phases. The assessment was carried out in accordance with the guidelines set out in Volume 11 of the DMRB. Potential impacts upon geology and soils during the construction phase are considered in Chapter 9 – Disruption Due to Construction.

Road schemes have the potential to impact upon the geology and soils of an area through direct and indirect impacts on sites of importance or scientific interest, loss or sterilisation of mineral deposits or soil resources, disturbance of contaminated land or surcharging of ground which may accelerate erosion and subsidence.

It should be noted that this section does not discuss the value of the soil resources in terms of agriculture or other potential land uses as this has already been covered in Chapter 8 – Land Use.

16.2 Methods

16.2.1 Baseline Methods

A desk-based study of the proposed route corridor was undertaken for Stage 2. This made use of historical ground investigation data to build a theoretical 3-dimensional ground model for each of the route options being considered at that time. This model has been continually updated with information from the preliminary Phase 1A (M8 Corridor) Ground Investigation and the mining-focused Phase 2 Ground Investigation. It will be further revised when the ongoing detailed Phase 3 Ground Investigation has been completed. The ground model allows digital manipulation of the historic ground investigation information and facilitates interpretation of the data, for example to produce drawings that illustrate ground conditions in plan and profile. Relevant information such as laboratory test results and known areas of potential contamination may also be superimposed. By interpreting the model, it is possible to predict the prevailing soil types present beneath the proposed alignment and to establish the broad engineering properties of each soil horizon.

16.2.2 Impact Assessment Methods

Guidance Documents

The impact of the proposed road scheme on the geology and soils of the area has been considered in accordance with the Design Manual for Roads and Bridges (DMRB), (1998); Volume 11; Environmental Assessment, Section 3; Environmental Assessment Techniques, Part 11; Geology and Soils.

Impact Assessment Criteria

In order to determine the impact that the preferred route option would have on sites of geological significance, a hierarchy of importance and magnitude has been devised for sites and impacts respectively. Significant geological sites may be classified into those of national importance/value, regional importance/value and those not considered worthy of protection, refer to Table 16.1. The magnitude of the impact may be determined by predicting the extent of the change in baseline condition resulting from route development, refer to Table 16.2. Each potential impact is assessed in order to establish its overall significance by drawing a comparison of the magnitude of impact against the importance/value of the affected site as shown in Table 16.3.

Table 16.1 Criteria to Assess the Geology and Groundwater Sensitivity

Sensitivity	Criteria
High	Areas containing geological or geomorphological features considered to be of a national interest, for example, Sites of Special Scientific Interest. Designated sites of nature conservation importance dependent on groundwater. Presence of extensive areas of economically important minerals valuable as a national resource.
Medium	Areas containing geological features of designated regional importance, for example geological SSSI, Regionally Important Geological Sites (RIGS), considered worthy of protection for their educational, research, historic or aesthetic importance. Exploitation of local groundwater is not extensive and/or local areas of nature conservation known to be sensitive to groundwater impacts. Presence of areas of economically important minerals of regional value.
Low	Geological features not currently protected and not considered worthy of protection. Poor groundwater quality and/or very low permeabilities make exploitation of the aquifer(s) unfeasible. Changes to groundwater not expected to impact on local ecology. Absence of mineral areas or minimal areas of local economical value only.

Table 16.2 Criteria to Assess the Magnitude of the Predicted Impact on Geology and Groundwater

Magnitude of Impact	Criteria
Major	Partial (greater than 50%) or total loss of a geological site, or where there would be complete severance of a site such as to affect the value of the site. Major permanent or long term change to groundwater quality or available yield. Existing resource use is irreparably impacted upon. Changes to quality or water table level will impact upon local ecology.
Moderate	Loss of part (between approximately 15% to 50%) of a geological site, major severance, major effects to the setting, or disturbance such that the value of the site would be affected, but not to a major degree. Changes to the local groundwater regime are predicted to impact slightly on resource use but not rule out any existing supplies. Minor impacts on local ecology may result.
Slight	Minimal effect on the geological site (up to 15%) or a medium effect on its setting, or where there would be a minor severance or disturbance such that the value of the site would not be affected. Changes to groundwater quality, levels or yields do not represent a risk to existing resource use or ecology.
Negligible	Very slight change from baseline condition. Change hardly discernible, approximating to a 'no change' condition.

Table 16.3 Criteria to Assess the Significance of the Predicted Impact on Geology and Groundwater

Magnitude	Sensitivity		
	High	Medium	Low
Major	Major	Major - Moderate	Moderate
Moderate	Major - Moderate	Moderate - Slight	Slight
Slight	Moderate	Slight	Slight
Negligible	Negligible	Negligible	Negligible

16.3 Baseline Conditions

16.3.1 Topography and Geomorphology

The Stage 2 Environmental Impact Assessment Report identified no topographical or geomorphological features within the survey corridor that were considered worthy of protection.

Since the production of the Stage 2 Report, a Preliminary Ground Investigation has been undertaken. This has provided a significant volume of data that has been incorporated into the ground model and has been used to more accurately define ground conditions generally. However, during this process no sites of geomorphological interest have been identified.

Topographical and geomorphological resources are therefore concluded to be of low sensitivity.

16.3.2 Geology

Drift Geology

The information obtained during the Preliminary Ground Investigation has enabled the ground model to be developed resulting in minor modifications to the interpreted soil profile. The broad sequence of stratigraphy that was described in the Stage 2 Environmental Impact Assessment Report has generally been confirmed by the recent intrusive works, however the additional information has exposed local variations in the strata.

Glacial till is the principal natural soil type beneath the study corridor, confirmed by recent ground investigation information. However, where this material was previously interpreted as being relatively uniform, it has now been established that, locally, glacial till gives way to fluvioglacial or glaciolacustrine deposits.

The preliminary ground investigation data have also allowed boundaries between soil horizons to be more accurately defined.

The Stage 2 Environmental Impact Assessment Report identified no drift deposits within the study corridor that were of economic importance. Information acquired since the production of this report has allowed refinement of the ground model but has not uncovered any economically important drift material. This baseline condition is therefore classified as low sensitivity.

Solid Geology

Several rotary boreholes were drilled during the ground investigations and have generally confirmed the assessment of solid geology that was produced at Stage 2.

The bedrock beneath the area is mainly mudstone, siltstone and sandstone and for the majority of the route is within 15m of the ground surface. No sensitive sites associated with solid geology have been identified within the survey corridor and this baseline condition is therefore considered to be low sensitivity.

16.3.3 Ground Surface Stability

Prior to the Phase 1 and Phase 2 ground investigations it was anticipated that unconsolidated underground mine workings would exist at shallow depths beneath rockhead in the study corridor. As described in the Stage 2 Environmental Impact Assessment Report it is recognised that where such conditions exist there is the potential for ground instability at the surface due to collapse of workings.

The Phase 1 and Phase 2 ground investigations included a study of abandoned mine workings and confirmed that potentially unstable ground exists along much of the

proposed route alignment. In particular the areas of Bargeddie, Shawhead and extensively around Chapelhall are underlain by mine workings at shallow depths beneath rockhead.

In terms of the value of a site for development, stable ground is of extreme importance and for the purposes of this assessment ground stability continues to be termed of high value.

16.3.4 Hydrogeology/Groundwater

The Stage 2 Environmental Impact Assessment Report recorded the hydrogeology of the area to be medium sensitivity. Since the production of that report several water monitoring stations have been installed across the site and have been monitored on a monthly basis. Results of this recent monitoring programme indicate that sub surface water is present at relatively shallow levels of less than 6m below ground surface. This is thought to be perched groundwater located within relatively permeable layers within the glacial till.

No sensitive hydrogeological features have been identified within the mainline study corridor and therefore the Stage 2 assessment remains unchanged at medium sensitivity.

16.3.5 Sensitive Land Uses/Designated Sites

Environmentally sensitive sites are considered in Chapter 10 – Ecology and Nature Conservation. As described in the Stage 2 Environmental Impact Assessment Report there are no geologically sensitive sites within the study corridor and this baseline condition therefore remains classified as low.

16.3.6 Contamination

At the time of the Stage 2 Environmental Impact Assessment Report little information was available on the extent and nature of contamination at the site. The Phase 1 Ground Investigation included a preliminary contamination investigation to provide an initial indication of contamination levels across the site. Historical land uses were reviewed during the earlier desk study process and sites of potential contamination were established. Each of these discrete sites was then investigated by intrusive methods and a series of chemical laboratory tests were undertaken on soil samples.

Qualitative risk assessments have been carried out using laboratory test data for each of the sites of potential contamination and results indicate that at a small number of locations there is a risk of contamination of controlled groundwater and surface waters from historical railway and mining land.

Those sites where contaminated soils have been confirmed are potentially of regional significance and may, for the purposes of this assessment, be classed as medium sensitivity.

16.3.7 Loss of Economic Deposits

The Phase 2 Ground Investigation involved a detailed study of the mineral position beneath the study corridor. This investigation reinforced the Stage 2 assessment that an economic quantity of coal remains beneath the site. As this resource is considered to be of regional importance the loss of economic deposits may be classified as medium sensitivity.

16.3.8 Summary of Baseline Conditions

Table 16.4 – Summary of Baseline Conditions

Baseline Condition		Sensitivity of Geological Interest
Topography and Geomorphology		Low
Geology	Drift Geology	Low
	Solid Geology	Low
Ground Surface Stability		High
Hydrogeology / Groundwater		Medium
Sensitive Land Uses / Designated Sites		Low
Contamination		Medium
Loss of Economic Deposits		Medium

16.4 Predicted Impacts

16.4.1 General

This section discusses the potential impacts on baseline geology and soil conditions that may result from development of the proposed route option without any mitigation measures. Only those geological conditions that have been identified as being of a greater than “low” sensitivity within Section 16.3 have been considered in the following section. The potential impact has been assessed for two possible scenarios, described below:

- Do-nothing Scenario

  Under the conditions of a “do-nothing” scenario, i.e. the proposed scheme did not go ahead, baseline conditions would only be affected by the occurrence of natural geological processes over time and would therefore remain largely unchanged. Other development may occur in the area with potential implications on geological and soil resources, however, no such significant development has been identified as part of this assessment.

- Development of the proposed Scheme Option

16.4.2 Ground Surface Stability

The collapse of abandoned workings is usually a result of deterioration of mine supports or mine roof material. Where this occurs at shallow depth the void created by original mine workings may migrate upwards to the surface and cause instability at ground level. This may occur with or without surface construction. However, ground instability would significantly affect the value of the site for road development and as a significant proportion of the route has been found to be at risk of shallow mine working collapse the magnitude of this impact may be considered major.

Reference to Table 16.3 indicates that the significance of route development on potential ground instability is major.

16.4.3 Hydrogeology / Groundwater

As described in the Stage 2 Environmental Impact Assessment Report groundwater levels can naturally vary both locally and regionally due to seasonal, short term and long-term climatic variations. The impact of a do-nothing scenario would be negligible.

The establishment of the proposed road would be likely to have an impact on hydrogeology only where groundwater is located at shallow depths or close to formation level.

Assumed perched groundwater has frequently been encountered at shallow levels and may be close to formation level particularly in areas of cuttings. Perched groundwater can easily be addressed using standard filter or slope drainage systems and whilst these will adequately protect the carriageway, the groundwater aquifer will be unaffected.

No groundwater sensitive sites have been identified within influencing distance of the proposed route alignment and it is therefore anticipated that the establishment of a new road would have a negligible impact on groundwater.

From Table 16.3, the combination of sensitivity and impact magnitude would indicate that the significance of route development on hydrogeology and groundwater is negligible.

16.4.4 Contamination

Contaminants have been identified in the soil at a number of locations and a qualitative risk assessment has been carried out for each of these sites. In most cases, under the conditions of a do-nothing scenario, the presence of contamination in the soil is not of concern as the contaminants have been found to be immobile and unable to impact on any receptor. However at a small number of sites the contaminants have been found to be leachable and may therefore be mobilised by infiltrating surface water and transferred to the underlying aquifer. Therefore under a do nothing scenario groundwater at some locations may be at risk from leachable contaminants and this impact is considered to be moderate.

Following establishment of the proposed new road hard cover will occupy previously soft ground. This will reduce surface water infiltration and will therefore lower the risk of

contaminants being mobilised beneath the carriageway. It is considered that in this way the impact on groundwater will be reduced from moderate to slight.

The construction of a new road to a contaminated site will introduce a potential impact on construction and maintenance workers as they may come into contact with the contaminated material. This impact is considered to be moderate.

The significance of route development on contamination is therefore assessed to moderate to slight.

16.4.5 Loss of Economic Deposits

The Stage 2 Environmental Impact Assessment Report states that despite extensive coal extraction beneath the site, significant quantities of coal are anticipated to remain. This has been confirmed by intrusive investigation as part of the Phase 2 Ground Investigation. However, as previously reported, the presence of the existing A8 as well as residential development to the north, would restrict opencast operations to any currently undeveloped areas in the vicinity south of the A8. The impact of a do-nothing scenario on the potential development of opencast coaling operations is therefore negligible.

The construction of the proposed road would effectively sterilise additional land from opencast development. However, given that the proposed alignment is relatively close to the existing A8 the additional area that would become sterilised on development would be relatively small and the magnitude of the impact and significance of route development may therefore be classed as slight.

16.4.6 Summary of Significance of Predicted Impacts without Mitigation

Table 16.5 – Summary of Significance of Predicted Impacts without Mitigation

Baseline Condition	Sensitivity of Geological Interest	Magnitude of Impact	Significance of Impact
Ground Surface Stability	High	Major	Major
Hydrogeology / Groundwater	Medium	Negligible	Negligible
Contamination	Medium	Groundwater - Slight	Slight
		Humans - Moderate	Moderate - Slight
Loss of Economic Deposits	Medium	Slight	Slight

16.5 Mitigation

16.5.1 Do-nothing Scenario

Under the conditions of a "do-nothing" scenario mitigation measures would be unnecessary.

16.5.2 Development of a Scheme Option

At this stage the only significant impacts that have been identified in relation to geology and soils is potential ground surface instability due to mine workings collapse, disturbance of contaminated ground and the loss of economic coal deposits. Mitigation measures to address each of these impacts are discussed in the following sections.

16.5.3 Ground Surface Stability

Potentially unstable ground exists at several locations along the proposed route alignment as outlined in Section 16.3.3. The most practical mitigation measure is consolidation of workings by grouting. This involves the drilling of a grid of closely spaced boreholes into the mine working void. Grout is placed down each drilled hole, commencing down the dip of the inclined seam and around the perimeter of the zone. This forms a curtain/perimeter wall and creates a barrier preventing grout material from escaping from the proposed grout zone. A suitable method statement for grouting work would be necessary to minimise damage and/or disruption to surrounding land, vegetation and natural features. Boreholes and proposed methods within locally designated SINCs (see Chapter 10 Ecology and Nature Conservation) should be discussed in advance with relevant officers of North Lanarkshire Council. Pre-works surveys for protected species (for example the possible presence of badger setts) should also be carried out at the appropriate time.

A further option to address unstable ground would be extraction of the remaining coal deposits by opencast methods and reinstatement of the ground to achieve stabilisation, although this could introduce other impacts.

16.5.4 Contamination

The past railway and mining activities, which may have caused some ground contamination, are not considered to present any risk to current users or to the public.

Current waste management regulations and sustainability objectives and guidance encourage the retention on site of all materials, even those that are contaminated. The impact of mobilising contamination and potentially bringing contaminants into contact with, controlled waters, or humans can be mitigated by remediation, encapsulation, or the introduction of clean cover and hydraulic break layers. However in each case the identified sources of contamination and the groundwater receptor extend far beyond the boundaries of the proposed construction corridor. It is therefore impractical to attempt to address this contamination risk by treating soils within the proposed construction area. Furthermore it has been demonstrated in Section 16.4.4 that establishment of the proposed road will reduce the risk of contaminated soils impacting on groundwater. It is unlikely that construction of the road will increase contamination exposure and

remediation may therefore not be necessary. Discussions with appropriate regulatory authorities are currently ongoing with respect to this assessment and any agreed measures will form part of contractual documentation for the Contractor.

Mitigation measures will be applied to protect construction and maintenance workers and to ensure that any possible migration of contaminants is avoided. The risk workers from mobilisation of and exposure to contaminants can be reduced to acceptable levels by ensuring appropriate personal protective clothing and equipment is adopted and standard health and safety procedures are followed where necessary.

Provided that potentially contaminated material is excavated and handled in a responsible manner to prevent migration to other receptors, the risks and associated impacts will be reduced to acceptable levels.

16.6 Residual Impacts

With appropriate mitigation measures adopted during the design, construction and operation of the any of the three options, potential effects associated with the collapse of old mine workings and the disturbance of contaminated ground will be reduced so as not to pose any significant risks to the general public, site workers or the development.

Consolidation of mine workings by grouting creates a relatively impermeable zone which may be located beneath the groundwater table. This is likely to alter groundwater flow paths by closing off a preferential pathway through workings. It also blocks an area which may previously have been filled with potentially contaminated minewater. As the grouted zone is relatively small in terms of the regional groundwater aquifer and the greater interconnected system of mine workings the impact of filling this void space is considered to be negligible.

16.7 References

Design Manual for Roads and Bridges Volume 11 Environmental Assessment (1993, amended and updated 2003), The Highways Agency, The Scottish Executive Development Department, The National Assembly of Wales and The Department of the Environment for Northern Ireland.

W A Fairhurst & Partners, Geological Long-Section, Mainline, Revision B, Horizontal Scale 1:1000, Vertical Scale 1:200.

W A Fairhurst & Partners, Basis of Design Statements – Mining Risk Assessments

W A Fairhurst & Partners, Basis of Design Statements – Contamination Risk Assessments

17 Policy and Plans

17.1 Introduction

This Chapter provides an overview and appraisal of the strategic and local planning context of the proposed A8 up-grade between Baillieston and Newhouse (the scheme). The Chapter sets out the Strategic Policies and their implications for the M8 project, looking at current guidance in the form of National Planning Policy Guidelines (NPPGs) and more recent Scottish Planning Policy (SSPs), before addressing the relevant structure and local plan policies and the context these set for the motorway improvement.

17.2 Methods

Information regarding current and emerging planning guidance and policies has been collated through review of the following documentation:

- National Planning Policy Guidelines.
- Scottish Planning Policies.
- The Glasgow and Clyde valley Joint Structure Plan.
- Relevant Local Plans.

17.3 Baseline Conditions

17.3.1 National Planning Policy

The following section examines the current national, strategic and local planning policies relating to the scheme.

The Scottish National Planning Framework

The National Planning Framework is a planning document that analyses the underlying trends in Scotland's territorial development, the key drivers of change and the challenges. It is one of the factors taken into account in coming to decisions on policy and spending priorities as well as providing a context for development plans and planning decisions.

The Framework sets the strategic context for the A8 up-grade. The transport policy is based on supporting the promotion of economic growth, promoting social inclusion and accessibility, while ensuring that the development of transport is sustainable and minimises the environmental impact of travel.

The A8 up-grade fits with the documents targeted improvements of the motorway and trunk road network by tackling some of the critical congestion spots. This issue is highlighted further in the “Key Issues and Drivers for Change Section”, which identifies that in parts of urban Scotland, the trunk road network and public transport systems require investment to address problems of congestion and unreliability to match Scotland’s needs and potential.

The "Scotland 2025 Section" sets out the priorities for spatial development and investment under "A Better Transport System". The Executive's transport infrastructure commitments to 2010 include completing the Central Scotland motorway network, and incorporates the up-grading the M8 as part of a range of works that include up-grading the M80 and building the M74 Northern Extension and the Aberdeen Western Peripheral Route. The M8 up-grade is one of the strategic improvements whose delivery has the full commitment of the capital investment plan for the next decade.

The Section on "Spatial Perspectives" sets a strong supporting context for the M8 up-grade works with the relationship between Edinburgh and Glasgow identified as being of key importance. The Framework identifies the complementary relationship between the two as important to the Central Belt and the Scottish economy as a whole because Central Scotland is viewed as a destination for business investment, living and tourism in both the European and global contexts. The document states:

"…from this perspective, Edinburgh and Glasgow should be seen as two economic and cultural anchors linked by a fast, efficient, high quality transport system" (paragraph 147, page 70). The M8 up-grade is also important in terms of the supportive role it will bring to key strategic development projects to the West of Edinburgh, the Clyde Waterfront defined growth corridor and the Clyde Gateway East of Glasgow".

National Planning Policy Guidelines, NPPG and SPP

National Planning Policy Guidelines (NPPG) and Scottish Planning Policy (SPP) are prepared by the Scottish Executive and provide a statement of Government policy on land use and other planning related issues, which are considered to be of national importance. These statements of Government policy may, where appropriate, be material considerations that should be taken into account in the development control process. At present much of the relevant guidance is under review, and for this reason each of the existing and consultation documents are outlined and reviewed. The relevant NPPGs and SPPs to this policy review are:

- NPPG 17 Transport and Planning (April 1999);
- SPP 17 Planning for Transport (August 2005);
- NPPG 18 Planning and the Historic Environment;
- NPPG 5 Archaeology and Planning;
- SPP2 Economic Development;
- NPPG 9 The Provision of Roadside Facilities on Motorways and other Trunk Roads in Scotland;
- SPP 7 Planning and Flooding; and
- NPPG 14 Natural Heritage.

The purpose of this section is to provide a comprehensive evaluation of the policies and how they relate to the A8 up-grade proposal. Quotes are included from the documents where it is felt supportive evidence is required.

SPP 1 The Planning System

SPP provides an overview of the land use planning system in Scotland under current arrangements. It sets out the key principles and the Executive's priorities for the system to guide policy formulation and decision making towards the goal of sustainable development. The policy mainly provides overall guidance to local authorities on producing development plans and setting objectives when deciding on development proposals. Those objectives relating to the A8 scheme are:

Sustainable development:

- promoting regeneration and the full and appropriate use of land, buildings and infrastructure;
- promoting the use of previously developed land and minimising greenfield development;
- encouraging energy efficiency through the layout and design of development;

The A8 proposals are positive response to these objectives because:

- they will improve accessibility to established and proposed regeneration sites sites;
- they improve access to brownfield regeneration sites; and
- they are designed to maximize the efficiency of the road network.

Economic Competitiveness

- ensuring that land for employment is well placed in relation to the transport network and the labour force; and
- supporting steps to achieve the Framework for Economic Development including the provision of infrastructure and raw materials;

The A8 proposals are positive response to these objectives because:

- they improve the relationship between employment land and the transport network; and
- they are a positive response to the Framework for Economic Development.

The section on Integrated Transport provides support for greater efficiency in the existing transport network which is the main aim of the A8 up-grade proposals, paragraph 20 states:

The planning system is important in delivering the Executive's commitment to a more sustainable, effective, integrated transport system. Integration of land use and transport is

not just an end in itself. It is essential for the economy of Scotland that the labour force has easy access to places of employment and that raw materials, components and finished *products can be transported efficiently.*

The SPP under Integrated Transport states ways in which more sustainable travel patterns can be achieved. This includes:

- promoting an efficient transport network for the movement of freight and goods distribution, including where possible use of rail and water;
- identifying priorities for investment in transport infrastructure and safeguarding land for longer term possibilities;

The A8 scheme is a National investment priority and will play a key role in promoting a more efficient transport network for freight and goods distribution.

SPP 17 Planning for Transport (August 2005)

SPP 17 Planning for Transport replaces NPPG 9 the Provision of Roadside Facilities on Motorways and Other Trunk Roads in Scotland, NPPG 17 Transport and Planning and SPP 17 Planning Maximum Parking Standards Addendum to NPPG 17. It is also intended that accompanying guidance Planning Advice Note 57 Transport and Planning, should be updated.

SPP 17 sets out the national focus on transport, namely the delivery of transport projects and the positive role land use and transport planning takes in supporting and building upon the Scottish Executive's transport delivery agenda. SPP 17 states that:

"The overall vision is of a Scotland where the economy can flourish and communities can function without significant environmental and social problems arising from car dependency, traffic congestion and pollution."

The overall vision for transport relates to The Scottish Executive "Partnership for a Better Scotland (2003)" which has four aims:

- Growing the economy;
- Delivering excellence in public services;
- Supporting strong communities; and
- Developing an ambitious and confident Scotland.

SPP 17 is based on supporting these aims through integration of land use, economic development, environmental issues and transport planning. Its key objectives are:

- to meet European and UK commitments and targets on greenhouse gases and local air quality;

- to maintain and enhance the natural and built environment, through avoiding or mitigating adverse environmental impacts, minimizing environmental intrusion and retaining, improving and enhancing areas for biodiversity;

- to maintain and enhance the quality of urban life, particularly the vitality and viability of urban centres;
- to reinforce the rural economy and way of life; and
- to ensure that the impact of development proposals on transport networks does not compromise their safety or efficiency.

It goes on to state how the planning system is a key mechanism for integration through supporting a pattern of development, those objectives relating to the A8 proposals are:

- supporting economic growth and regeneration;
- taking account of identified population and land use changes in improving accessibility to public services, including health services jointly planned; and
- contributing to effective management of motorised travel, within a context of sustainable transport objectives.

In the section on Major Strategic Projects the policy provides supportive statements to the A8 up-grade works, where it states:

"Maintaining and improving transport infrastructure has an important role to play in growing Scotland's economy. Congestion has a major impact on the economy and environment of Scotland." (Paragraph 15)

The A8 up-grade is a key development project in Scotland and will play an important role in relieving congestion and contribute to the economic development objectives by improving the network's efficiency and improve the profile and accessibility of a number of key economic development sites along a 'Corridor of Growth' as outlined in NPPG 17 (refer to section above). This in particular directly relates to sites in North Lanarkshire (Southern Area) and Glasgow City and indirectly on economic development sites in North Lanarkshire (Monklands). This positive impact also provides a strong response to paragraph 22 of SPP17 which states:

"There is a general presumption against new motorway or trunk road junctions. The Scottish Executive will consider the case for such junctions where nationally significant economic growth or regeneration benefits can be demonstrated."

The project requires new motorway junctions, but this is justifiable as the project can be seen as being of national significance and will provide an important catalyst to economic growth.

NPPG 18 Planning and the Historic Environment

NPPG 18 deals primarily with listed buildings, conservation areas, world heritage sites, historic gardens, designed landscapes and their settings. It complements NPPG 5 Archaeology and Planning, which sets out the role of the planning system in protecting ancient monuments and archaeological sites and landscapes.

Central to the Government's approach is the need to secure preservation of such features whilst accommodating and remaining responsive to present day needs.

In relation to NPPG 18, the A8 upgrade is in general compliance with these objectives in that there will be no effect on:

- designated Conservation Areas (Paragraph 13, page 7);
- Historic Gardens or Designed Landscapes (Paragraph 16, page 8); nor
- Designated Listed Buildings (Paragraph 12, page 7).

SPP 21 Green Belts

SPP 21 sets out the objectives of green belt policy and the way in which it should be used and enforced. The key objectives of green belt policy are:

- To direct planned growth to the most appropriate locations and support regeneration;
- To protect and enhance the character, landscape setting and identity of towns and cities; and
- To protect and give access to open space within and around towns and cities, as part of the wider structure of green space.

As a result, there is a strong presumption against inappropriate development in the green belt. The A8 Up-grade works however although seen as inappropriate development will fall under the heading in the SPP of ***Proposals for non-conforming Uses*** which states:

"Where a proposed use would not normally be consistent with green belt designation, exceptionally it may still be considered appropriate, either as a national priority or to meet an established need, and only if no other suitable site is available."

The A8 up-grade works can be viewed as a national priority and is meeting an established need.

NPPG 5 Archaeology and Planning

NPPG 5 sets out the Government's planning policy on how archaeological remains and discoveries should be handled under the development plan and development control systems, including the weight to be given to them in planning decisions and the use of planning conditions. The ultimate objective of NPPG 5 is to secure the best possible treatment of the archaeological heritage indicating ways of preserving archaeological resources while at the same time accommodating the need for development.

NPPG 5 states that because of their extent, certain activities such road development, may have particularly significant consequences for archaeological remains. This is reflected in the principle recently adopted by government departments of directly funding necessary archaeological investigations from project costs, for example in trunk road schemes.

The preservation of ancient monuments and their setting is a material consideration in determining planning applications and appeals, whether a monument is scheduled or not. Therefore the archaeological implications of development proposals should be considered at the outset of the development control process. In considering applications for planning permission which involve, or may have implications for, archaeological remains, planning authorities should:

- encourage prospective developers to seek early discussions;
- consult the Regional Archaeologist at the outset of the process;
- ensure, where appropriate, that the prospective developer arranges for an archaeological assessment and, if necessary, a field evaluation; and
- ensure that relevant information on the cultural heritage, including archaeological resources, is taken into account in any environmental assessment that may be necessary in relation to the application for planning permission

Consultation would involve not only the local authority but also, in some circumstances, Historic Scotland where scheduled ancient monuments are involved, which acts on behalf of the Secretary of State for Scotland through SMC procedures.

In relation to the A8 upgrade, the principles of NPPG 5 have been taken into account in the assessment of the DMRB Stage 3 assessment of the preferred option. Discussions have been undertaken with Historic Scotland to ensure that appropriate consideration of the cultural heritage resource is progressed, as have consultations with the West of Scotland Archaeology Service regarding the nature of cultural heritage resources in the vicinity of the Scheme.

SPP 2 Economic Development

SPP 2 Economic Development was issued in November 2002 replacing NPPG 2 Business and Industry. This guideline sets out existing government policy in relation to economic development.

In accordance with SPP 2, local planning authorities are required to have regard to the following objectives:

- ensure existing business locations are able to meet the anticipated changes in the economy and provide choice for a diverse range of economic development;
- provide special sites, particularly those of national significance and those which support the knowledge based economy;
- respond positively to firm proposals for corporate headquarters;
- support existing and new businesses;
- provide for small towns and rural areas;
- secure and support the delivery of sites for economic development in sustainable locations by identifying key locations that are highly accessible by public transport;

- promote the re-use of previously developed sites in sustainable locations and meet the requirements of particular sectors; and
- work with the enterprise networks to provide a framework that links key business locations more closely with public transport and other development activity.

In relation to the above, the proposed scheme is in general compliance with these objectives, as outlined below:

- the up-grading of the A8 will help support the development of a number of high quality employment/mixed use land development opportunities in three Local Planning Authority areas, which will enable employment creation, as well as contribute to the overall economic development of the central belt of Scotland;
- the proposed up-grade will improve the marketability of existing land for business and industry use;
- the up-grade will contribute to providing attractive and high quality development sites which aim to improve the environmental characteristics of development sites and surrounding environs;
- the up-grade will improve accessibility for business and industry by both public and private modes of transport;
- the development proposals support a wide range of government policies, including those relating to sustainable development. The improved accessibility of the M8 and the strategic road network contributes towards meeting the needs of all businesses whether inward investing or indigenous companies; and
- the up-grade will improve the marketable profile of existing brownfield sites by making them highly accessible to the M8 growth corridor.

SPP 7 Planning and Flooding

SPP 7 provides guidance on the need to properly consider flooding issues, especially in the light of climate change predictions, and so prevent additional land and development being put at risk from flooding.

Many parts of Scotland have a legacy of development at risk of flooding from watercourses, the sea, groundwater and inadequate drainage. Climate change is predicted to worsen the situation. The Scottish Executive expects developers and planning authorities to err on the side of caution in decision making whenever flooding is an issue. Flood risk will be a material consideration in a range of cases.

The key objectives of SPP 7 comprise the following:

- new development should not take place if it would be at significant risk of flooding from any source or would materially increase the probability of flooding elsewhere. SEPA have issued planning authorities with indicative flood risk maps. The Scottish Executive Environment and Rural Affairs Department has commissioned

SEPA to prepare a 2nd generation flood map which will provide a better basis for identifying the areas at risk from flooding;

- the storage capacity of functional floodplains should be safeguarded, and works to elevate the level of a site by land raising should not lead to a loss of flood water storage capacity;
- developers and planning authorities should take an informed approach to decision making and err on the side of caution where flood risk is an issue;
- developers should give proper consideration to the probability of flooding and the associated risks;
- where built up areas already benefit from flood defences, redevelopment of brownfield sites should be acceptable but greenfield proposals will extend the area of built development at risk and should preferably be considered in the light of alternatives through the development plan process;
- generally, drainage will be a material consideration and the means of draining a development should be assessed;
- sustainable drainage will be required whenever practicable and, preferably, watercourses should not be culverted; and
- flood prevention and alleviation measures should respect the wider environmental concerns and appropriate engineering solutions recognise the context provided by the development plan.

The policy in SPP7 is based on the following principles:

- developers and planning authorities must give consideration to the possibility of flooding from all sources;
- new development should be free from significant flood risk from any source;
- in areas characterised as 'medium to high' flood risk for watercourse and coastal flooding new development should be focussed on built up areas and all development must be safeguarded from the risk of flooding;
- new development should not:
  - materially increase the probability of flooding elsewhere;
  - add to the area of land which requires protection by flood prevention measures;
  - affect the ability of the functional flood plain (see Glossary) to attenuate the effects of flooding by storing flood water;
  - interfere detrimentally with the flow of water in the flood plain;
  - compromise major options for future shoreline or river management.

For coastal and watercourse flooding a Risk Framework characterises areas for planning purposes by their annual probability of flooding and gives the planning response:

- little or no risk area (less than 0.1% (1:1000)) – no general constraints;

- low to medium risk area (0.1% to 0.5% (1:1000 – 1:200)) – suitable for most development but not essential civil infrastructure; and
- medium to high risk area (0.5% (1:200)) or greater – in built up areas with flood prevention measures most brownfield development should be acceptable except for essential civil infrastructure; undeveloped and sparsely developed areas are generally not suited for most development.

In relation to the above, the A8 upgrade is in general compliance with these objectives, as outlined below:

- the potential risk of flooding has been considered along the defined route.
- the preferred scheme will be designed so that the risk of flooding of areas in the vicinity is not increased during construction and operation of the road. Potential effects on the existing flood plain have been assessed as part of the Stage 3 assessment and appropriate recommendations made;
- a precautionary approach has been taken on areas of potential flood risk in all development options and this will be followed through to the detailed design of the scheme;
- road drainage is a fundamental component of the scheme design;
- sustainable drainage systems (SUDS) will be used where practical in the design of final adopted option; and
- the probability of flooding has been assessed during the scheme design.

NPPG 14 Natural Heritage

NPPG 14 provides guidance on how the Government's policies for the conservation and enhancement of Scotland's natural heritage should be reflected in land use planning. This NPPG:

- sets out national planning policy considerations in relation to Scotland's natural heritage;
- summarises the main statutory obligations in relation to the conservation of natural heritage;
- explains, as part of a wider framework for conservation and development, how natural heritage objectives should be reflected in development plans;
- describes the role of the planning system in safeguarding sites of national and international importance;
- provides guidance on the approach to be adopted in relation to local and non-statutory designations; and
- draws attention to the importance of safeguarding and enhancing natural heritage beyond the confines of designated areas.

The guidance incorporates elements from the wider framework for sustainable development, which takes the position that the Government's objectives for Scotland's natural heritage are to conserve, safeguard and, where possible, enhance:

- the overall populations and natural ranges of native species and the quality and range of wildlife habitats and ecosystems;
- geological and physiographical features;
- the natural beauty and amenity of the countryside and the natural heritage interest of urban areas; and
- opportunities for enjoying and learning about the natural environment.

NPPG 14 states that these objectives can best be realised through close co-operation and partnership between public agencies, local communities and the private and voluntary sectors. They should be taken into account in all land use planning activities, and reflected in both development plans and development control decisions.

A key role of the planning system according to NPPG 14 is to ensure that society's land requirements in terms of housing, economic activity, transport infrastructure and recreation are met in ways which do not erode environmental capital. The protection of natural heritage may sometimes impose constraints on development. However, conservation and development can often be fully compatible and, with careful planning, the potential for conflict can be minimised.

NPPG 14 takes the view that the scale, siting and design of new development should take full account of the character of the landscape and the potential impact on the local environment. Particular care is needed in considering proposals for new development at the edge of settlements or in open countryside.

Under the section "statutory designations" it states "*Designation does not imply prohibition on development. Sites are designated for a variety of different purposes and development proposals require to be assessed for their effects on the natural heritage interests which the designation is intended to protect*". The Guidance covers a vast array of designations, including international (e.g. RAMSAR Sites, Special Protection Areas and Special Areas of Conservation) and national (e.g. Sites of Special Scientific Interest, National Nature Reserves and National Scenic Areas) designations, many of which are not directly relevant to the A8 proposals.

The section on "the wider natural heritage" provides a broader definition of the extent to which natural heritage requires to be protected and states:

"Planning authorities should seek to safeguard and enhance the wider natural heritage beyond the confines of nationally designated areas. The effect of a development proposal on the natural heritage can be a material consideration whether or not a designated area is likely to be affected, though the level of protection afforded to natural heritage interests out with designated areas will not normally be as high as that afforded to sites of national or international importance."

The section provides further guidance on features which may be of a value and need to be accounted for in assessing development impact on the natural habitat and includes: Trees and Woodlands, Lochs, Ponds, Watercourses and Wetlands.

In addition to the national and international designations there are a number of "regional and local designations" that development proposals must account for, including:

- Areas of Great Landscape Value;
- Local Nature Reserves; and
- Wildlife Sites

The section under "Development Control and Implementation" provides the basis by which habitat protection will be assessed in approving development proposals stating:

"Planning authorities should have full regard to natural heritage considerations in determining individual applications and contributing to the implementation of specific projects. While in some circumstances it will be necessary to refuse planning permission on natural heritage grounds, authorities should always consider whether environmental concerns could be adequately addressed by modifying the development proposal or attaching appropriate planning conditions. In negotiating over development proposals, authorities should first seek to avoid any adverse effects on the natural heritage.

Where this is not possible and other material considerations clearly outweigh any potential damage to the natural heritage, they should endeavour to minimise and mitigate the adverse effects and consider the scope for compensating measures. They should always encourage the retention and enhancement of features of natural heritage interest and seek to avoid the fragmentation or isolation of habitats. Where appropriate, they should also consider the scope for concluding an access agreement."

The section on Conditions and agreements goes on to say:

"Conditions can be used to prevent or mitigate adverse effects on the natural heritage or to secure measures directly related to the development which offer positive environmental benefits.

Where conditions do not appear appropriate to control the use of land, authorities may consider the use of an agreement under Section 75 of the Town and Country Planning (Scotland) Act 1997.

Where the primary concern relates to land management or access to natural heritage resources, authorities should consider whether mechanisms other than those provided under planning legislation might provide the best means of securing their objectives."

An important factor in assessment of development proposals is "the Precautionary Principal" which states:

"While much can be done to mitigate the environmental effects of development through the use of conditions or agreements, there may be instances where the scientific evidence is inconclusive but the potential damage could be significant. In view of the importance of safeguarding biodiversity, the Government is committed to the application of the precautionary principle where there are good scientific grounds for judging that a development could cause significant irreversible damage to our natural heritage."

NPPG 14 also places emphasis on the environmental assessment of development proposals.

- SDD Circular 24/1985 and SDD Circular 18/1987 also provide statements of Scottish Executive Policy and contain guidance on policy implementation through legislative or procedural change.

- SDD Circular 24/1985: Development in the Countryside and Green Belts

- Circular 24/1985 provides guidance on control of development in Green Belts and sets out circumstances in which development will be deemed appropriate and where adjustments can be made.

- SDD Circular 18/ 1987: Development Involved in Agricultural Land. The main thrust of this circular is that when considering the allocation of land for development and in deciding applications for planning permission that affect a cultural land, planning authorities should consider the implications for agriculture alongside the implications for economic development and for the environment. In addition to the consequences of the potential loss of agricultural land authorities should consider the extent to which other economic activity and employment could be generated and the continuing need to protect the scenic and other qualities for which the countryside is valued.

In summary, the proposed A8 upgrade seeks to minimise the environmental effects of road construction and operation through restricting development to the strategic road corridor already identified by current planning policy. The principles of NPPG14 have been considered during the assessment of the preferred option and opportunities for environmental enhancement of the urban corridor investigated where appropriate.

17.3.2 Local Planning Policy Context

The M8 corridor between Baillieston and Newhouse is covered by the two local authorities of North Lanarkshire and Glasgow City which have a number of local plans and in turn policies with direct relevance to the proposed scheme. The relevant local plans are:

- Glasgow and the Clyde Valley Joint Structure Plan 2006
- North Lanarkshire Council: North Lanarkshire Local Plan – Consultation Draft (2007).

- North Lanarkshire Council: Southern Area Local Plan –Finalised Draft (Modified June 2001).
- North Lanarkshire Council: Northern Corridor Local Plan (February 2003).
- Monklands District Local Plan 1991- First Alteration (1996).
- Glasgow City Council: Glasgow City Plan (August 2003).
- Glasgow City Council: Glasgow City Plan 2 Finalised Draft (May 2007).

Glasgow and the Clyde Valley Joint Structure Plan (2000 and 2005 up-date)

The strategic vision for the development of the Structure Plan area is to achieve a radical change in the competitive position and quality of life and environment of Glasgow and the Clyde Valley.

The key aims of the plan are:

- to increase economic competitiveness;
- to promote greater social inclusion and integration;
- to sustain and enhance the natural and built environment; and
- to integrate land uses and transportation

The Scottish National Planning Framework sets the national context for the Glasgow and the Clyde Valley Joint Structure Plan in spatial terms. A key concept is the creation of a "corridor for growth" in which the M8 plays an important role in connection of key development areas across local authority boundaries. Under the section "Collaborating for Success" the Structure Plan states the following:

"Transport Networks: better access is important in achieving social and economic cohesion both within the area and beyond."

One of the 4 key aims of the Structure Plan is *"to integrate land uses and transportation with a key issue being that some recent greenfield industrial and business development is poorly linked to areas of high unemployment….and there is a growing linkage between urban and rural areas and the rest of Scotland" .*

The A8 upgrade will play an important role in developing the concept of the corridor of growth as the main east-west road artery linking to a number of Structure Plans; paraphrasing paragraph 5.9 the aims for the corridor are:

- the promotion of key renewal opportunities within or related to the corridor;
- the enhancement of the key centres of business, education and commerce;
- the improvement of public transport access along, across and into the corridor; and
- the completion of the road and rail network serving the corridor.

The Chapter on the Integrated Land Use and Transportation Framework identifies the M8 between Newhouse – Baillieston in schedule 3 (b), Priority Corridors for Management, Central corridor as a priority which should be given to Transport Strategies on main transportation corridors. This is emphasised by the A8/M8 Upgrade (East) being included under Schedule 4 Strategic Transport Network Development Proposals under part (iv) Road Schemes it states:

"The sustainable development of Glasgow and Clyde Valley Metropolitan Area will be supported through the development of the Strategic Transportation Network as identified on Key Diagram Inset B and in Schedule 4."

The key diagram Schedule set out the main transport network with (iv) Road Schemes containing A8/M8 Upgrade (East).

The investment in the M8 is seen as beneficial to freight movement with a network of interchange points seen as an essential component of the freight movement strategy.

Glasgow and the Clyde Valley Joint Structure Plan (2006 up-date)

The Joint Structure Plan sets out an Agenda for Sustained Growth as the basis for a twenty-year planning and development strategy for Glasgow and the Clyde Valley. The overall goal of the Structure Plan is to promote the balanced and sustainable development of the area by:

- setting the land use framework for sustainable development;
- encouraging economic, social and environmental regeneration; and
- maintaining and enhancing the quality he natural heritage and built environment.

The Structure Plan promotes a Corridor of Growth which will link the major centres of employment and services to all communities, in particular the Priority Areas (Table 2) by the:

- promotion of key renewal opportunities within or related to the Corridor;
- enhancement of the key centres of business, education and commerce within the Corridor;
- improvement of public transport access along, across and into the Corridor; completion of the road and rail network serving the Corridor;
- safeguarding and expansion of the international transport terminals within the Corridor;
- safeguarding and enhancement of the environmental resources along the Corridor, particularly by the creation of the Green Network and protection of the Green Belt; and
- use and enhancement of the established infrastructure, particularly water services, to serve development needs within the Corridor.

The M8/A8 Corridor Interim Land Use Strategy

The M8/A8 Corridor Interim Land Use Strategy also has relevance to the proposed scheme.

The strategy aims to maintain and improve the attractiveness of the area for residents, businesses and visitors by balancing development needs with those of the environment. Policies, initiatives and strategies of relevance to the area are considered and the impact of recent development in the area is highlighted. Ten zones are identified based on recent landscape assessments and an appropriate strategic approach to their future development recommended. Around 250 hectares of land in the corridor has potential for development. Most of this relates to existing commitments yet to be taken up. Potential new developments include strategic industrial development, single user high amenity development, general business and industry, business park extension, expansion of an existing business and motorway service area.

The strategy recommends review of the Greenbelt boundary and improvements to the landscape, especially through new woodland planting. In approving the strategy, the Council intends to use it:

- as a material consideration in determining planning applications in the area;
- as part of the Council's contribution to the new Structure Plan for Glasgow and the Clyde Valley;
- to inform new Local Plans;
- as a basis for preparing landscape character assessments and landscape masterplans; and
- to highlight to The Scottish Executive the urgent need to upgrade this strategic transport corridor.

It is anticipated that the key effects of the A8 up-grade will be experienced along both the immediate road and the broader corridor and fall into the following policy areas:

- transportation;
- industry and business; and
- the environment.

Indirect impacts relate to:

- housing; and
- retail and commerce, leisure and tourism.

Potential effects on policies and plans specifically relate to the amount of land required for the new road and junctions.

North Lanarkshire Council Planning Update

North Lanarkshire Council's Planning Department has prepared a new, single local plan for North Lanarkshire and a Consultation Draft was published in July 2007. This plan represents the Council's initial ideas for the local plan based on the issues identified at the survey and issues report stage. The main aim of this document is to stimulate interest and establish which policy areas may cause concern.

When the plan is adopted the North Lanarkshire Local Plan will offer a 5-10 year strategy for physical development of the local authority area.

The council currently provides 11 separate plans which cover smaller areas within North Lanarkshire.

.It should be noted at this stage that the North Lanarkshire Southern Area Local Plan, Northern Corridor Local Plan, Airdrie and Coatbridge Area Local Plan (Consultative Draft) and Monklands District Local Plan will be amalgamated into the single North Lanarkshire Plan.

North Lanarkshire Local Plan – Consultation Draft (2007)

The North Lanarkshire Council: North Lanarkshire Local Plan – Consultation Draft (2007) sets out for the first time a single local plan covering the entire local authority area. IT therefore will eventually replace the Southern Area Local Plan, Northern Corridor Local Plan and Monklands District Local Plan. The M8 now sits in central location within the local plan with the main areas of policy impact in the Central Area and South Area of the Plan.

The plan is quick to recognise the importance of the M8 in terms of socio-economic development of Lanarkshire:

"North Lanarkshire's extensive supply of land for business and industry and its central position relative to Scotland's main transport infrastructure has enabled economic restructuring towards service industries and a more knowledge-based economy. Accessibility by a variety of means of transport is becoming increasingly important.
Key industrial and business development areas linked with the A8/M8 corridor include Eurocentral, Newhouse, Faskine/Woodhall, and Strathclyde Business Park."

It goes on to state:

"Planned key transportation infrastructure improvements such as the A8, A80, and M74 upgrades and Airdrie to Bathgate rail line reinstatement offer further opportunity to connect communities with areas of economic activity."

The A8/ M8 corridor from Bargeddie to Newhouse is identified in the plan strategy as one of the Development Strategy Area Priorities for regeneration and it is evident that the plan at a number of levels is supportive of the proposed up-grade scheme.

North Lanarkshire Council: Southern Area Local Plan

The North Lanarkshire Council: Southern Area Local Plan (modified June 2001) includes the area to the south of the A8 between Baillieston and Newhouse. The Local Plan Development Strategy highlights the importance of the M8 corridor taking up the theme of the "Corridor for Growth" and one of the fundamental considerations influencing the Plan's direction and content contained under the heading "Industry and Business" which states:

"Advantage must be taken of the areas strategic location on the M8/A8 corridor. The success of the Strathclyde Business Park, Eurocentral and the Enterprise Zone sites as key business locations requires to be built upon to compensate for the problems associated with economic restructuring. Longer term opportunities to identify new business locations require to be assessed to ensure that future land requirements can be met".

The Local Plan recognises the deficiencies in the A8 Trunk road between Baillieston and Newhouse and that this remains the only non-motorway link of the main Glasgow to Edinburgh road link. The Council considers that the upgrade of the A8 to motorway standard would improve road safety and provide economic benefit to the area. This should be considered in conjunction with encouraging the use of public transport and sustainable land use.

North Lanarkshire Council: Northern Corridor Local Plan

The local plan area covers some 18.3 square kilometres stretching from the north eastern corner of Glasgow to Cumbernauld and includes the settlements of Auchinloch, Stepps, Chryston and Muirhead, Moodiesburn, Mount Ellen, Gartcosh, Mollinsburn and the surrounding rural hinterland on either side of the A80 corridor.

Although the areas considered within the North Lanarkshire Council: Northern Corridor Local Plan lie out with the A8 corridor, the strategic implications of the M8 development is that it will have indirect impacts this Local Plan area. This particularly relates to improvements to the Baillieston Interchange and Bargeddie Junction, which will improve accessibility to the M73. For this reason only relevant economic policies are included in Table 17.1 as other policies are not applicable.

Airdrie & Coatbridge Areas Issues Report (November 1997)

The report is the first stage in the review and replacement of the Monklands District Local Plan 1991 and has so far reached the consultation stage with a Report on Consultation issued in 1997.

North Lanarkshire Council: Monklands District Local Plan (1991)

The Monklands District Local Plan covers the geographic area immediately to the North of the M8. The plan itself is somewhat out of date and not in line with the more recent Glasgow and the Clyde Valley Joint Structure Plan because the plan is some 14 years out of date. The plan area is currently subject to review. It however remains the adopted statutory land use planning guidance for the area and highlights the importance of the

A8/M8 in the Chapter on Transport and Communications with section 8.2.5 Motorways and Trunk Roads stating:

"The travel pattern on the District's roads is dominated by the A8/M8 running roughly east-west and the M73 running roughly north-south. Traffic volume on these major roads is increasing rapidly, with severe congestion on the A8 Shawhead Interchange. "

Glasgow City Plan (Part One)

The Glasgow City Plan covers the western end of the M8 corridor at Baillieston Interchange. The Areas of Focus: M8 East this section of the Local Plan sets out specific detailed guidance on the future development of the area focusing on the M8 motorway from the Baillieston Interchange in the East to Junction 12 in the West and incorporates the fourteen Neighbourhoods that comprise Easterhouse. The A8 up-grade options have specific potential in contributing to regeneration goals for the area with paragraph 10.58 stating:

"Within the M8 East Area of Focus there are opportunities to:

- *establish the development potential of the motorway corridor;*
- *better integrate Greater Easterhouse with the rest of the City;*
- *allow Greater Easterhouse to become a more cohesive City suburb; and*
- *build on existing social, economic and investment priorities."*

Glasgow City Plan 2 Finalised Draft May 2007

The Glasgow City Plan 2 is a new draft up-date and it will eventually replace the previous plan. There has been a substantial re-writing of some of the major policies and some change of emphasis of some key policies. The section on Key Regeneration Areas identifies the area of the proposed M8 works as the M8 East Corridor one of a number of key growth corridors in the City. The road proposals for the M8 can be seen as supporting the economic development objectives for the area through being a catalyst for growth in particular supporting development at Queenslie Industrial Estate and Glasgow Business Park. The Plan Development Priorities and Proposals under Infrastructure section provides a fully supportive statement to the proposals in the Glasgow City Plan area:

"To support the regeneration of the Greater Easterhouse area and the Easterhouse/Gartloch Community Growth Area proposal new road infrastructure is required." (Paragraph 6.13)

"Completing the missing link of the M8 (Baillieston to Newhouse) will have a knock-on impact in Glasgow, as the existing Baillieston Interchange roundabout is proposed to be incorporated into the Motorway." (Paragraph 6.13)

The Glasgow City Plan 2 Draft has just completed its first stage public consultation and from discussions with the Local Plan Team will be adopted in early 2009.

17.4 Schedule of Policies

Table 17.1 sets out a schedule of policy objectives from the aforementioned Structure and Local Plans which relate to the scheme route options. An indication of whether or not the proposed scheme options are in compliance with these objectives is given.

Table 17.1 Schedule of Relevant Structure and Local Plan Policies

Policy Number	Policy Content	Compliance with Policy
Glasgow and Clyde Valley Joint Structure Plan (April 2006)		
Schedule 4 Strategic Transport Network Development Proposals Road Schemes	"The sustainable development of Glasgow and Clyde Valley Metropolitan Area will be supported through the development of the Strategic Transportation Network as identified on Key Diagram Inset B and in Schedule 4." Road Schemes: A8/M8 Up grade (east) and associated improvements. Paragraph 9.19 states: New Road Schemes: The schemes identified in Schedule 4(iv) are needed to fill recognised gaps in the Strategic Road Network which will have a significant impact upon the competitiveness of the metropolitan area over the twenty-year period: M8 Baillieston - Newhouse Upgrade and associated network improvements would improve strategic road links to the east of Scotland in the same Corridor of Growth and on the Coatbridge - East Kilbride Circumferential Corridor;	The proposal is fully compliant with Policy Schedule 4

Policy Number	Policy Content	Compliance with Policy
North Lanarkshire Local Plan – Consultation Draft (2007)		
DSAP Development Strategy Area Priorities	The following development opportunities and regeneration priorities are of strategic significance for North Lanarkshire. 1 Town Centres - Implement Town Centre Action Plans (TCAPs). 2. Ravenscraig Team to co-ordinate Council involvement in statutory approvals and projects for redevelopment of Ravenscraig. 3 A8/M8 Corridor Study to establish for further environmental renewal and development potential of the A/M8 corridor from Bargeddie to Newhouse. 4 Urban Masterplans to establish housing-led development Expansion Areas potential and infrastructure for: Community Growth Areas: Gartcosh and Glenboig, South Wishaw, South Cumbernauld Local Expansion Areas: North and West Coatbridge, East Airdrie, East Motherwell Villages	The scheme will both directly and indirectly support this policy through improving accessibility and enhancing investment potential in the defined priority areas. • It will directly support the A8/M8 Corridor • It will indirectly support the redevelopment of Ravenscraig as it incorporates improvements to Chapelhall Junction which is a key strategic link to the development area. • Improve strategic access to community growth and local expansion areas.
DSP 3 Development Strategy Policy 3 /	Where development would have an unacceptable impact on the economic, social, or environmental infrastructure of a community, planning	The scheme has followed a full Environmental Impact Assessment and has adopted mitigation measures to deal with possible negative environmental

Policy Number	Policy Content	Compliance with Policy
Impact of Development	permission will only be granted if planning conditions or legal agreements can mitigate those impacts. Council Services and partner organisations will be invited to contribute to working groups recommending priorities and criteria addressing development impact for the Finalised Draft Plan.	impacts.
DSP 4 Development Strategy Policy 4 / Quality of Development	All planning applications need to be accompanied by a completed Sustainable Design and Construction Checklist satisfactorily addressing the following aspects of the development: • Design • Accessibility • Energy • Biodiversity • Resources	The scheme has been designed following a comprehensive checklist of sustainable design and construction needs assessment.
EDI 6 Promoting Transport Development	The Council supports the following transport infrastructure improvements listed in Schedule EDI 6 of the Area Proposals Documents: • A8 Motorway upgrade • A80 Motorway Upgrade • Airdrie - Bathgate Rail Extension • Kirkintilloch and Bishopbriggs Relief Roads • Motorway Service Area along the M80 and its extension	The Scheme is fully supported by this Policy. It should be noted a defined area is given in the Plan for road improvements that takes in a number of other designated sites. This however does not indicate a priority for development over other designations within the defined area and the case for development will still need to be made.
EDI 1 Protecting Industrial and Business Areas	There will be a presumption against development inconsistent with the continuing industrial and business character of Existing Industrial and Business Areas identified on the Proposals maps.	The proposed scheme would be compliant and supportive of this policy as the road proposals enhance the operation of M8 and help open up strategic

Policy Number	Policy Content	Compliance with Policy
	Developments of an ancillary nature may be acceptable, dependent upon: • the extent to which there is a surplus in the land supply for industry and business • the existence of suitable alternative sites • potential undermining of the attractiveness as a location for industry and business • the potential impact on travel patterns and accessibility by public transport • a specific locational requirement for the proposal whether the development would re-use vacant or under-utilised industrial land • whether the proposal would result in significant economic benefit to the Plan area	development sites. The proposed scheme will have an impact on this policy due to resulting in loss of land from designated industrial sites at Eurocentral Newhouse West due to Chaplehall Junction Improvements. The proposed scheme will have a positive impact and support this policy as it includes improvements to the M8 which will enhance the accessibility and in turn marketability of the adjacent industrial sites. This will be both direct and indirect depending on the geographic position of the sites. Sites directly adjacent to the M8 (Eurocentral and Newhouse West Mossend) will gain a higher profile and higher visibility making some sites highly desirable for future development. Improved access to a wider area will allow a number of more peripheral/isolated sites to become more attractive as potential business locations. The Righead Industrial Estate will benefit from a new junction access and improve the marketability of the estate to prospective business activity. The proposed scheme is therefore in general compliance with this policy
EDI 4 Promoting Sites for Industrial and Business Development	The Council will maintain a 10-year land supply of quality marketable industrial land, including a 5-year supply of readily available sites, by: • supporting the development of the Industrial and Business Land Supply	The proposed scheme would be compliant and supportive of this policy as the road proposals enhance the operation of M8 and help open up strategic development sites. The proposed scheme will have a positive impact and support this policy as it

Policy Number	Policy Content	Compliance with Policy
	sites listed in Schedule EDI 4 of the Area Development Proposals and shown on the Proposal Maps • carrying out a review of the effectiveness of the existing Industrial and Business Land Supply and potential additions to the supply through the identification of sustainable business locations that: contribute to urban renewal; complement existing council commitments and priorities for business development; are accessible by public transport, and link jobs to where people stay including the results of the Industrial and Business Land review in the Finalised Draft Local Plan.	includes improvements to the M8 which will enhance the accessibility and in turn marketability of the adjacent industrial sites. This will be both direct and indirect depending on the geographic position of the sites. Sites directly adjacent to the M8 will gain a higher profile and higher visibility making some sites highly desirable for future development. Improved access to a wider area will allow a number of more peripheral/isolated sites to become more attractive as potential business locations. The proposed scheme is therefore in general compliance with this policy
ENV 1 Protecting the Natural Environment and Biodiversity	The Council will safeguard sites of importance for natural heritage and Biodiversity (as listed in Schedules ENV 1A, 1B, 1C, and 1D of the Area Proposals Documents and shown on the Proposals Maps) from development. Planning permission will only be granted for proposals potentially affecting these sites if the applicant demonstrates to the Council's satisfaction that there will be no adverse impact, or that adverse impacts can be mitigated to the Council's satisfaction by natural heritage or biodiversity improvement measures. C Local Designations: i Sites of Importance for Nature Conservation (SINC)	The biodiversity and nature conservation impacts of the scheme have been assessed at Stage 3 and appropriate mitigation measures identified. Land take for the scheme has avoided sensitive receptors where practicable. Proposals and measures to enhance biodiversity have been included as part of the scheme design mitigation. The scheme is therefore in general compliance with this policy. The scheme does not directly impact on any internationally or nationally designated sites, but does impact upon locally designated SINCs. Mitigation measures in relation to such impacts have been identified as part of the Stage 3 assessment. The scheme design will be in accordance with standard and best practice

Policy Number	Policy Content	Compliance with Policy
	ii Local Nature Reserve (LNR) iii Country Parks (CP) iv Tree Preservation Orders (TPO) D Other Sites of Importance for Biodiversity and Access to the Natural Environment i Wildlife Corridors ii Trees and Woodlands iii Watercourses and Wetlands iv Flood Plains v Public Rights of Way (PRW)	guidance for road design and will include an appropriate landscaping strategy. Land take is minimised particularly where any Corridors of Wildlife and/or Landscape Importance could be affected, and replacement habitat/landscape features identified and enhancement undertaken to provide linkages between areas. A full landscape audit has been undertaken during the Stage 3 of the road scheme and any loss of landscape will be compensated through a high quality planting regime.
ENV 6 Assessing Development in the Green Belt	Acceptable development in the Green Belt shall be restricted to: telecommunications, generation of power from renewable sources, or other appropriate rural uses that meet all of the following criteria: • economic benefit • environmental impact • infrastructure implications • specific locational need New businesses require to be supported by detailed and financially robust Business Plans. Planning permission for a house associated with such a new business will only be considered once that business has been operational for a minimum period of 18 months and is deemed viable on inspection of detailed financial accounts.	The scheme will have an impact on this policy as proposals will result in the loss of greenbelt land. The land take requirement is minimal but according to the list of acceptable development such road proposals are excluded. The proposals are however are fully supported by EDI 6 Promoting Transport Development and is a designated corridor of land allocated for the up-grade scheme. SPP 21 Green Belts under the heading Proposals for non-conforming Uses which states: “Where a proposed use would not normally be consistent with green belt designation, exceptionally it may still be considered appropriate, either as a national priority or to meet an established need, and only if no other suitable site is available.”
HCF 2 Protecting Community	The Council will maintain community well-being in residential areas by protecting the community	The scheme will have an impact on existing community facilities, but this will

Policy Number	Policy Content	Compliance with Policy
Facilities	facilities listed in Schedule HCF 2 in the Area Proposals Documents and shown on the Proposals Maps. Work on DSP 3 Impact of Development will identify community facilities to be protected, allowing the Finalised Draft version of the Local Plan to include Schedule HCF 2.	involve a minimal loss of recreation land and replacement land will be identified as a compensation measure.
ENV 2 Protecting the Built Environment	The Council will safeguard from development sites of importance for built environment amenity and their settings listed in Schedules ENV 2A, 2B and 2C in the Area Proposals Documents and are shown on the Proposals Maps. Planning permission will only be granted for proposals potentially affecting these sites if the applicant demonstrates there will be no or minimal adverse impact, or adverse impacts can be mitigated by built environment improvement measures. B National and Regional Designations i. Scheduled Ancient Monument Development that would adversely impact or threaten shall not be permitted, development that affects the setting shall preserve archaeological remains in situ for excavation and recording prior or during development, at the developer's expense.	The scheme will have no impacts on this policy

Policy Number	Policy Content	Compliance with Policy
North Lanarkshire: Southern Area Local Plan		
Policy IND 1 Industrial and Business Land Supply	"Advantage must be taken of the areas strategic location on the M8/A8 corridor. The success of the Strathclyde Business Park, Eurocentral and the Enterprise Zone sites as key business locations requires to be built upon to compensate for the problems associated with economic restructuring. Longer term opportunities to identify new business locations require to be assessed to ensure that future land requirements can be met". The Council will seek to maintain a 10 year supply of marketable land for industrial and business development in each category of the land supply (High amenity, Prestige, Local and Low Amenity) promoting where possible the re-use of vacant and derelict urban land. It will support, in principle, the development of those sites listed in schedule IND 1 and shown on the Proposals Map. Where industrial and business land is identified which is surplus to the area's long term requirements, the council will encourage its allocation to appropriate alternative uses.	The proposed scheme would be compliant and supportive of this policy as the road proposals enhance the operation of M8 and help open up strategic development sites. The proposed scheme will have an impact on this policy due to loss of land from designated industrial sites at IND 154.91 Eurocentral Newhouse West due to Chaplehall Junction Improvements. The proposed scheme will have a positive impact and support this policy as it includes improvements to the M8 which will enhance the accessibility and in turn marketability of the adjacent industrial sites. This will be both directly and indirectly depending on the geographic position of the sites. Sites directly adjacent to the M8 (Eurocentral and Newhouse West Mossend) will gain a higher profile and higher visibility making some sites highly desirable for future development. Improved access to a wider area will allow a number of more peripheral/isolated sites to become more attractive as potential business locations. The Righead Industrial Estate will benefit from a new junction access and improve the marketability of the estate to prospective business activity. The proposed scheme is therefore in general compliance with this policy.
Policy IND 2 Lanarkshire	The following sites identified on the Proposals map and designated under the terms of the	The proposed scheme will have a positive impact and support this policy as it will improve the accessibility of a number of the former Enterprise Sites. The

Policy Number	Policy Content	Compliance with Policy
Enterprise Zone	Lanarkshire (Motherwell) Enterprise Scheme will continue to be developed in accordance with the terms and conditions of the adopted scheme. Newhouse West (Mossend) Newhouse West (Woodhall Park) Airbles Road, Motherwell Tannochside Park, Uddingston Excelsior Park, Wishaw The Council will welcome development which takes place in accordance with the provisions contained within the development briefs prepared for each of the sites.	scheme has both direct and indirect impacts on sites in the defined Zone. It will also enable the sites to have easier access from the wider Lanarkshire labour market and support travel to work patterns into the industrial land and estates. The proposed scheme is therefore in general compliance with this policy.
Policy IND 3 Constrained Sites	"The Council with the assistance of Scottish Enterprise Lanarkshire and private developers will seek to rehabilitate any constrained industrial sites that may be identified during the plan period for industrial and business development, where appropriate".	The proposed scheme will have a positive impact and support this policy as it will improve the accessibility to a significant number of sites both directly and indirectly. It will also enable the sites to have easier access from the wider Lanarkshire labour market and support travel to work patterns into the industrial land and estates. The proposed scheme is therefore in general compliance with this policy.
Policy IND 5 Business Development (Class 4)	The Council will seek to encourage business developments defined under Class 4 of the Town and Country Planning (Use Classes) (Scotland) Order 1997 to locate within the following High Amenity and Prestige industrial	The scheme will have a positive impact and support this policy as it will improve the accessibility of these sites both directly and indirectly. The scheme is therefore in general compliance with this policy.

Policy Number	Policy Content	Compliance with Policy
	and business locations: Strathclyde Business Park, Bellshill Tannochside Park, Uddingston Newhouse West, Woodhall Park Airbles Road, Motherwell Class 4 developments will also be supported within or adjacent to Town Centre Areas, Secondary, Village and Neighbourhood commercial Areas subject to their compatibility with other Policies contained within the Local Plan.	
Policy IND 6 *Ravenscraig Regeneration/* *Former Steelworks Site*	The Council in association with Scottish Enterprise Lanarkshire and Corus (Steel Manufacturer and owner of the site) will pursue the redevelopment of the former Ravenscraig Site as identified on the Proposals Map and within the Glasgow and the Clyde Valley Structure Plan which recognises it is part of a Metropolitan Flagship Initiative.	The scheme will have a positive impact and support this policy as it incorporates improvements to Chapelhall Junction which will support the redevelopment of Ravenscraig. The scheme is therefore in general compliance with this policy.
Policy IND 7 Improvement of Industrial and Business Areas	The Council will seek to maintain and enhance the quality of industrial and business areas.	The scheme will have a positive impact and support this policy as it will improve access to industrial and business areas and support the aims of the policy.

Policy Number	Policy Content	Compliance with Policy
		The scheme is therefore in general compliance with this policy.
Policy IND 8 Established Industrial and Business Areas	The Council will seek to retain the existing character of Established Industrial and Business Areas by safeguarding existing uses and supporting the development of General Industrial, Distribution, Storage or Class 4 Business Uses where appropriate.	The scheme will have a positive impact and support this policy as it will result in an improvement in accessibility to a number of established industrial and business areas. The proposed scheme is therefore in general compliance with this policy.
Policy IND 10 Assessing Other Developments on Industrial and Business Land	In determining applications for non-industrial development within Established Industrial and Business Areas or on sites which form part of the industrial land supply the council will consider, amongst other things, the following: 1) the extent to which there is a surplus in the land supply for industry and business, 2) whether development would undermine the attractiveness of a location for industry and business, 3) whether there is a specific locational requirement for the proposal, 4) whether the proposal would result in significant economic benefit to the Plan area, 5) the existence of suitable alternative sites, 6) the potential impact on travel patterns	The proposed scheme will have an impact by taking some existing designated industrial and business land. But it will also be positive and support this policy as the development would fit with criteria set down under the policy especially in terms of: 2) Improve attractiveness of the location for industry and business, 3) specific locational requirement, 4) significant economic benefit to the Plan area, 6) improve travel patterns and accessibility The scheme is therefore in general compliance with this policy.

Policy Number	Policy Content	Compliance with Policy
	and accessibility by public transport, and 7) In the case of Established Industrial and Business Areas, whether their redevelopment would lead to the re-use of vacant or under utilised industrial land.	
Policy TR 1 Overcoming Access Constraints	The Council will encourage measures to overcome identified access constraints and to enable the realisation of the development proposals contained within the Local Plan.	The scheme will have a positive impact and support this policy as it will remove existing access constraints to development sites. The scheme is therefore in general compliance with this policy.
Policy TR 5 Development of Strategic Routes	The council seeks to improve the efficiency and effectiveness of the strategic road network serving the Plan area by: 1) Recommending that the Scottish Executive gives priority to up-grading the A8 to motorway standard between Baillieston and Newhouse interchanges. 2) Recommending that the Scottish Executive investigates and tackles the causes of congestion at Junction 5 Raith Interchange of the M74. 3) Supporting the upgrading of the Chapelhall Interchange on the A8, to improve accessibility to the Ravenscraig site.	The proposed scheme will have a positive impact and support this policy as it will improve the efficiency and effectiveness of a key part of the strategic road network by: a. Up-grading the A8 to motorway standard between Baillieston and Newhouse interchanges. b. Tackling the causes of congestion at Junction 5 Raith Interchange of the M74. c. Upgrades the Chapelhall Interchange on the A8, to improve accessibility to the Ravenscraig site. The proposed scheme is therefore in general compliance with this policy.
Policy TR 6 Ravenscraig	The Council will seek to initiate and support improvements to the public transport and road	The proposed scheme will have a positive impact and support this policy as it will include the upgrading of the Chapelhall Interchange on the A8, to improve

Policy Number	Policy Content	Compliance with Policy
Access Improvements	networks which are required in association with the redevelopment of Ravenscraig site, including: • improvements to Airbles Road and Windmillhill Street. • The construction of a link to the site from Airbles Road. • The provision of an internal spine road. • The provision of a new station within the site. • The upgrading of the Carfin-Holytown Link Road to Dual Carriageway. • The upgrading of the Chapelhall Interchange on the A8, and • Improvements to the junction at Hamilton Road/ Airbles Road.	accessibility to the Ravenscraig site as set out in the policy providing a key strategic link. The scheme is therefore in general compliance with this policy.
Policy TR 12 Cycling –relates to long distance route	The Council will seek to improve facilities for cyclists by: 1) Taking account of the needs of cyclists in the design of new roads proposals and traffic management schemes. 2) Supporting the development of the Glasgow to Edinburgh cycle route. 3) Identify and develop, where funds are	The scheme will conform to this policy as new cycle access/crossing facilities are to be provided as part of the scheme, which takes into account existing routes and, where practicable, aspirations for future network links. The scheme is therefore in general compliance with this policy

Policy Number	Policy Content	Compliance with Policy
	available, safe routes for cycling, and 4) Requiring developers to include facilities for cyclists as part of their development proposals where appropriate.	
Policy TR 13 Assessing the Transport Implications of Development	In determining applications for new development, the council will consider amongst other things, the following transport criteria: 1) the level of traffic generated and its impact on the environment and adjoining land uses, 2) the scope to integrate development proposals with existing public transport facilities, 3) Impact of the development on road circulation and safety, 4) The provisions made for access, parking and vehicle manoeuvring, and 5) The extent to which development promotes "access for all", particularly for those with impaired mobility. In appropriate circumstances the council will require the provision of a Transport Assessment to accompany development proposals.	The scheme will conform to this policy as it will be based on a full transport assessment accounting for the 5 criteria outlined under the policy. The scheme is therefore in general compliance with this policy.
ENV 1 The Environment	The Council supports sustainable development by seeking to maintain and enhance the quality of the environment of the plan area through	The scheme will seek to utilise the existing area of land which is allocated for strategic road development. In addition it is proposed that the design will incorporate measures to minimise adverse environmental effects of road

Policy Number	Policy Content	Compliance with Policy
	promoting the long term environmental interest and reducing, where appropriate, the damaging effects of development on this long term interest.	development and provide enhancements where feasible. The scheme will therefore comply with this policy.
ENV 3 Vacant and Derelict Land	Policy ENV 3 Vacant and Derelict Land The Council will promote the re-use of vacant and derelict land particularly within the urban area by: 1) facilitating a programme of land reclamation where appropriate in partnership with other agencies and private landlords. This includes working with, and encouraging Scottish enterprise Lanarkshire, through the work of the Partnership Task Group, to bring forward Priority Sites in accordance with the agreed Derelict Land Strategy. 2) identifying appropriate after-uses for vacant and derelict sites, including the retention and creation of wildlife habitats and biomass production where appropriate, and 3) encouraging developers to utilise, where appropriate, the development opportunities arising on vacant and derelict sites, including those identified in Schedule ENV 3, while playing due regard to other Local Plan Policies.	The scheme will open up areas for rehabilitation by providing improved access for local and strategic traffic. The scheme therefore aims to incorporate this policy.

Policy Number	Policy Content	Compliance with Policy
ENV4 Contaminated Land	The Council will require developers to investigate the site conditions of land which is known or suspected to be contaminated prior to the development being implemented. Such investigations should identify the nature of the contamination and detail the remedial measures to be undertaken to treat or remove the contamination in accordance with the best practicable environmental option appropriate to the proposed development and the nature of the site. In some circumstances this investigation will be required prior to the granting of an outline or detailed planning permission.	Ground investigations have been undertaken to identify potential areas of contamination and are being taken into consideration in the scheme design and identified mitigation. The scheme is therefore in compliance with this policy.
ENV 5 Assessment of Environmental Impact	In determining applications for development, the council will address the likely impact on the environment by considering, amongst other things, the following criteria: 1) the suitability of a proposal to the character of the area in which it is set, 2) the landscape and visual impact of the proposal, 3) the extent of traffic generation, noise, dust, pollution, flooding risk and interference, 4) the loss of natural habitats, protected	The scheme has been evaluated through Environmental Assessment in accordance with Government regulations and has considered the seven criteria set out under the policy. The scheme is therefore in general compliance with this policy.

Policy Number	Policy Content	Compliance with Policy
	species and areas designated for their natural heritage value, 5) the loss of urban open space, 6) the extent to which derelict land is regenerated the Environmental Impact Assessment (Scotland) Regulations 1999 Planning Advice Note 58: Environmental Impact Assessment; and 7) the need for specific measures to ensure satisfactory decommissioning, particularly of renewable energy developments. There will only be a presumption in favour of development where it can be clearly demonstrated that the proposal is not likely to inflict an unacceptable impact on the environment. Proposals will be assessed with reference to mitigating measures.	
ENV 6 Green Belt	The Council will safeguard the character and function of the green belt, as defined by the Proposals Map, within which there will be a presumption against development or change of use other than that directly associated with and required for agriculture, forestry, generation of power form renewable sources, outdoor leisure and recreation, telecommunications or other appropriate rural uses.	The scheme will have an impact on this policy as proposals will result in the loss of greenbelt land but will have relatively low impact in terms of land take as part of an improvement to an important national utility.

Policy Number	Policy Content	Compliance with Policy
	Mineral extraction may also be acceptable where proposals accord with other relevant policies within the plan. Proposals to extend established industrial and business uses will be acceptable only where the development would not result in the adverse effect on the character and function of the Green Belt.	
ENV 7 Urban Fringe Improvement	The Council will promote improvements to the Green Belt and Urban Fringe at the locations identified in Schedule ENV 7 and shown on the proposals map and will encourage and support public, private and voluntary sector initiatives which enhance its amenity and ecological value.	The scheme will have an impact on the urban fringe but associated landscape works will mitigate landscape, ecological and visual impact.
ENV 8 Countryside Around Towns	The Council will seek to promote and protect the Countryside as defined on the proposals map and will not normally permit development other than that which relates to agriculture, forestry, the generation of power for renewable energy sources, outdoor leisure and recreation, telecommunications or other appropriate rural uses.	The scheme will have an impact on areas defined as “countryside around towns”. But will fit with criteria for development as important national road link.
ENV 9 Flooding	Where development is proposed in areas with a history of, or potential for, flooding, the Council will require a statement from the applicant	The scheme design will fully consider the implications of flood risk in the area, in terms of both potential for the new road alignment to increase flooding in other areas and the potential for flooding of the scheme itself. This will ensure

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	showing measures to ameliorate the effects of flooding, both within the sites and in other areas where flooding is likely to be aggravated by the development. This statement will not normally be permitted where it would create or intensify an unmanageable risk of flooding.	that the risk is not significantly increased. The scheme will therefore comply with this policy.
ENV 10 Trees and Woodland Management	The council will encourage the protection and enhancement of the plan areas' tree and woodland resource by: 1) resisting development proposals which could adversely affect woodland areas. 2) promoting the planting of sustainable woodlands at appropriate locations, 3) encouraging the sustainable management of woodlands, where appropriate, in accordance with a Woodland Management Plan, and 4) declaring Tree Preservation Orders where appropriate.	The scheme aims to avoid areas of significant planting and linear belts of trees which act as wildlife corridors. Replacement planting proposals will mitigate unavoidable losses and create new habitat links such as hedgerows and woodland planting. The scheme is therefore in general compliance with this policy.
ENV11 Protected Urban Woodland	The Council will protect and enhance those areas of urban woodland identified on the Proposals Map by: 1. resisting development proposals which could adversely effect them, encouraging the sustainable development of the woodlands in accordance with the woodland	The scheme will have an impact on this policy as Chapelhall Junction improvements may result in disturbance of Blacklands Plantation which is designated as a Protected Urban Woodland. Mitigation through planting of appropriate native species hedgerow and woodland will replace lost woodland over time.

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	management plan, and 2. ensuring that these areas are, where appropriate, made available for recreational and educational use by the public.	
ENV 13 Biodiversity	The Council will seek to maintain the nature resources of the plan area by the protection of habitats, species and natural features which are vulnerable and/or specifically protected, and by a requirement to take account of the needs of wildlife where new development is proposed. The creation of new habitats will also be encouraged as part of development proposals or as stand alone projects. The council Biodiversity Action Plan and associated Habitat and Species Action Plans will form an important consideration.	The biodiversity and nature conservation impacts of the scheme have been assessed at Stage 3 and appropriate mitigation measures identified. Land take for the scheme has avoided sensitive receptors where practicable. Proposals and measures to enhance biodiversity have been included as part of the scheme design mitigation. The scheme is therefore in general compliance with this policy.
ENV 14 Nature Conservation Sites	The Council will protect and enhance the natural resources: 1) Safeguarding the Special Areas of Conservation, 2) Designating Local Nature Reserves (LNRs) as resources permit at the locations identified in Schedule ENV14 and shown on the proposals map, and 3) Identifying and protecting other areas of importance to wildlife especially Sites of	The scheme does not directly impact on any internationally or nationally designated sites, but does impact upon locally designated SINCs. Mitigation measures in relation to such impacts have been identified as part of the Stage 3 assessment.

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	Importance for Nature Conservation (SINCs) and Wildlife Corridors. The council will not permit development proposals which would significantly affect a Site of Importance to Nature Conservation or a Wildlife Corridor and where the nature conservation interest in the site cannot be accommodated within the development proposals to the satisfaction of the Council conservation staff.	
ENV 20 Historic Gardens and Designed Landscapes	Any development proposals which would harm the character of a Historic Gardens or Designed Landscapes included in the inventory of Gardens or Designed Landscapes or proposed for inclusion during the plan period, will be resisted. Proposals of the management or enhancement of Inventory Sites shall be encouraged to ensure that changes in planting or management are in keeping with the historic layout, character and planting of these sites.	Woodhall House Designed Landscape is located to the north of the existing A8 between Eurocentral and Chapelhall junctions but will not be significantly detrimentally affected by the proposed upgrade. Consultations with Historic Scotland have confirmed no specific mitigation measures are required with regard to cultural heritage features during scheme implementation and operation. The scheme is therefore in compliance with this policy.
ENV 21 Archaeology	The Council will not normally allow development which would have an adverse impact on Scheduled Ancient Monuments, other archaeological sites and industrial archaeological resources and their settings. Where development affecting sites of	The scheme will not affect any scheduled ancient monuments or other known sites of archaeological value. Historic Scotland has advised that no further investigations are required. The scheme is therefore in compliance with this policy.

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	archaeological importance is permitted, conditions will be attached to the planning consents to allow for the excavation and recording before or during development. The Council will require developers to fund such works.	
L4 Public Rights of Way and Access	The Council will maintain and protect the Network of Public Rights of Way and other permitted access routes. The development, promotion, and management of quality public access, will be guided by the North Lanarkshire Public Access Strategy and at least one local access forum.	The scheme will impact on this policy as there will be a need for an adjustment of the existing public access right of way and the possible provision of footbridge crossing points. There will be no detrimental change to public access, and non-motorised access generally will be improved by the incorporation of additional cycleways and footpaths between Baillieston and Newhouse which have been identified and developed in consultation with North Lanarkshire Council access officers.
North Lanarkshire: Northern Corridor Local Plan		
NOTE: PLAN AREA IS OUTSIDE THE SCHEME IMPACT AREA. SO POLICY STATEMENTS FOR THIS PLAN ARE NOT RELEVANT. ONLY RELEVANT ECONOMIC POLICIES (POTENTIALLY STRATEGICALLY AFFECTED) ARE INCLUDED BELOW.		
ECON 1: Maintain the Land Supply for Industry and Business	The Council will seek to maintain a supply of marketable land for industrial and businesses development in the Plan area, promoting where possible the reuse of vacant and derelict land within the urban areas. The Council will support in principal the development of those sites listed in the industrial land supply and shown on the proposals map.	The scheme will have an indirect impact on the North Lanarkshire Council: Northern Corridor Local Plan. This specially relates to impacts on the Baillieston Interchange and to Bargeddie (APR) Junction, with the former having particular impact on the M73 which forms the western edge of the Corridor Plan linking to the A80 and the latter linking into the Plan area via the A782.

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ECON 3: Strategic Industrial Location: Gartcosh Masterplan	The former Steel Mill at Gartcosh will be safeguarded as a strategic Industrial Location, and will be retained for Class 4, 5 and 6 of the Town and Country Planning (Use Classes Scotland) Order 1997 as identified in the Masterplan.	The scheme will have a positive impact by incorporating an up-grade to the M8, and improvements to Bargeddie Junction and Baillieston Interchange will benefit the strategic position of the former Gartcosh site.
ECON 4 Gartcosh Industrial Park: Gartcosh Masterplan	The Council through the Gartcosh Regeneration Partnership will seek to rehabilitate the former steel works site at Gartcosh, which will include measures to allow the protection and enhancement of the nature conservation interest of the site.	The scheme will not adversely impact upon the nature conservation interest of the Gartcosh Site.
North Lanarkshire Council: Monklands Area Local Plan (1991)		
TR2 Improved Trunk Roads and Motorways	To recommend to the Scottish Development Department: 1. The early up-grading of the A8 to Motorway Standards. • Phase 1 Shawhead to Baillieston 1991- • Phase 2 Newhouse to Shawhead 1994- 2. Designing the motorway interchanges at Shawhead and Newhouse to maximise the commercial opportunities of the sites	The scheme will have a positive impact by providing outline proposals to implement key components of this policy.

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	as well as meeting engineering criteria. 3. Increasing the planned traffic capacity of the upgraded Shawhead Interchange by the extension of the Bellshill Bypass. 4. Considering the possibility, and desirable location, of slip roads onto the M73 at Gartcosh. 5. Studying the possible construction of an A73 (T) Airdrie Eastern Bypass, and the Chapelhall Bypass.	
TO8 Develop Tourism Accommodation	The District Council will encourage the development of further tourism accommodation, including the following hotel sites: 1. Shawhead Interchange, Coatbridge 2. Town Park, Coatbridge.	The scheme will have a direct impact on this policy as the Shawhead Interchange site will be affected.
Econ 1 Major Industrial Sites:	The District Council: (1) supports the existing allocation of a "single user" industrial site of over 100 hectares at Newhouse in Motherwell District.	The scheme will have a positive impact by improving the strategic accessibility of the site area and raise the site's profile.
Econ 2 Existing General Industrial Areas	M8 Interlink Estate.	The scheme will have a positive impact by improving the strategic accessibility of the site area and raise the site's profile.
Econ 3 Allocated General Industrial	3/2 Dunalisatair (west), Chapelhall; 3/5 Kirkshaws Road Coatbridge; 3/6 Finning,	The scheme will have a positive impact by improving the strategic accessibility of the site area and raise the sites' profiles.

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Areas	Coatbridge.	
Econ 4 Industrial Land for Company Expansion	Organon, Chapelhall	The scheme will have a positive impact by improving the strategic accessibility of the site area and raise the site's profile.
Econ 5 Rehabilitation of Industrial Sites	Carnbroe (South).	The scheme will have a positive impact by improving the strategic accessibility of the site area and raise the sites profile.
Econ 7 Office/Business/ Light Industry	7/2 Shawhead Interchange; 7/12 Dunalisatair (East), Chapelhall; 7/3 Dunalisatair (west), Chapelhall	The scheme will have a positive impact by improving the strategic accessibility of the site area and raise the sites profile.
LR3 Develop new national and Regional Facilities	The District Council will promote the development of national and regional facilities for leisure, recreation and sport. These will include: 1. Regional Riding Centre at Chapelhall.	The scheme will have a positive impact by improving the strategic accessibility of the site area and raise the site's profile.
LR6 Develop Facilities for Golf	The District Council will support the development of further golf course facilities. In particular: A 9 hole private Golf Course at Dunalastair.	The scheme will have a positive impact by improving the strategic accessibility of the site area and raise the site's profile.

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LR11 Improve Public Open Space	The District Council will protect existing public open space from inappropriate development and will up-grade existing large areas of public open space. In particular it will: 1. provide synthetic all weather pitch at Kirkwood. 2. provide public open space at Petersburn. 3. provide public open space at Souterhouse Road, Coatbridge	The scheme will have an impact on this policy, as at Bargeddie (APR) Junction some public space land under LR11 is affected. This will need to be accounted for in detailed design.
HG4 Strategic Housing Site	The District Council designates Chapelhall South, Phases A to E, as an area to be developed to meet the strategic requirement in Monklands.	The scheme will have a positive impact by improving accessibility to the sites.
CU 1 Safety Restraint Areas	All planning application within the following types of safety restraint areas shown on the Proposals Maps will be subject to special scrutiny including possible referral to the Health and Safety Executive, the Regional Council, Scottish office, British Gas or British Telecom: 1. Health and safety Notification Areas: No development will be allowed within Health and Safety Notification Areas without the agreement of the Health and safety Executive.	The scheme will have an impact on Safety Restraint Areas and attention will be given in detailed specimen design and consultation undertaken with relevant agencies.

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	2. Trunk Road Notification Areas: No development will normally be allowed within 67m of any trunk Road without the approval of the Trunk Roads Authority. 3. Gas pipeline Safety Zones: There will be a general presumption against the development within 400m of high gas pipelines, unless the proposal is opposed by neither the Health and safety Executive nor British gas and is otherwise in accordance with this Plan. 4. Radio Transmitter Approaches: Any development proposals within Radio mast approaches may be subject to referral to British Telecom advice. 5. Landfill Gas: No development shall be permitted within 250m of either operational or completed land fill sites unless it can be demonstrated by way of suitable scientific investigation that the site in question is not producing, and is unlikely in any time in the future to produce, any potential dangerous gases.	
Env18 Protect Ancient Monuments	(A) The District Council will continue to protect all Scheduled Ancient Monuments from development which might destroy or significantly alter them, and will promote investigation and interpretation on the sites. (B) The District Council recognises that the	No scheduled ancient monuments or other known sites of archaeological value will be affected by scheme Historic Scotland has advised that no further investigations are required as part of the assessment of the preferred scheme.

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	industrial and archaeological heritage should be safeguarded and will take this into account when considering applications for development, operating a general presumption against development that would destroy or significantly damage any important heritage feature.	The scheme is therefore in compliance with this policy.
LI1 Landscape Improvement	The District Council will promote the protection and improvement of the landscape in Monklands by methods appropriate to the quality of the existing landscape. In all landscape zones (high, good, medium and low quality and devastated landscape) the Council will seek to remove land use conflicts and management difficulties, particularly those which occur in the "urban fringe".	The scheme seeks to utilise the existing area of land that is allocated for strategic road development. The detailed design will incorporate measures to minimise adverse effects on the landscape through the provision of appropriate landscape enhancements where feasible. The scheme will therefore comply with this policy.
FOR 1 Encourage Forestry	The District Council will encourage forestry: a) as part of integrated farming/forestry developments; b) to improve the environment and amenity of the settlements; c) to help define the "edges" of settlements and reduce problems of the "urban/rural fringe"; d) to improve the appearance of road and rail corridors within the District; e) to rehabilitate derelict sites of mineral	The scheme will aim to avoid existing areas of significant planting and linear belts of trees. Replacement and new planting is part of the scheme and tree, shrub and hedgerow planting will form an important component of the final landscaping strategy. The scheme is therefore in general compliance with this policy.

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	workings; and f) as Community Woodlands.	
FOR 2 Encourage Tree Planting Schemes	The District Council will encourage tree planting through: a) tree planting schemes in District Council parks; b) landscaping conditions on planning consents; and c) planting trees in verges and pavements in towns and villages.	The scheme alignment has sought to avoid areas of significant planting and linear belts of trees. Where unavoidable, mitigation planting as part of the landscape conceptual strategy is proposed. The scheme is therefore in general compliance with this policy
NAT 2 Protect "Key" Nature Conservation Sites	The District Council recognises the Nature Conservation value of Key conservation sites and will consult with the statutory and other interested bodies over proposals affecting these areas.	All relevant bodies have been consulted.
NAT 5 Encourage Natural Species	There will be a presumption in favour of the use of indigenous trees, shrubs and plants in landscape, amenity and rehabilitation schemes.	Wherever possible native species of local provenance will be used in landscape replacement/habitat enhancement schemes. The scheme is therefore in general compliance with this policy.
GB 1 Restrict development in Greenbelt	Within areas designated as Green Belt no development will be permitted except for: a) New houses for full time workers in connection with forestry or agriculture. b) Non residential developments in connection with forestry or agriculture.	The proposed scheme will result in the loss of greenbelt land, however, the scheme is in the regional and national interest and the majority of the proposed road corridor is already allocated for strategic road development. The scheme also requires a rural location as a matter of need for the route connecting Edinburgh and Glasgow to be implemented and also enhances many areas with substantial development potential.

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	c) Use requiring a rural location. d) Areas identified as having substantial development potential.	The scheme is therefore in general compliance with this policy.
GB 2 Restrict development in Countryside Around Towns	Isolated developments in the "Countryside Around Towns" shall not generally accord with the local plan unless there is a specific locational need. Proposals for development within the area shall require to be justified against the following criteria: a) economic benefit b) specific locational need c) infrastructure implications d) environmental impact	Although the A8 upgrade will in impact on the area defined as "countryside around towns", it is in the national interest and fits with the criteria stated. The scheme is therefore in general compliance with this policy.
GB 3 Protect Prime Agricultural Land	There shall be a general presumption against development or fragmentation of prime agricultural land.	No prime quality land will be affected. The scheme is therefore in general compliance with this policy.
Glasgow City Council: Glasgow City Plan Adopted Plan (August 2003)		
DEV13 Transport Infrastructure	The Council will encourage proposals that continue to support a sustainable transport network, assist the regeneration of the City and improve the quality of the environment of the transport corridors and associated facilities. Developments that would reduce the City's ability to provide effective transport infrastructure will be resisted.	The upgrade of this section of the A8 to motorway standard under the scheme will improve the efficiency and effectiveness of a key part of the strategic road network. The scheme will provide opportunities to improve areas of currently degraded landscape and will relieve congestion currently occurring at key junctions along the route. The scheme is therefore in general compliance with this policy.

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DEV12 Greenbelt	The areas designated green belt is the countryside surrounding the City's built environment and Pollok Estate and Park. They form part of the City's Green Network and are intended to prevent urban sprawl and coalescence and to maintain the visual amenity of the City. These areas will remain primarily in use for agriculture, forestry, leisure and recreation and other appropriate countryside uses. There is a presumption in favour of retaining the green belt. See policy ENV 1: Development Related to the Green Belt.	The proposed A8 upgrade under the scheme will result in the loss of some greenbelt land, however, it is anticipated that this will have little adverse impact on character of the overall greenbelt resource particularly as the majority of the proposed road corridor is already allocated for strategic road development and the scheme is considered be of regional and national importance. The scheme is therefore in general compliance with this policy.
ENV 1 Development Related to the Green Belt	While there is presumption in favour of retaining the Green Belt, the Council does recognise that situations could arise where development may be acceptable. The Council will assess development proposals for sites in the Green Belt as follows: 1. Within the area designated Green Belt on the Development Policy Principles map there will be a presumption against development with the exception of the following categories: i. Development directly associated with and required for agriculture or forestry; ii. Leisure or recreational development appropriate to a countryside location;	The proposed A8 upgrade under the scheme will result in the loss of some greenbelt land, however, it is anticipated that this will have little adverse impact on character of the overall greenbelt resource particularly as the majority of the proposed road corridor is already allocated for strategic road development and the scheme is considered be of regional and national importance. The scheme is therefore in general compliance with this policy.

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	iii. Replacement of an unoccupied or recently vacated dwelling house for residential use; iv. The conversion or redevelopment of existing structures to residential use and/or other acceptable uses; and v. Limited new development directly associated with telecommunications and/or required for existing approved uses. These will be considered on the basis of individual merit.	
ENV 3 Flood Prevention and Land Drainage	To ensure that appropriate surface water drainage is provided in new developments, the Council will require development proposals: a. to include sustainable drainage and permeable surfacing wherever practicable; and b. In all but exceptional circumstances, to comply with the guidance contained in the Sustainable Urban Drainage Systems (SUDS) Design Manual for Scotland and Northern Ireland. To ensure that proper consideration is given to flood risk in new developments, the Council will: a. require prospective developers to undertake a Flood Risk Assessment for proposals in areas considered to	The scheme will comply with the guidance contained in the Sustainable Urban Drainage Systems (SUDS) Design Manual. The detailed design of the scheme will fully consider the implications of flood risk in the area, in terms of both potential for the new road alignment to increase flooding in other areas and the potential for flooding of the scheme itself. This will ensure that the risk is not significantly increased. Consultation has and will continue to be undertaken with SEPA, Scottish Water and SNH. The scheme will therefore comply with this policy.

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	be at risk from flooding, from whatever cause. This will require to conform (as a minimum) to the Council's guidance for undertaking a flood risk assessment; b. consult with the Scottish Environment Protection Agency (SEPA), Scottish Water, Scottish Natural Heritage (SNH) and other planning authorities lying within each of Glasgow's river system catchment areas, and take into account their views on the risk of flooding and the potential implications arising from development proposals; and c. have regard to categories of development and risk based on the following guidelines; i. Strategic Developments. ii. Residential. iii. Retail, Commercial and Industrial/Business Development.	
ENV 5 Sites of Importance for Nature Conservation	Local Sites a. In order to conserve an integrated system of wildlife habitats, the Council will also aim to protect Local SINCs from proposals which might	The scheme will directly or indirectly affect SINC sites identified close to the A8. However, the majority of the proposed road corridor is already allocated for strategic road development (Policy TR5). Land take for the preferred scheme will be minimised, particularly where SINCs will be affected, and replacement habitat identified and enhancement undertaken where practical to

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	adversely affect them. b. In assessing proposals affecting a Local SINC all of the following criteria must be met before a development may be looked on favourably: i. no alternative site can be found for the proposed development; ii. the social and economic benefits of the scheme outweigh the total or partial loss of nature conservation; and iii. the loss can be compensated by habitat creation/site enhancement elsewhere, and where there are satisfactory arrangements to do this.	help compensate for any losses. Consultation has been undertaken with SNH and North Lanarkshire Council's Ecologist during Stage 3 assessment of the preferred scheme.
ENV 7 Corridors of Wildlife and/or Landscape Importance	There will be a presumption against any development likely to have an adverse effect on the integrity or character of a Corridor of Wildlife and/or Landscape Importance. Notwithstanding the proposals within any Corridor of Wildlife and/or Landscape Importance will only be considered favourably providing they meet all of the following criteria: i. development proposals should be consistent with the Plan's other development policies and environmental policy designations; ii. development proposals must be of a high quality design, and include associated	The majority of the proposed road corridor is already allocated for strategic road development (Policy TR5). The scheme design will be in accordance with standard and best practice guidance for road design and will include an appropriate landscaping strategy. Land take is minimised particularly where any Corridors of Wildlife and/or Landscape Importance could be affected, and replacement habitat/landscape features identified and enhancement undertaken to provide linkages between areas. The scheme is therefore in compliance with this policy.

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	landscape works appropriate to the character of the surrounding area and in scale with the development, whilst respecting the integrity of the Corridor; iii. proposals must include details of methods to be adopted, including legal agreements etc, to guarantee future maintenance arrangements; and iv. applications for development must be shown in the context of the Corridor of Wildlife and/or Landscape Importance, and demonstrate that they enhance the existing situation in respect of wildlife, landscape character and visual amenity.	
ENV 9 Gardens and Designed Landscapes	There will be a presumption against any development that is likely to have an adverse effect on the integrity, landscape setting or distinctive character of gardens listed in the Inventory of Gardens and Designed Landscapes.	Woodhall House Designed Landscape is located to the north of the existing A8 between Eurocentral and Chapelhall junctions and will not be significantly detrimentally affected by the proposed upgrade. The scheme is therefore in compliance with this policy.
ENV12 Landscape Standards in New Development	To achieve a good design, a new development must be integrated with its surroundings. It is important that its context, including the local green network, is recognised. Links should be made, wherever possible, to: • the green network; • the pedestrian/cycle networks; and • public transport infrastructure.	The scheme design will be in accordance with standard and best practice guidance for road design and safety and will include an appropriate landscaping strategy. Wherever possible pedestrian/cycle links will be established and access for public transport maintained. A detailed landscape assessment has been undertaken as part of the Stage 3 assessment of the preferred scheme so that existing landscape features are integrated into the final scheme design.

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	Landscape components should be surveyed and analysed in order to help achieve an integrated development. This should include: • topography; • water features including culverted water courses; • significant woodland and trees; • other vegetation or natural features including habitats for wildlife; • built artefacts; • microclimate; and • views in and out of the site.	The scheme is therefore in compliance with this policy.
ENV16 Development of Contaminated Sites	Where the previous history of a site suggests that contamination may have occurred, developers will be responsible for undertaking surveys specified by this policy.	The Stage 3 assessment of the scheme has included detailed ground investigations to identify potential areas of contamination and will be used to inform the scheme design and construction. The scheme is therefore in compliance with this policy.
HER4 Ancient Monuments	There will be a presumption in favour of retaining, protecting, preserving and enhancing ancient monuments and their setting. Developments that have an adverse impact on scheduled ancient monuments and their setting will be strongly resisted.	No scheduled ancient monuments or other known sites of archaeological value will be affected by the proposed scheme. Historic Scotland will advise on any further investigations that require to be undertaken as part of the assessment of the preferred scheme. The scheme is therefore in compliance with this policy.
HER5 Sites of	There will be a presumption in favour of retaining, protecting, preserving and enhancing	No known sites of archaeological value will be affected by the proposed

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Archaeological Importance	the existing archaeological heritage and any future discoveries found in the City. Certain procedures apply when: • development is proposed that would affect a site of archaeological significance; • development that will affect a site of archaeological significance is to be carried out; and • archaeological remains are discovered after a development has commenced.	scheme. Historic Scotland will advise on any further investigations that require to be undertaken as part of the assessment of the preferred scheme. The scheme is therefore in compliance with this policy.
Glasgow City Council: Glasgow City Plan 2 Finalised Draft May 2007		
DEV 1 Transport Infrastructure	The Council will encourage proposals that continue to support an integrated and sustainable transport network (particularly for public transport, walking and cycling), assist City regeneration and improve the environmental quality of transport corridors and associated facilities. Developments that would reduce the City's ability to provide effective transport infrastructure will be resisted.	The upgrade of this section of the A8 to motorway standard under the scheme will improve the efficiency and effectiveness of a key part of the strategic road network. The scheme will provide opportunities to improve areas of currently degraded landscape and will relieve congestion currently occurring at key junctions along the route. The scheme is therefore in general compliance with this policy.
DEV 3 Green Belt	The areas designated Green Belt are the countryside surrounding the City's built-up area and Pollok Estate and Park which form part of the Glasgow and the Clyde Valley Green Network. The Green Belt forms an important part of the wider network, supports regeneration and helps manage long term urban growth. It is also an important element in protecting and	The proposed A8 upgrade under the scheme will result in the loss of some greenbelt land, however, it is anticipated that this will have little adverse impact on character of the overall greenbelt resource particularly as the majority of the proposed road corridor is already allocated for strategic road development and the scheme is considered be of regional and national importance. The scheme is therefore in general compliance with this policy.

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	enhancing: • the identity, character and landscape setting of the City; and • access to open space within and around the Glasgow and Clyde Valley Green Network. The Green Belt will remain primarily in use for agriculture, horticulture, forestry, recreation and other appropriate uses (see the Council's PAN 65 Map (see Definition)). There is a presumption against development that would adversely affect the function and integrity of the Green Belt (see policy ENV 3: Development in the Green Belt).	
TRANS 1 Transport Route Reservations	The schemes listed below reflect the proposals to develop new transport schemes within the Plan period. Transport route reservations will be a material consideration when the Council considers development applications. Development applications that would impinge on the ability to facilitate the development and construction of the following transport infrastructure schemes will be refused planning permission (see the Proposals Map and the map accompanying this policy): 4. ROADS • M8 Baillieston to Newhouse - associated works	The policy is fully supportive of the road improvements scheme proposals.

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ENV 3 Development in the Green Belt	In accordance with policy DEV 12: Green Belt, there is a presumption against development that would adversely affect the function and integrity of the Green Belt. Development within the Green Belt, which complies with one or more of the following criteria, will be considered where the proposal: • supports the Plan's Development Strategy and is promoted through the Glasgow and the Clyde Valley Joint Structure Plan; Development, acceptable in principle, will also require to meet all of the following criteria: • The development should not adversely affect any area covered by an Environmental Designation (see Environmental Policy Designations Maps and policy ENV 7: Regional and Local Environmental Designations); • The development should integrate with the landscape and be finished in materials appropriate to the location, without detriment to the visual amenity of the area; • The completed conversion or redevelopment should be contained	The proposed A8 upgrade under the scheme will result in the loss of some greenbelt land, however, it is anticipated that this will have little adverse impact on character of the overall greenbelt resource particularly as the majority of the proposed road corridor is already allocated for strategic road development and the scheme is considered be of regional and national importance in the Clyde Valley Joint Structure Plan and in the Glasgow City Development Plan Strategy. The scheme is therefore in general compliance with this policy.

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	substantially within the shell of original structure(s); • It should have no adverse impact on the residential amenity of neighbours, landscape character, local distinctiveness, visual amenity or the enjoyment and recreational use of the countryside; and • It should not have a negative impact on water courses, water supply, traffic and access requirements nor increase the risk of pollution.	
	All development proposals are required to make satisfactory provision for Sustainable Drainage Systems (SUDS - see Definition). The only exceptions to this requirement are: • a proposal for a single dwelling; and • proposals for a change of use, which will not result in an increase in surface water run-off from the site. SUDS will be required in association with any open space requirements for a development (see policy ENV 2: Civic and Open Space Provision). The Council expects that the SUDS infrastructure will most likely be integrated into a development's open space requirement. SUDS proposals should: • incorporate, or connect to, an acceptable overland flood-routing or	The scheme will comply with the guidance contained in the Sustainable Urban Drainage Systems (SUDS) Design Manual. The proposals will be designed in accordance with Scottish Water's 'Sewers for Scotland Working Document.

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	design exceedance solution (see Definition) agreed by the • Council; be designed to accommodate a 1 in 30 year rainstorm event with the ability to deal with a 1 in 200 year event by safe flood routing; • use agreed methods of surface water run-off collection, treatment, decontamination and disposal; • not be detrimental to the effectiveness of existing SUDS schemes; incorporate a design appropriate to the site, particularly where contamination is present, (expert advice should be sought at an early stage); and • incorporate natural and semi-natural elements to enhance environmental amenity and biodiversity. SURFACE WATER MANAGEMENT PLANS The Council will require development proposals to comply with the SUDS requirements set out in any surface water management plans prepared for parts of the City (e.g. Clyde Gateway and Toryglen). Surface water management plans may require to be prepared for larger developments where development is divided into multiple ownership (e.g. a large housing development) where no management plan has been prepared. The developer would be responsible for its	

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	preparation, in liaison with the Council and Scottish Water. Note: In order to achieve adoption by Scottish Water, SUDS proposals should be designed in accordance with Scottish Water's 'Sewers for Scotland Working Document' (available at www.scottishwater.co.uk). If it is intended not to design SUDS proposals to these standards, the maintenance arrangements of the proposed SUDS scheme will require approval as part of the planning consent.	
ENV 5 Flood Prevention and Land Drainage	To safeguard development from the risk of flooding and to ensure new development does not have an adverse impact on the water environment, does not materially increase the probability of flooding elsewhere and does not interfere detrimentally with the storage capacity of any functional flood plain (see Definition) or associated water flows. 1. FLOOD MANAGEMENT Proposals should demonstrate that they: • contribute to minimising flood risk; • avoid any increased risk of flooding which would affect people and properties from any source (e.g. sewer, watercourse (see Definition) or surface water) either within the development site or as a consequence of development out with the site; and • address the cumulative impact on	The detailed design of the scheme will fully consider the implications of flood risk in the area, in terms of both potential for the new road alignment to increase flooding in other areas and the potential for flooding of the scheme itself. This will ensure that the risk is not significantly increased. Consultation has and will continue to be undertaken with SEPA, Scottish Water and SNH. The scheme will therefore comply with this policy.

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	infrastructure capacity of incremental growth of impermeable surfaces by not increasing the quantity and rate of surface water run-off from any site. 2. PROTECTING THE WATER ENVIRONMENT Development should not have an adverse effect on the water environment, including surface water and groundwater quality and quantity, river corridors and associated wetlands, unless these impacts can be mitigated to the satisfaction of the Council, as advised by the Scottish Environmental Protection Agency (SEPA) and Scottish Natural Heritage (SNH). 3. THE FLOOD RISK FRAMEWORK Notwithstanding the flood risk areas identified on SEPA's indicative flood risk maps (see Note), the Council expects developers to consider the: • flood risk to their proposed development from any source, including watercourses, through a Flood Risk Assessment (FRA); and • impact of discharging surface water from the proposed development to any watercourse, through a Drainage Impact Assessment (DIA).The River Clyde Flood Management Strategy - River Corridor Supplementary Development Guide (currently in preparation) will be treated as supplementary development guidance and will be a material	

Policy Number	Policy Content	Compliance with Policy
	consideration when assessing development proposals/applications. **Flood Risk and Drainage Impact Assessments** These must conform to the requirements set out in guidance at SEPA. The FRA and/or DIA must clearly assess the nature of the particular flood risk and drainage issues that the proposal needs to address the likely effects of the proposal on flood risk and drainage impact and whether mitigation would be likely to be acceptable and effective. They should also clarify the separation between planning considerations and requirements and those of other Environmental Regulatory Regimes with regard to the water environment. The Council, in applying the Scottish Executive's flood risk framework (See Policy Review Section of SSP 7 Planning and Flooding. 4. FUNCTIONAL FLOOD PLAINS Remaining undeveloped areas of flood plain within Glasgow are covered by the development policy principle designation DEVELOPMENT 11: Green Space or DEV 12: Green Belt. Development on, or affecting, the functional flood plains within the City boundary should not:	

Policy Number	Policy Content	Compliance with Policy
	• contribute to the piecemeal reduction of flood plain storage capacity; or • interfere, detrimentally, with the flow of water in the flood plain. Exceptionally, where a case for infrastructure, such as a bridge, etc., has been justified, it should be designed in accordance with this policy, remain operational in times of flooding and minimise its effect on flood water storage capacity. 5. CONNECTION TO THE PUBLIC SEWERAGE SYSTEM All development proposals requiring foul drainage must be connected to the public sewerage system. The only exception to this will be in areas where connection to the collection system is not permitted due to a lack of capacity. In such cases, the use of temporary private treatment systems will be permitted until connection to a sewer is possible. The following requirements, however, will apply. • The sewerage network must be designed and built to a standard which will allow adoption by Scottish Water. • The sewerage network must be designed such that they can be easily connected to a public sewer in the future. Typically, this will mean providing a drainage line up to a likely point of	

Policy Number	Policy Content	Compliance with Policy
	connection. The developer must provide Scottish Water with the funds to allow it to complete the connection once the sewerage system has been upgraded. 6. CULVERTED WATERCOURSES Development over an existing culvert, which includes removal of the culvert, or its diversion into parts of the site not covered by structures, should: • benefit wildlife and improve amenity, wherever possible; and • provide adequate access for maintenance. Proposals for the formation of new culverts will not be supported.	
ENV 6 Biodiversity	All development within the City shall take cognisance of, and be compatible with, the Glasgow Local Biodiversity Action Plan (2001/2002), which sets out a number of species and habitat action plans. Many of the sites identified as important for habitats and species are also covered by Environmental Policy Designations (see Environmental Policy Designations Map and policy ENV 7: Regional and Local Environmental Designations). Development should not have any adverse effect on existing habitats or species protected in law, or identified as a priority in the Glasgow	A full biodiversity assessment has been made of the road scheme and an action programme has been evolved to minimise any adverse impacts during construction and final completion.

Policy Number	Policy Content	Compliance with Policy
	Local Biodiversity Action Plans. Proposals will require to demonstrate, to the satisfaction of the Council, that: • there will be no fragmentation or isolation of habitats or species as a result of the development; • the development will be sited and designed to minimise adverse impacts on the biodiversity of the site (including its environmental quality, ecological status and viability); and • public benefits at a local level will clearly outweigh the value of the habitat for biodiversity conservation. Where there is evidence that a protected habitat or species exists on the development site, the developer may be required (at their own expense) to undertake a survey of the site's natural environment. Where planning permission is granted, planning conditions will be imposed, or agreements negotiated, to minimise disturbance, protect, enhance and promote existing habitats and/or create new habitats and put in place measures to provide for their effective future management.	
ENV 7 Regional and Local Environmental	Proposals should not have an adverse effect, either directly or indirectly, on the integrity or character of one or more of the natural, or special, features covered by an Environmental Designation (see Definition) listed below:	The scheme will directly or indirectly affect SINC sites identified close to the A8. However, the majority of the proposed road corridor is already allocated for strategic road development (Policy TRANS 1). Land take for the preferred scheme will be minimised, particularly where SINCs will be affected, and

Policy Number	Policy Content	Compliance with Policy
Designations	• Sites of Special Scientific Interest (SSSI) • Local Nature Reserves (LNR) • Sites of Importance for Nature Conservation (SINC) - City wide and local sites • Corridors of Wildlife and/or Landscape Importance • Sites of Special Landscape Importance (SSLI) • Tree Preservation Orders (TPO) • Ancient, Long Established and Semi Natural Woodlands • Gardens and Designed Landscapes • Water courses, lochs, ponds and wetlands There are limited circumstances where development affecting certain Environmental Designations may be acceptable (see Development Guide DG/ENV 4: Development Affecting Environmental Policy Designations).	replacement habitat identified and enhancement undertaken where practical to help compensate for any losses. Consultation has been undertaken with SNH during Stage 3 assessment of the preferred scheme. The majority of the proposed road corridor is already allocated for strategic road development (Policy TRANS 1). The scheme design will be in accordance with standard and best practice guidance for road design and will include an appropriate landscaping strategy. Land take is minimised particularly where any Corridors of Wildlife and/or Landscape Importance could be affected, and replacement habitat/landscape features identified and enhancement undertaken to provide linkages between areas. The scheme is therefore in compliance with this policy.
ENV 8 Trees, Woodlands and Hedgerows	Development should not cause the loss of, or serious damage to, trees, woodlands or hedgerows, which are covered by an existing tree preservation order (TPO) (see Environmental Policy Designation Maps), are on Council owned land or are of significant ecological, recreational, historical, shelter or landscape value. Proposals should demonstrate, to the satisfaction of the Council, that:	A full landscape audit has been undertaken during the Stage 3 of the road scheme and any loss of landscape will be compensated through a high quality planting regime.

Policy Number	Policy Content	Compliance with Policy
	• where they are in, or near, an ancient, long established or semi-natural woodland there has been consultation with and approval from the Central Scotland Conservator, Forestry Commission Scotland; • the public benefits at the local level clearly outweigh the value of the habitat; • the development will be sited and designed to minimise adverse impacts on the biodiversity of the site, including its environmental quality, ecological status and viability; • there will be no further fragmentation or isolation of habitats as a result of the development; • where any individual trees, groups of trees, woodlands or hedgerows would be lost, the applicant will provide compensatory planting either as part of the overall scheme or elsewhere in the vicinity (this may require a Section 69 or 75 Agreement); and • appropriate legal agreements to guarantee future maintenance arrangements are in place and the details of methods to be adopted agreed. In addition, the Council will: • encourage new planting, particularly if it relates to areas of ancient, long established or semi-natural woodland	

Policy Number	Policy Content	Compliance with Policy
	that are small, isolated or in close proximity; • encourage developers to consult the Forestry Commission Scotland on woodland establishment plans; and • support applications to the Forestry Commission's Scottish Forestry Grants Scheme and the Woodlands in and Around Towns Challenge Fund. Trees on Council owned land are protected as if covered by a TPO.	
ENV 10 Access Routes and Core Path Network	Developers should, where appropriate, provide footpaths and cycleways in the design of their development schemes in line with the Land Reform (Scotland) Act 2003 (see policies DES 1: Development Design Principles, DES 5: Development and Design Guidance for The River Clyde and Forth and Clyde Canal Corridors and TRANS 5: Providing for Pedestrians and Cycling in New Development). Development should not: • prejudice the continuity of the existing walking/cycling network; or • obstruct or adversely affect a public right of way (unless satisfactory provision is made for its replacement). Development proposals should not impact adversely on public rights of way, core paths and important public access routes. Where such infrastructure is affected by a development	The Stage 3 Assessment of the scheme has fully assessed access routes and path networks. The proposals will have no impact on public rights of way, core paths or important access routes.

Policy Number	Policy Content	Compliance with Policy
	during construction and upon completion, the developer should incorporate appropriate alternative or modified public access provision, approved by the Council. Core Path Plans (see Definition) and access rights will be material considerations in considering planning applications. The Council will seek reasonable opportunities from developers to create, manage, maintain and improve access through planning conditions or legal agreements.	
ENV 12 Development of Contaminated Sites	Where the previous history of a site suggests that contamination may have occurred, developers should: • undertake a detailed site survey and analysis to establish whether contamination has occurred and the degree and location of the problem (in accordance with BS 10175); • provide a detailed written report of survey and assessment following the advice of Planning Advice Note (PAN) 33: Development of Contaminated Land (including recommendations for treating affected ground) to the Council (the survey should assess whether the effects of leaching affect water courses/drainage and specialists should be employed to produce the report and undertake any treatment that is required); and	The Stage 3 assessment of the scheme has included detailed ground investigations to identify potential areas of contamination and will be used to inform the scheme design and construction. This is will be in accordance with BS 10175 and PAN 33 Development of Contaminated Land. The scheme is therefore in compliance with this policy.

Policy Number	Policy Content	Compliance with Policy
	• remediate sites, by agreement with the Council, prior to new development works taking place (no development should take place until the Council is completely satisfied that the affected ground has been satisfactorily treated).	
ENV 14 Sites of Archaeological Importance	The Council will seek to retain, protect, preserve and enhance the City's existing historic environment and archaeological heritage, including any future discoveries. When development is proposed that would affect a site of archaeological significance: • The developer should notify the West of Scotland Archaeology Service (WSAS) and the Council at the earliest possible stage in the conception of the proposal. • An assessment of the importance of the site should be provided by the developer as part of the application for planning permission, or (preferably) as part of the pre-application discussions. When development that will affect a site of archaeological significance is to be carried out: • Developers should make provision for the protection and preservation of archaeological deposits in situ within their developments, including by designing foundations that minimise the impact of the development on the remains.	No known sites of archaeological value will be affected by the proposed scheme. Historic Scotland will advise on any further investigations that require to be undertaken as part of the assessment of the preferred scheme. The scheme is therefore in compliance with this policy.

Policy Number	Policy Content	Compliance with Policy
	• The Council will require the developer to make appropriate and satisfactory provision for the excavation, recording, analysis and publication of the remains where it is satisfied that the protection and preservation, in-situ, is not warranted, for whatever reason. Where archaeological remains are discovered after a development has commenced: • The developer should notify WSAS and the Council immediately, to enable an assessment of the importance of the remains to be made. • Developers should make appropriate and satisfactory provision for the excavation, recording, analysis and publication of the remains (developers may see fit to insure against the unexpected discovery of archaeological remains during work). The West of Scotland Archaeology Service should be consulted for all sites in each category.	

17.5 Compatibility with Planning Policy

The overall proposed scheme, which comprise the up-grading of the A8 Trunk Road between the Baillieston and Newhouse junctions to motorway standard, junction improvements and the inclusion of an 'all-purpose' road generally complies in principle with the relevant planning policies and guidance at national, structure plan, and local plan levels, as outlined in Table 17.1.

The proposal will contribute to the improvement in the national road and transport infrastructure, and assist in promoting visibility, access, and marketability of employment land, as well as contributing to economic development and regeneration. The proposal will be compatible with policy of reducing congestion on the route network and will assist in increasing the competitiveness of both the Lanarkshire area and wider Central belt of Scotland.

There will be implications for existing SINCs, Greenbelt, Protected Open Space and some access routes, which will not comply with current protective planning policies. There is therefore a need to incorporate and consult over mitigation measures with the local planning authorities where appropriate, and the detailed aspects of how this has been addressed are described in the relevant topic chapters of this Environmental Statement. It should be noted that land is also allocated for a strategic road link and this is safeguarded by local planning policy.

The road development option has a good level of compatibility with planning policy.

17.6 References

A Spatial Planning Framework for Scotland – The Scottish Executive, April 2004

SPP 1 The Planning System, November 2002 - The Scottish Executive Development Department

SPP 17 Planning for Transport (August 2005) - The Scottish Executive Development Department

NPPG 18 Planning and the Historic Environment, April 1999 - The Scottish Office Development Department

NPPG 5 Archaeology and Planning - The Scottish Office Environment Department, 1994.

SPP 2 Economic Development, November 2002 - The Scottish Executive Development Department

SPP 7 Planning and Flooding, February 2004 - The Scottish Executive Development Department

NPPG 14 Natural Heritage, The Scottish Office Development Department, 1999

SDD Circular 24/1985: Development in the Countryside and Green Belts

SDD Circular 18/1987: Development Involved in Agricultural Land

Glasgow and the Clyde Valley Joint Structure Plan (2000 and 2005 up-date)

Glasgow and the Clyde Valley Joint Structure Plan (2006 up-date)

North Lanarkshire Council: Southern Area Local Plan – Finalised Draft (Modified June 2001).

North Lanarkshire Council: Northern Corridor Local Plan (February 2003).

Monklands District Local Plan 1991- First Alteration (date of first alteration? 1996?).

Glasgow City Council: Glasgow City Plan (August 2003).

Glasgow City Plan 2 Finalised Draft (May 2007).

18 Cumulative Impacts

18.1 Introduction

This chapter describes the potential for cumulative impacts to occur in relation to the scheme. Cumulative impacts may be broadly defined as impacts that result from the accumulation of a number of individual impacts (EC, 1999).

Cumulative impacts are considered in terms of

a) the interaction between, or additive effect of, different individual impacts arising from the scheme itself (i.e. 'within-scheme' cumulative impacts); for example the combination of activities associated with the M8 corridor improvements together with other development projects (for example, impacts from the scheme may be exacerbated by construction activity from other major construction planned nearby; or the accumulation of different impacts at a specific location (for example, construction noise and visual intrusion affecting a receptor); and

b) the interaction between the scheme and other major development projects in the vicinity of the road corridor. The accumulation of impacts of the same type at different location (for example, non significant ecological impacts at different sites, collectively may give rise to an overall significant ecological impact in the local area.

In order to consider the latter type of interaction, it has been necessary to make certain assumptions and to limit the scope of what other developments will be considered. As a result, developments considered as remote (beyond 2km) from the road corridor have not been included in this assessment, as there is considered to be insufficient information available to make a meaningful assessment, and demonstrating likely cumulative effects is likely to be difficult. Also, only those developments already with planning approval or within the Local Plan developments are included.

Other road proposals have been taken into account in the following ways:

Traffic modelling for the M8 Baillieston to Newhouse scheme included confirmed road schemes (2010 Committed Do-Minimum or CDM network listed in Chapter 3, Table 3.7) and proposed schemes closely associated with the M8 proposal, namely M74 Junction 5 (Raith) and the Associated Network Improvements for the M73/M74 Baillieston – Hamilton, modelled as the Enhanced Do-Minimum or EDM.

18.2 Baseline Conditions

The developments that have been identified which may interact with the M8 corridor and create cumulative environmental impacts have been chosen primarily through knowledge of other major infrastructure projects planned for development and likely to be under construction within the same timeframe as the M8 corridor improvements (i.e. approximately between 2008 - 2011). These road and commercial developments form

part of the 2010 baseline scenario for the modelling of M8 and surrounding network traffic flows.

At this time, detailed information on the location, layout, timing and accompanying proposed environmental mitigation (if any) of all the possible developments along the scheme corridor is not available. For this reason the potential cumulative impacts are considered on a qualitative rather than a quantitative basis.

The following defined development areas have been taken into consideration in predicting possible impacts, as being near to or associated with the M8 corridor between Baillieston and Newhouse and also likely to have environmental impacts associated with them. These are identified as areas of significant likely future development activity and have been included in the traffic assessment:

- Faskine (Faskine Estate);
- Eurocentral;
- Ravenscraig (out with 2km but linked by the major road network); and
- Newhouse.

18.3 Predicted Impacts

Cumulative impacts may arise in future associated with each of the topic areas identified in Chapter 6-16. The extent, scale or significance of such impacts, and whether positive or negative, cannot be meaningfully determined at this time as they will vary according to the detailed development design and mitigation measures set in place.

18.3.1 Air Quality

At the locations on which the local air quality assessment has focused, the cumulative impacts of the Raith and Associated Network Improvement proposed road schemes together are unlikely to be substantially different to those from the M8 scheme alone. In terms of wider-scale cumulative impacts, in 2010 the increases in emissions would range from extremely small to very small for different pollutants. In 2020, the increases range from extremely small to medium. It should be noted that this represents a worst-case assessment.

The cumulative impacts of future traffic growth have been included in the air quality assessment (Chapter 6) for this scheme based in traffic modelling of the strategic network which has incorporated the effect of road improvements at Raith (M74 Junction 5) and the Associated Network Improvements described previously. The modelled predictions have also incorporated the traffic effects of development at:

- Faskine (Faskine Estate);
- Eurocentral;
- Ravenscraig;
- Gartcosh;

- Strathclyde East; and
- Newhouse.

Cumulative impacts on air quality arising from other developments (industrial and residential) along the road corridor cannot be quantified at this stage, but for all developments, emissions will be subject to the appropriate Local Authority air quality controls and therefore cumulative impacts are unlikely to be significantly adverse.

18.3.2 Cultural Heritage

As for the current scheme, no significant cumulative impacts on known cultural heritage features are anticipated. The potential for previously undiscovered remains to be affected would need to be addressed for each development in consultation with Historic Scotland.

18.3.3 Land Use

Development will take place or is planned within areas already designated for development by the relevant Local Authority. As such it is assumed that they should not conflict with current land use and that this would be addressed by the local authority through the planning process. However, if some or all of the proposed developments proceed, there will inevitably be permanent loss and fragmentation of the remaining undeveloped/agricultural land. There will however be beneficial cumulative impacts on development land from improvements to infrastructure, transport and commercial/residential activity.

18.3.4 Disruption Due to Construction

Adverse cumulative disruption impacts arising from concurrent developments are particularly likely to occur where sensitive receptors lie within 100-200m of the construction. These would potentially include (amongst others) noise, vibration, dust, and increased visual disbenefit. The degree to which these would be significant will however depend on the construction and working controls and mitigation set in place (by the Local Authority, SEPA etc. for other developments), for example through Environmental Management Plans and working Method Statements. It should be noted that the current scheme will be complete by 2011 and that, during the anticipated 30 month construction period, work would vary in intensity and level of disruption along its length. Other major developments along this Baillieston to Newhouse corridor would be likely to take place in phases beyond that date, thereby limiting the likely level of overlap and hence of cumulative impacts arising from disruption due to construction. If appropriate controls are set in place to minimise the level of impacts for different developments, and on the basis that construction activity will not all be concentrated in any one location at one time, it is not considered likely that there will be significant cumulative impacts overall.

18.3.5 Ecology and Biodiversity

The assessment of the road scheme in relation to ecology and biodiversity has considered habitat loss and effects on species in the context of the current condition of the adjacent land which is not required for the scheme. To the south of the route alignment, much of this land is agricultural and rural in nature. In the future, the

remaining habitat resource in the vicinity of the scheme is likely to decrease as a result of additional land take for development, and may therefore be subject to greater degree of fragmentation. Mitigation measures set in place for one scheme and relating to surrounding habitats, may in the future be compromised as development of nearby land reduces the efficacy of the mitigation or its linkage with other habitats (increased fragmentation). As with land use discussed above, the cumulative impact of removing available remaining habitat is likely to be adverse.

18.3.6 Landscape and Visual Change

Over time, the current landscape setting of the scheme corridor is likely to become more built up and urbanised, as land that is currently green space, agricultural land, or designated for development but not yet developed, is progressively built upon. There will therefore be altered views from nearby settlements and for vehicle travellers on the M8, the APR and the local road network. The setting of the road itself will similarly be altered.

18.3.7 Noise and Vibration

The cumulative impacts of future traffic growth have been included in the noise and vibration assessment (Chapter 12) for this scheme based in traffic modelling of the strategic network which has incorporated the effect of road improvements at Raith (M74 Junction 5) and the Associated Network Improvements (M73/M74) described previously. The modelled predictions have also incorporated the traffic effects of development as for air quality, above.

Adverse cumulative noise and/or vibration impacts during construction where several developments are underway near to sensitive receptors cannot be ruled out, but there is insufficient information available to predict the degree to which this may be significant. Noise and vibration impacts for individual developments would also be subject to Local Authority controls and requirements for mitigation in the normal way.

18.3.8 Pedestrians, Cyclists, Equestrians and Community Effects

The proposed scheme maintains access routes for non-motorised users linking existing routes to the wider footpath and cycleway network and specifically proposes to provide accessible routes for north-south and east-west movements which are currently restricted by the existing A8. Long-distance routes promoted by the Local Authority are not compromised by the scheme. Other developments along the route corridor may be encouraged to include provision for pedestrians, cyclists etc. in line with planning policy but the extent of this cannot be predicted with certainty. Future commercial and residential developments are likely to benefit from the enhanced access provision offered by the M8 scheme, where improved links between communities, and between homes and jobs, will be a positive impact. It is unlikely that there will be any significant adverse cumulative impacts on access, but positive improvements to the local and regional footpath and cycleway network are predicted as improved links and connections between routes are made.

18.3.9 Water Quality and Drainage

Should further development take place close to the scheme and during the same construction period there is an increased possibility of accidental pollution of watercourses and surface water features (runoff from several construction sites in the same area). The level of likely physical disruption and alteration of watercourses may also increase as new outfalls and attenuation features are set in place. The total amount of hardstanding would also increase with attendant requirements for drainage attenuation.

However, all such developments will be required to set in place effective and appropriate site controls such that surface and ground waters are protected. Provided SEPA requirements are fully met (for example obtaining necessary licences under the Controlled Activities Regulations, maintaining discharge at greenfield rates, and implementing relevant Pollution Prevention Guidelines), no significant adverse cumulative impacts are anticipated.

18.4 Conclusions

Cumulative impacts arising from the current scheme in combination with other developments are not likely to be significantly adverse overall so long as appropriate mitigation and control mechanisms are set in place. Adverse cumulative impacts are most likely to occur where the construction phases of different developments coincide; when local residents/businesses may experience temporary nuisance, elevated levels of disruption and localised congestion.

Should all of the identified developments proceed as proposed, there will over time be a cumulative and permanent loss of land in the area around the proposed scheme, including agricultural and some Green Belt land, which will result in significant adverse impacts on the existing ecological resource and on landscape and visual amenity over time. It may be possible to offset this loss to an extent through new planting, landscaping and habitat creation measures associated with different developments, but an adverse residual impact is likely to remain in the long term.

19 Summary of Key Issues and Environmental Impact Tables (EITs)

19.1 Introduction

This chapter presents a summary of the key environmental impacts associated with the scheme.

19.2 Environmental Impacts Table

An Environmental Impacts Table (Table 19.1) has been prepared for the preferred scheme, the purpose of which is to present the predicted residual impacts associated with the conceptual design (taking account of agreed mitigation measures) in summarised form.

The table includes the following:

- Description of the potential impact;
- sensitivity/value of the receptor;
- significance of impact without mitigation;
- description of any mitigation and its objective in addressing a specified impact;
- significance of the impact with mitigation in place; and
- likely duration of the impact.

The likely effects of the 'do nothing' situation, should the Scheme not be developed mainly comprises a no change situation for the existing site conditions.

The mitigation measures summarised in Table 19.1 are described in more detail in Chapters 6 – 16 (no mitigation measures are proposed for Chapter 17 Policies and Plans) and summarised in Table 20.1 Schedule of Environmental Commitments (Chapter 20).

Table 19.1 Environmental Impacts Table (EIT)

Description of Potential Impact	Sensitivity /Value of Receptor	Mitigation Measure	Magnitude of Impact With Mitigation	Significance of Impact With Mitigation	Duration of Impact (long, medium or short term)
AIR QUALITY					
Construction Phase: Construction dust and emissions from construction vehicles and plant. Disbenefit.	High	A package of measures to be implemented that are commonly regarded as "good practice" on construction sites. The precise measures are set out in the mitigation schedule.			Short term
Local Air Quality: Improved air quality at some locations and deteriorated air quality at others. Overall net disbenefit.	High	No mitigation necessary.	Moderate beneficial to Large Adverse	Substantial beneficial to very substantial adverse	Long term
Air Quality Impacts on Vegetation: Improvements predicted at the two SSSIs potentially affected. Benefit.	High	No mitigation necessary.	Very to extremely small beneficial	Slight beneficial	Long term
Wider-Scale Impacts: Net increase in total vehicle emissions due to the Scheme. Disbenefit.	High	No mitigation necessary.	Extremely small adverse	Not significant	Long-term

Table 19.1 Environmental Impacts Table (EIT)

Description of Potential Impact	Sensitivity /Value of Receptor	Mitigation Measure	Magnitude of Impact With Mitigation	Significance of Impact With Mitigation	Duration of Impact (long, medium or short term)
CULTURAL HERITAGE					
Physical damage to/ loss or severance of sites or remains of cultural heritage value.	Negligible to National	No known sites or remains. Contractor will set in place contingency measures and actions to be enacted should new remains be uncovered.	Low adverse	Not significant	Permanent
Disturbance due to compaction, vibration or subsidence	Negligible to National	No features in area likely to be affected in this way. Watching brief if required.	Negligible	Not significant	Permanent
Effects on setting and amenity	Negligible to National	No settings considered to be affected in any noticeable way. No special measures required.	Negligible	Not significant	Temporary during construction. Permanent during operation.
Effects on unrecorded features.	Negligible to National	Consultation with Historic Scotland and recording of features and/or excavation if found and need to be removed. Trial trenching if required. Discovery of new features due to excavation and earthworks, adding to archaeological knowledge of area.	Negligible	Not significant	Long-term, permanent

Table 19.1 Environmental Impacts Table (EIT)

Description of Potential Impact	Sensitivity /Value of Receptor	Mitigation Measure	Magnitude of Impact With Mitigation	Significance of Impact With Mitigation	Duration of Impact (long, medium or short term)
LAND USE					
Change in land use Total land requirement approximately 344ha of which 229ha is currently in Scottish Ministers' ownership. Includes existing highway.	Dependent on user perception	Change minimised through scheme design; restoration of existing use where possible. Opportunities for realisation of development potential.	Medium – low	Variable	Long Term
Loss of agricultural land Classified Agricultural Land: Grade 3.1 19.11ha Grade 3.2 121.97ha Grade 4.2 108ha Grade 5.2 2.47ha Note: active agricultural use estimated at 46% of total classified land area.	 High Medium Low Low	Compensation for permanent loss of land; reinstatement of agricultural use where appropriate.	Medium adverse	Significant overall	Long Term

Table 19.1 Environmental Impacts Table (EIT)

Description of Potential Impact	Sensitivity /Value of Receptor	Mitigation Measure	Magnitude of Impact With Mitigation	Significance of Impact With Mitigation	Duration of Impact (long, medium or short term)
Loss of designated land/features: Land with Tree Preservation Orders 1.08ha Protected Open Space 22.88ha Protected Urban Woodland 0.04ha Ancient Woodland 1.36ha Sites of Importance for Nature Conservation 7.57ha	Medium (local to regional value)	New planting of woodland, scrub/shrub, hedgerow and species-rich grassland. Removal, safe storage and re-use of soils from areas where there will be direct loss of ancient woodland to retain seed bank and soil microflora and fauna. See also Ecology and Nature Conservation below.	Medium adverse (local)	Significant	Permanent
Severance of agricultural land and operational disturbance.	Medium – High	Restoration and upgrading of access (with associated NMU benefit); reorganisation and renewal of field boundaries to reduce fragmentation and improve management. Landscape and habitat benefit from new tree and hedgerow planting.	Net medium beneficial	Significant	Short to medium term
Demolition of private property and loss of private land.	High	Demolition confined to one group of farm buildings (Braehead Farm); marginal land loss elsewhere. Compensation for loss of property.	Low adverse	Not significant	Long term
Loss of community land	Not fully determined	Identified as minor encroachment at one site only (Calderbank football ground, Woodhall Mill Rd). Compensatory access and boundary improvements.	Low adverse	Not significant	Medium term

Table 19.1 Environmental Impacts Table (EIT)

Description of Potential Impact	Sensitivity /Value of Receptor	Mitigation Measure	Magnitude of Impact With Mitigation	Significance of Impact With Mitigation	Duration of Impact (long, medium or short term)
Effect on development land	Medium	Some reduction in land designated for industrial or business use and in strategic development sites but overall positive effect on economic development potential through improved accessibility and landscape upgrading.	Net medium beneficial	Significant	Long term
Loss of Green Belt and protected landscape features	Locally High	Adverse impact on Green Belt status and environmental protection designations - compensated by substantial new planting and seeding (itemised in Table 8.3).	Net medium beneficial	Significant	Medium to long term

Table 19.1 Environmental Impacts Table (EIT)					
Description of Potential Impact	**Sensitivity /Value of Receptor**	**Mitigation Measure**	**Magnitude of Impact With Mitigation**	**Significance of Impact With Mitigation**	**Duration of Impact (long, medium or short term)**
DISRUPTION DUE TO CONSTRUCTION					
Impacts on nearby sensitive receptors from airborne particles and deposited dust (generally only experienced within 200 m of construction activity)	High	Contractor to use BRE9 publication 'Control of dust from construction and demolition activities'. A package of measures (part of Contractual requirements and the Environmental Management Plan) to be implemented that are commonly regarded as "good practice" on construction sites. The precise measures are set out in the mitigation schedule and include watering of haul road surfaces and restricting haulage vehicle speeds - measures recognised to reduce dust emission rates by about 70-80%.	Low adverse	Not significant	Short term
Discovery of previously unrecorded cultural heritage remains during construction	Unknown	Contingency measures set in place by Contractor in advance of groundworks, to include cessation of work in the vicinity and consultation with historic Scotland over necessary mitigation measures. Record or protect remains as advised – thereby adding to cultural heritage records for the area.	Low adverse – low beneficial	Not significant assuming recording and/or preservation of remains	Permanent

[9] Buildings Research Establishment, 2003 'Control of Dust from Construction and Demolition Activities, BRE Garston

Table 19.1 Environmental Impacts Table (EIT)

Description of Potential Impact	Sensitivity /Value of Receptor	Mitigation Measure	Magnitude of Impact With Mitigation	Significance of Impact With Mitigation	Duration of Impact (long, medium or short term)
Disruption to or diversion of public or landowner access routes during construction	High	Alternative routes provided with the agreement of the Local Authority if required. Maintain safe access to and along routes during construction phases at different locations along the scheme. Minimise time-period of any disruption through planning and phasing of work.	Low adverse	Not significant	Short-term
Visual intrusion due to vehicles and machinery, earthworks; vegetation removal, soil stripping and excavation; creation of temporary spoil mounds, materials storage areas and compounds; and transient features such as fencing, lighting and signage.	High (where working areas overlooked by residential areas). Low elsewhere	Minimise visual intrusion through a series of good practice measures set in place by the Contractor and described in the Schedule of Environmental Commitments, including the use of screening, careful placement of storage areas and managed vegetation retention to limit views of working areas..	Low--medium adverse	Not significant	Short term
Disruption to or loss of access or use of land during construction period	High (private users/owners)	Land take from sites designated for built development restricted to the minimum necessary for construction of the scheme and ancillary works Contractor to maintain good lines of communication with any affected landowners, local residents or businesses. Temporary access points provided where accessibility and severance may pose a temporary problem. Access arrangements to properties to be fully	Low adverse	Not significant	Short term

Table 19.1 Environmental Impacts Table (EIT)

Description of Potential Impact	Sensitivity /Value of Receptor	Mitigation Measure	Magnitude of Impact With Mitigation	Significance of Impact With Mitigation	Duration of Impact (long, medium or short term)
		considered prior to works on site and necessary facilities constructed before any works that may cause disruption are undertaken.			
Noise and vibration nuisance from vehicles and machinery, earthworks and construction of structures etc.	High	Noise mitigation will follow statutory guidance and requirements agreed and set in place in agreement with the Scottish Executive and relevant local authorities. These may include restrictions on workings hours, avoidance of unsocial hours where working closest to residential areas, and use of noise screening.	Slight adverse	Not significant	Short term and intermittent at different locations along the route.
Increased driver stress from temporary diversions or other traffic management measures during construction period. Altered views from roads overlooking construction areas.	High	Driver stress impacts on views from the road alleviated through clear signage and road markings, careful positioning and screening of site compounds and storage areas and other measures as described for mitigation of visual impacts. Two lane running maintained on the A8 throughout construction period.	Low adverse	Not significant	Short term

Table 19.1 Environmental Impacts Table (EIT)

Description of Potential Impact	Sensitivity /Value of Receptor	Mitigation Measure	Magnitude of Impact With Mitigation	Significance of Impact With Mitigation	Duration of Impact (long, medium or short term)
Temporary disruption to hydrological flows during construction (i.e. through proposed works upstream/culverts); Risk of accidental spillage/mobilisation of sediments into local watercourses; Risk of accidental spillage of liquid contaminants into local watercourses; and/or Risk of inputs of leachate derived from on-site stored construction materials.	Low-medium	All works carried out in line with best practice guidelines, including the SEPA's Special Requirements and Pollution Prevention Guidelines. Early establishment of temporary drainage facilities, including cut-off drains and attenuation/settlement ponds. Temporary watercourse crossings (Kennel Burn and Luggie Burn) will use bottomless arch large diameter culverts to retain natural bed and maintain free passage of fish and other wildlife. The temporary crossing of the North Calder Water will be a bailey bridge, constructed so as to minimise disturbance to the banks and bed of the watercourse. Safe storage of on-site materials such as oils, fuels, concrete and cement products, to prevent potentially contaminating spillage events. Bunded storage areas for oil and fuel storage away from watercourses, water bodies, ditches and drains. No batching or mixing of concrete, or refuelling, near to watercourses, ditches or ponds. Provision of erosion control measures, cut-off ditches, silt traps, containment bunds and storage reservoirs of appropriate size in	Low adverse	Not significant	Short – medium term

Table 19.1 Environmental Impacts Table (EIT)

Description of Potential Impact	Sensitivity /Value of Receptor	Mitigation Measure	Magnitude of Impact With Mitigation	Significance of Impact With Mitigation	Duration of Impact (long, medium or short term)
		line with SEPA requirements, The provision of clearly defined 'no access' areas adjacent to sensitive watercourses, and protective fencing to prevent unauthorised staff, plant and machinery access. Runoff interception and control measures for grouting operations (where required) to include settlement ponds and provision for the removal and safe disposal of settled material off site as necessary. Contingency procedures in case of emergencies/unforeseen events to be set in place by the Contractor as part of the Environmental Management Plan (EMP).			

Table 19.1 Environmental Impacts Table (EIT)

Description of Potential Impact	Sensitivity /Value of Receptor	Mitigation Measure	Magnitude of Impact With Mitigation	Significance of Impact With Mitigation	Duration of Impact (long, medium or short term)
Disturbance to geological and soil attributes.	Medium	Consolidation of mine workings (e.g. by grouting) in advance of road construction. Controlled investigation, excavation and handling of any contaminated material. Possibility of local remediation of areas of contamination - subject to discussion/agreement with regulatory authorities. Limitation of the extent and location of working and storage areas. Implementation of erosion and sediment controls. Appropriate handling and storage of spoil. Re-use of excavated materials as part of the in scheme landscaping strategy wherever possible. Appropriate removal of surplus material off-site to a suitable disposal facility.	Negligible – Low adverse	Not significant	Long term

Table 19.1 Environmental Impacts Table (EIT)

Description of Potential Impact	Sensitivity /Value of Receptor	Mitigation Measure	Magnitude of Impact With Mitigation	Significance of Impact With Mitigation	Duration of Impact (long, medium or short term)
ECOLOGY AND NATURE CONSERVATION					
Habitat loss of undesignated areas	Negligible - Low	Minimise land take/avoid constraints with both scheme and temporary compounds	Negligible – Low adverse	Not significant	Permanent
Loss of designated habitat that is assessed as being of local nature conservation value – eight separate points along the scheme	Medium	Minimise land take/avoid constraints with both scheme and temporary compounds	Medium adverse (local)	Significant	Permanent

Table 19.1 Environmental Impacts Table (EIT)

Description of Potential Impact	Sensitivity /Value of Receptor	Mitigation Measure	Magnitude of Impact With Mitigation	Significance of Impact With Mitigation	Duration of Impact (long, medium or short term)
Habitat fragmentation/barriers; Disturbance due to human activity and noise, vibration, dust and light	Low	New bridge crossing across North Calder Water to be of open span construction, supported by abutments that are positioned well back from the water's edge and constructed from above. Woodland, scrub, hedgerow and grassland planting to eventually create new linking habitats. Monitoring change, e.g. updating surveys Ecological input to detailed design Ecological input to Method Statements Licensed species mitigation, if necessary Timing works to avoid species of value Definition of working areas Protective fencing where necessary Maintain vegetated habitat links Ramp(s) in trenches for wildlife to escape Planting – maximising biodiversity value	Negligible - Low adverse	Not significant	Long term

Table 19.1 Environmental Impacts Table (EIT)

Description of Potential Impact	Sensitivity /Value of Receptor	Mitigation Measure	Magnitude of Impact With Mitigation	Significance of Impact With Mitigation	Duration of Impact (long, medium or short term)
Indirect impacts on aquatic flora and fauna through changes to water flows and quality: North Calder Water Shirrel Burn Kennel Burn Shotts Burn Creation of new wetland areas through drainage design.	 Medium Medium Low High	Surface and groundwater protection measures (as set out in Water Quality and Drainage) Ecological benefit over time through development of significant new pond and wetland habitat as part of SUDs design (see Water Quality and Drainage)	Low adverse Low to medium beneficial	Not significant Significant (positive)	Permanent
Wildlife mortality on roads	Low – High (protected species)	Safe crossing points incorporated into scheme design allied with exclusion fencing at appropriate locations. Post-construction monitoring of crossings. Maintenance of free movement of wildlife along watercourse corridors through bridge and culvert design and associated fencing.	Low adverse	Not significant	Permanent

Table 19.1 Environmental Impacts Table (EIT)

Description of Potential Impact	Sensitivity /Value of Receptor	Mitigation Measure	Magnitude of Impact With Mitigation	Significance of Impact With Mitigation	Duration of Impact (long, medium or short term)
LANDSCAPE AND VISUAL EFFECTS					
Alteration to landscape during construction and operation phases at: Bargeddie Kirkwood to Kirkshaws Shawhead junction Shawhead to Eurocentral Eurocentral to Chapelhall Chapelhall junction Chapelhall to Newhouse	Overall Low but ranging from Low – High at a local level	Conceptual landscape strategy developed as part of scheme including extensive new woodland, scrub/shrub and hedgerow planting. Extent of scheme and associated land-take kept to the minimum required for the safe construction and operation of the road. Good practice measures included as part of Contractual requirements to minimise adverse impacts during construction of the scheme. Detailed mitigation measures set out in Table 20.1.	 Moderate Moderate-Substantial Substantial (local) Low – Moderate Moderate Substantial (local) Moderate	 Not significant Significant Significant Not significant Significant Not Significant	Long Term (mitigated over time as landscape planting matures)
Impacts on views from sensitive receptors at: Bargeddie Kirkwood to Kirkshaws	High	Conceptual landscape strategy developed as part of scheme including extensive new woodland, scrub/shrub and hedgerow planting. Extent of scheme and associated land-take kept to the minimum required for the safe construction and operation of the road. Good practice measures to reduce visual	 Low Low – Moderate	 Significant	Long Term (mitigated over time as landscape planting matures)

Table 19.1 Environmental Impacts Table (EIT)

Description of Potential Impact	Sensitivity /Value of Receptor	Mitigation Measure	Magnitude of Impact With Mitigation	Significance of Impact With Mitigation	Duration of Impact (long, medium or short term)
Shawhead to Eurocentral Eurocentral to Chapelhall Chapelhall to Newhouse		intrusion included as part of Contractual requirements during construction of the scheme. Detailed mitigation measures set out in Table 20.1.	Moderate – Substantial (individual dwellings) Moderate Moderate		
TRAFFIC NOISE AND VIBRATION					
Decreased traffic induced noise or vibration Impacts on properties	High	Improvements in the noise climate through altered road alignment/geometry where traffic is moved further away than at present or runs in cutting, the use of quieter road surfacing and, where deemed appropriate, noise screens.	Variable - Slight to Substantial beneficial	Variable	Long Term
Increased traffic induced noise or vibration impacts on properties	High	Improvements in the noise climate through road geometry, the use of quieter road surfacing and, where deemed appropriate, noise screens. Under the Noise Insulation (Scotland) Regulations 1975 some properties may be eligible for secondary glazing in order to further mitigate the impact of traffic noise due in part to the scheme.	Variable – Negligible to Substantial adverse	Variable	Long Term

Table 19.1 Environmental Impacts Table (EIT)

Description of Potential Impact	Sensitivity /Value of Receptor	Mitigation Measure	Magnitude of Impact With Mitigation	Significance of Impact With Mitigation	Duration of Impact (long, medium or short term)
PEDESTRIANS CYCLISTS, EQUESTRIANS ETC.					
Journey times and amenities of routes used by pedestrians, cyclists and other non-motorised users to access key services and reduce community severance/social exclusion	Baillieston Interchange – LOW	Shared use farm access/pedestrian/cycle links to be provided. Existing bus stops on the A89 (north east of the Baillieston Interchange) and the A8 (west of the Baillieston Interchange) will be relocated along the same route to maintain bus service access. A new section of shared use path is to be constructed from Baillieston (east of the interchange) to the A752 improving NMU access.	Low positive	Not significant	Long-term
Journey times and amenities of routes used by pedestrians, cyclists and other non-motorised users to access key services and reduce community severance/social exclusion.	A752 Corridor – MEDIUM	Provide improved crossing. Retain right of way reserved for the future NCN route. A new foot/cycle bridge to be provided from the existing path from Kirkwood to link into the proposed NCN.	Low positive	Significant	Long-term
Journey times and amenities of routes used by pedestrians, cyclists and other non-motorised users to access key services and reduce community severance/social exclusion.	Douglas Support Estate – LOW	Re-establish previous links with shared used farm access/pedestrian/cycle crossings and paths.	Low positive	Not significant	Long-term

Table 19.1 Environmental Impacts Table (EIT)

Description of Potential Impact	Sensitivity /Value of Receptor	Mitigation Measure	Magnitude of Impact With Mitigation	Significance of Impact With Mitigation	Duration of Impact (long, medium or short term)
Journey times and amenities of routes used by pedestrians, cyclists and other non-motorised users to access key services and reduce community severance/social exclusion.	Shawhead Interchange – MEDIUM	Combination of new and improved infrastructure, including shared foot/cycleways and foot/cycle bridges, which will provide continuous pedestrian links between Shawhead, Strathclyde Business Park and Shirrel. New shared farm access/pedestrian/cycle crossings of A8 and M8 between Shirrel and Carnbroe to facilitate an alternative NLC long distance path. A new section of Path is to be constructed between the Shawhead Interchange (east) and Eurocentral Interchange (west), via the existing Overbridge for the Motherwell to Cumbernauld rail line.	Medium positive	Significant	Long-term
Journey times and amenities of routes used by pedestrians, cyclists and other non-motorised users to access key services and reduce community severance/social exclusion.	North Calder Heritage Trail/Calderbank/Eurocentral - MEDIUM	Incorporate shared use foot/cycleways and crossings of Eurocentral interchange. A realignment of the B799 will incorporate a shared foot/cycleway for NLC proposed regional cycleway and relocated bus stops.	Low positive	Significant	Long-term

Table 19.1 Environmental Impacts Table (EIT)

Description of Potential Impact	Sensitivity /Value of Receptor	Mitigation Measure	Magnitude of Impact With Mitigation	Significance of Impact With Mitigation	Duration of Impact (long, medium or short term)
VEHICLE TRAVELLERS					
Increased driver stress. Reduced quality of view from the road	High	Positive impact on driver stress on both local users and users of the new motorway due to reductions in congestion and resolution of difficulties arising from the mixing of local and through traffic	Slight beneficial	Not significant	Long term
Visual amenity effects such as loss of landscape elements, including trees and hedgerows.	High – low	Appropriate and sensitive design of all new structures to enhance views from the road wherever possible. Minimise height of embankments and extent of cuttings. Landscaping proposals to reinstate/ enhance existing features. Landscaping to mitigate impact of proposed structures, cuttings and embankments and acoustic barriers.	Slight – medium adverse	Significant	Medium – long term
Restricted views of open landscape from existing roads due to construction of new roads, junctions, bridges and acoustic barriers.	High – low		Medium adverse	Significant	Permanent
Vehicle travellers exposed to new views of residential areas, industrial areas and open landscape.	High – low		Medium adverse	Significant	Permanent

Table 19.1 Environmental Impacts Table (EIT)

Description of Potential Impact	Sensitivity /Value of Receptor	Mitigation Measure	Magnitude of Impact With Mitigation	Significance of Impact With Mitigation	Duration of Impact (long, medium or short term)
WATER QUALITY AND DRAINAGE					
Increased run-off into watercourses leading to pollution:		Scheme to include new Sustainable Urban Drainage system. (SUDs) (mitigation described more fully in the Schedule of Environmental Commitments, Chapter 20), to protect surface water quality and groundwater and to ensure no impacts on flows. Construction phase to include good practice measures following SEPA Pollution Prevention Guidelines (PPGs) and Special Requirements. SEPA licences for work affecting watercourses to be obtained in advance of works.	Low adverse		
North Calder at Bargeddie	Medium			Not significant	Long term
Shirrel Burn	Medium			Not significant	Long term
Kennel Burn	Low			Not significant [27]	Long term
Shotts Burn	High			Not significant	Long term
Flood risk	High	No construction in floodplain; SUDs design will attenuate runoff from construction areas and completed road to ensure no change.	Negligible - Low adverse	Not significant	Long term
Erosion of river banks and beds	High	Erosion protection measures to minimise damage at outfalls from extended detention basins	Low adverse	Not significant	Long term

[27] * Based on higher % of efficiency. If lower efficiency magnitude is high with moderate significance

Table 19.1 Environmental Impacts Table (EIT)

Description of Potential Impact	Sensitivity /Value of Receptor	Mitigation Measure	Magnitude of Impact With Mitigation	Significance of Impact With Mitigation	Duration of Impact (long, medium or short term)
GEOLOGY AND SOILS					
Ground surface instability caused by collapse of abandoned mine workings.	High	Consolidation of mine workings (e.g. by grouting.	Low adverse	Not significant	Long term
Disturbance of contaminated material resulting in risk to humans, controlled waters or building materials.	Medium	Controlled investigation, excavation and handling of any contaminated material. Possibility of local remediation of areas of contamination - subject to discussion/agreement with regulatory authorities.	Low adverse	Not significant	Short term

20 Schedule of Environmental Commitments

20.1 Introduction

In order to ensure compliance with environmental commitments, all mitigation measures identified in the Environmental Statement necessary to protect the environment prior to, or during construction, or during operation of the proposed scheme will be incorporated in Contract documents, the Environmental Management Plan (EMP) to be drawn up by the Contractor, and specific Method Statements as appropriate. Legal and other environmental requirements will be defined (including licensing), and responsibilities and requirements established to ensure, firstly, their implementation, secondly, monitoring procedures to check their implementation and thirdly, any specific consultation requirements to ensure that mitigation measures are implemented and appropriately adhered to.

20.2 Schedule of Environmental Commitments

The purpose of the Schedule of Environmental Commitments (Table 20.1 below) is to collate and summarise mitigation measures identified throughout the Environmental Statement for ease of reference. It provides a record of commitments that the Contractor will be obliged to adhere to throughout the Contract period, although it is recognised that there may be a need to revise or supplement the commitments by agreement between the Contractor, the Scottish Executive and other interested parties. Specifically, the following are tabulated:

- Location of the proposed measures
- description of the mitigation measure;
- comments on the timing of the measures;

Figures 20.1 a-g illustrate the conceptual environmental mitigation proposed as part of the scheme. Figure 20.2 illustrates the conceptual planting at SUDS pond features. Should any significant modifications to the scheme be proposed (i.e. design, construction or operational requirements), there may be additional environmental impacts arising to those identified as part of this DMRB Stage 3 EIA process. These impacts would likely require the implementation of appropriate mitigation measures. If this were the case, there would be a requirement to publish an addendum to the Environmental Statement, within which appropriate impacts and mitigation measures would be described. This addendum would include a revised Schedule of Environmental Commitments.

It should be noted that the Schedule of Environmental Commitments provides a summary of mitigation measures developed at this stage in the design process. In addition Appendix 11.1 provides a more detailed breakdown of the proposed landscape mitigation and planting strategy. The measures outlined in Table 20.1 may require further consultation and specification by the Contractor during the development of the specimen design. Both operational and construction stage impacts are considered under each environmental parameter and therefore a separate Disruption due to

Construction heading has not been included in the table. No mitigation is proposed in relation to policies and plans (Chapter 17) as this aspect is picked up in the relevant topic chapters.

Table 20.1 Schedule of Environmental Commitments

Mitigation No.	Chainage/ location	Purpose	Proposed Mitigation Measure	Timescale
Air Quality				
6.1	Throughout	Prevent dust being raised during construction phase	Early construction of a network of paved haul routes across the site.	Early on in construction period
6.2	Throughout	Prevent dust being raised during construction phase	Locating unpaved haul routes as far as possible from occupied residential properties.	Throughout construction period
6.3	Throughout	Prevent dust being raised during construction phase	Use of water-sprays to ensure that any unpaved routes across the site are maintained in a damp condition when in use.	Throughout construction period where appropriate
6.5	Throughout	Prevent dust being raised during construction phase	Imposition and enforcement of a 5 mph speed limit on unpaved ground.	Throughout construction period where appropriate
6.6	Throughout	Prevent dust being raised during construction phase	Sheeting of lorries carrying dusty material on and off site.	Throughout construction period where appropriate
6.7	Throughout	Prevent dust being raised during construction phase	Early sealing of open ground with vegetation.	Throughout construction period where appropriate
6.8	Throughout	Prevent dust being raised during construction phase	Locating any concrete crushing plant well away from residential areas.	Throughout construction period where appropriate
6.9	Throughout	Prevent dust being raised during construction phase	Location of stockpiles of potentially dusty material as far from sensitive locations as possible.	Throughout construction period where appropriate
6.10	Throughout	Prevent dust being raised during construction phase	Location of stockpiles of potentially dusty material as far from sensitive locations as possible.	Throughout construction period where appropriate

Table 20.1 Schedule of Environmental Commitments

Mitigation No.	Chainage/ location	Purpose	Proposed Mitigation Measure	Timescale
6.11	Throughout	Prevent dust being raised during construction phase	Regular use of a water-assisted dust sweeper on local roads if necessary, to remove any material tracked out of the site.	Throughout construction period where appropriate
6.12	Throughout	Prevent dust being raised during construction phase	Regular cleaning of paved areas on-site.	Throughout construction period where appropriate
6.13	Throughout	Prevent dust being raised during construction phase	Use of a jet-spray vehicle and wheel wash for all vehicles leaving the site.	Throughout construction period where appropriate
6.14	Throughout	Prevent dust being raised during construction phase	Use of water suppression during any demolition works near to occupied residential properties.	Throughout construction period where appropriate
6.15	Throughout	Prevent dust being raised during construction phase	Use of water suppression during any cutting of stone or concrete.	Throughout construction period where appropriate
6.16	Throughout	Prevent dust mitigation measures causing watercourse contamination	Where mitigation measures rely on water, it expected that only sufficient water will be applied to damp down the material. There should not be any excess to potentially contaminate local watercourses.	Throughout construction period where appropriate
6.17	Throughout	Reduce impacts should other mitigation measures not be fully implemented or should they temporarily break down	During all stages of the construction works there will be close liaison with the local community, including the setting up of a well-publicised hotline, together with a rapid response to concerns that may arise.	Throughout construction period where appropriate
6.18	Throughout	Prevent contaminated materials becoming airborne	Any contaminated materials should be dealt with following standard procedures.	Throughout construction period where appropriate

Table 20.1 Schedule of Environmental Commitments

Mitigation No.	Chainage/ location	Purpose	Proposed Mitigation Measure	Timescale
Cultural Heritage				
7.1	Throughout	Minimise damage/disturbance to as yet unknown archaeological sites.	During site clearance and construction, the Contractor will be made aware of the possibility of unrecorded finds and careful construction techniques will be employed. If any features are uncovered by the Contractor during excavation works that may be of cultural heritage significance, works should be halted to enable Historic Scotland to determine whether any archaeological recording or removal is required.	Throughout construction period where appropriate
Land Use				
9.1	Throughout	Maintain access to agricultural/private land during construction and operation phases of scheme.	Provide temporary and permanent accommodation works.	Part of construction phase.
Ecology and Nature Conservation				
10.1	Throughout	Maximise Biodiversity value of new habitats	Ecologists will provide input to designs for new drainage arrangements and site landscaping. Re-use of spoil on new verge will be explored, with a view to maintaining habitat suitable for Young's helleborine close to where it has been recorded in the past.	Throughout construction period where appropriate
10.2	Throughout	Minimise environmental risk	Contractor to use the Environmental Management Plan (EMP) with Construction Method Statements for activities in areas of sensitivity.	Created in advance of site clearance and maintained/updated throughout construction period

Table 20.1 Schedule of Environmental Commitments

Mitigation No.	Chainage/ location	Purpose	Proposed Mitigation Measure	Timescale
10.3	Throughout	Protection of water quality and aquatic species/habitat.	See Water Quality and Drainage below. Works to drain wetlands, ponds and ditches will be subject to specific Method Statements. Arrangements for dewatering will be agreed with SEPA and SNH.	In advance of site clearance and maintained/updated throughout construction period
10.4	Throughout	Compliance with protected species legislation: monitor change	Protected species surveys updated in advance of construction, to inform Contractor's specimen design and any requirements for additional mitigation, consultation and/or licences.	Surveys to be updated in the correct survey season prior to the commencement of works and thereafter where appropriate
10.5	Throughout	Compliance with protected species legislation: licences for faunal species including otter, badger, bats, breeding birds and (possibly) amphibians	Where pre-construction surveys indicate that there will be impacts on protected species, detailed mitigation schemes will be agreed with SNH and/or the Scottish Executive and appropriate licences obtained before works to disturb those species can be lawfully implemented by the Contractor.	Obtain licences in advance of works allowing sufficient time for any pre-construction mitigation requirements to be set in place.
10.6	Throughout	Compliance with protected species legislation: avoidance of accidental damage to colony of Young's helleborine (protected plant in vicinity of **TN 57** in Figure 10.2c)	Further survey search for this species to be undertaken. If still present, a licence will be required from SNH for works affecting the colony, and the measures for ensuring appropriate protection as a matter of legislative compliance will need to be incorporated into the EMP.	If the area in the vicinity of TN 57 is affected by works, it will be searched for this plant at the correct time of year.

Table 20.1 Schedule of Environmental Commitments

Mitigation No.	Chainage/ location	Purpose	Proposed Mitigation Measure	Timescale
10.7	Throughout	Protection of biodiversity resource	All working areas will be kept to a minimum, and their boundaries clearly marked at commencement of works. Sensitive habitats to be avoided when placing construction compounds, etc. using information provided in the Environmental Statement and any subsequent surveys. Areas defined in the EMP as requiring protection from accidental damage or disturbance, will be securely fenced prior to commencement of works. Fencing will be fit for purpose and be clearly visible to drivers of large construction vehicles. No materials storage will be permitted within the fenced areas. Topsoil will be removed and stored separately from subsoil in piles less than 3m high. Topsoil, in particular, should be stored for as short a time as possible.	Planned during detailed specimen design and implemented throughout construction period
10.8	North Calder Water	Maintain habitat links for aquatic and terrestrial species using the North Calder Water valley as a north-south (and vice versa) route, and thus minimise risk to drivers of collisions with wildlife trying to cross over the new road.	Habitat links north-south are required to facilitate the safe crossing of the road by species of conservation significance. New bridge crossing to be designed to be of open span construction, supported by abutments that are positioned well back from the water's edge. Work on the North Calder Water to avoid any in-stream works. Construction to be from above (e.g. structures craned in). The detailed specimen design to be undertaken with input from suitably experienced ecologists, to ensure that screen planting of trees and shrubs does not channel flying species into the path of traffic. Mammal tunnels and associated fencing (if appropriate), or "green" bridges will be designed in accordance with principles set out in DMRB Volume 10 and agreed with SNH.	Planned during detailed design and implemented throughout construction period

Table 20.1 Schedule of Environmental Commitments

Mitigation No.	Chainage/ location	Purpose	Proposed Mitigation Measure	Timescale
			Design measures will be implemented to ensure that otters can pass through culverts. Areas of sensitivity, such as holts and setts, should not be directly illuminated. A broad band of vegetation should be retained along the North Calder Water where it is crossed by the new bridge, so that an element of cover is provided along this corridor. Open trenches should be ramped in at least one location to provide a means of escape in case of animals falling in.	
10.9	Throughout	Compliance with legislation: control and prevention of spread of invasive plant species	Checks for and control of Japanese knotweed and giant hogweed will form part of the EMP and will be carried out in accordance with the requirements of SEPA.	Surveyed in advance of site clearance and maintained/updated throughout construction period
10.10	Throughout	Compliance with legislation: reasonable measures to minimise impact to breeding birds (other than specially protected species, which are considered above)	Minimise the potential for damage to nests, eggs and young by removing vegetation likely to be used by breeding birds outside of the season if at all possible. Special measures may be required for ground-nesting species. Alternatively, a search of vegetation by the site ecologist immediately prior to clearance is recommended, so that breeding sites can be identified and their clearance delayed until any young have fledged.	Throughout construction period
10.11	Ponds/Ditches Throughout	Minimise Impacts to Amphibians (and fish, where present)	Procedures for dewatering ponds and wetlands will be agreed with SEPA and SNH and license(s) obtained if required for fish rescue.	Throughout construction period

Table 20.1 Schedule of Environmental Commitments

Mitigation No.	Chainage/ location	Purpose	Proposed Mitigation Measure	Timescale
10.12	Woodland/ Trees throughout	Compliance with legislation: reasonable avoidance measures (RAMs) to minimise potential for impact to bats during construction	Where roosts have not been confirmed during pre-construction surveys, but presence of bats cannot be entirely ruled out, RAMs will be agreed with SNH.	In advance of site clearance
10.13	Throughout	Minimise animal casualties through provision of safe crossing points allied with fencing to prevent access to the road at key locations.	Any mammal tunnels and associated badger-proof fencing where it is to be provided must be in place before the new road is opened. Measures will be put in place to ensure that mammal tunnels and fencing are checked and maintained as appropriate, on an ongoing basis.	Prior to commencement of operation.
10.14	Throughout	Ensure success of mitigation measures	A monitoring programme in accordance with advice given in DMRB Volume 10 will be established to assess the effectiveness of the mammal crossing measures put in place. Additional post-construction monitoring may be required in respect of any protected species mitigation carried out under licence.	The nature and timing of such monitoring will be agreed between the Contractor and the relevant authorities at the time when (if) the licence is applied for.

Table 20.1 Schedule of Environmental Commitments

Mitigation No.	Chainage/ location	Purpose	Proposed Mitigation Measure	Timescale
Landscape and Visual Impacts (see also Appendix 11.1 Landscape Mitigation and Planting Strategy)				
11.1	Throughout	Reduce visual intrusion during construction and operation phases as far as practicable.	Retain existing vegetation to provide screening during works. Contractor to limit size and extent of working and storage areas. Time and phase works to minimise the duration of impacts at any set of visual receptors. Use fencing to define working areas. Good housekeeping of construction site and storage areas. Use temporary floodlighting only when necessary; lighting and night-time working to be in line with Local Authority requirements. Careful selection and placement of site compounds, material storage areas and spoil heaps to reduce visual intrusion and landscape impacts. Contractor to use spoil/topsoil storage bunds to create temporary screening of working areas/compounds. Early planting of trees, shrubs and grassed areas as well as new ponds and wetland creation to establish the structure of the longer-term visual and landscape mitigation.	
11.2	Throughout	Screen new roads and associated junctions and earthworks and integrate scheme into the surrounding landscape	Reduce vegetation removal to the minimum necessary for the safe construction and operation of the scheme. Contractor to use the landscape/planting strategy as the minimum required for the scheme. Extensive new areas of woodland, scrub/shrub, hedgerow and conservation grassland planting will help to screen new road features and integrate new earthworks into the landscape as the planting matures.	During construction phase.

Table 20.1 Schedule of Environmental Commitments

Mitigation No.	Chainage/ location	Purpose	Proposed Mitigation Measure	Timescale
Noise and Vibration				
12.1	Throughout working areas and particularly near to residential/built-up areas	Mitigation of noise impacts on sensitive receptors (construction phase)	Noise mitigation will follow statutory guidance and requirements agreed and set in place with the Scottish Executive and relevant local authorities. These may include restrictions on workings hours, avoidance of unsocial hours where working closest to residential areas, and use of noise screening. These limits will be detailed within the Employer's Requirements and the Environmental management Plan.	
12.2	A89w/b[28] to M8 w/b Houses to Rail Bridge	Mitigation of noise impacts on sensitive receptors	2m high acoustic screens relative to the ground level. The barriers to be at least 15kg/m2 close boarded timber fencing.	
12.3	A8 e/b[29] Ch 435 - Ch 620	Mitigation of noise impacts on sensitive receptors	As above	
12.4	A8 e/b Ch 620 - Ch 840	Mitigation of noise impacts on sensitive receptors	As above, screens to be 3m high	
12.5	A8 e/b Ch 840 - Ch 1090	Mitigation of noise impacts on sensitive receptors	As above, screens to be 2m high	
12.6	M8 e/b Ch 1175 - Ch 2520	Mitigation of noise impacts on sensitive receptors	As above, screens to be 2m high	

[28] wb = westbound side of the road

[29] e/b = eastbound side of the road

Table 20.1 Schedule of Environmental Commitments

Mitigation No.	Chainage/ location	Purpose	Proposed Mitigation Measure	Timescale
12.7	M8 e/b Ch 3200 - Ch 3400	Mitigation of noise impacts on sensitive receptors	As above, screens to be 2m high	
12.8	Immediately west of Loop A725 n/b to M8 e/b	Mitigation of noise impacts on sensitive receptors	As above, screens to be 2m high	
12.9	A8 w/b Off slip South west Quadrant Ped bridge extension	Mitigation of noise impacts on sensitive receptors	As above, screens to be 2m high	
12.10	A725 s/b On slip from M8 w/b Ch -30 - Ch 230	Mitigation of noise impacts on sensitive receptors	As above, screens to be 2m high	
12.11	M8 w/b Ch 1750 - Ch2300	Mitigation of noise impacts on sensitive receptors	As above, screens to be 2m high	
12.12	M8 w/b Ch 2300 - Ch2500	Mitigation of noise impacts on sensitive receptors	As above, screens to be 3m high	
12.13	M8 w/b Ch 2500 - Ch2800	Mitigation of noise impacts on sensitive receptors	As above, screens to be 2m high	
12.14	M8 w/b Ch 4980- Ch 5190	Mitigation of noise impacts on sensitive receptors	As above, screens to be 3m high	
12.15	APR w/b Ch 6970 - Ch 7380	Mitigation of noise impacts on sensitive receptors	As above, screens to be 2m high	

Table 20.1 Schedule of Environmental Commitments

Mitigation No.	Chainage/ location	Purpose	Proposed Mitigation Measure	Timescale
12.16	APR w/b Ch 7575 - Ch 8165	Mitigation of noise impacts on sensitive receptors	As above, screens to be 2m high	
12.17	Ch7820 to Ch8165	Mitigation of noise impacts on sensitive receptors	Landscape Bund at 2m high	
12.18	APR e/b Ch 6910 - Ch 8150	Mitigation of noise impacts on sensitive receptors	As above, screens to be 2m high	
12.19	M8 e/b Ch 8825 - Ch 10010.	Mitigation of noise impacts on sensitive receptors	As above, screens to be 2m high	
Pedestrians, Cyclists, Equestrians and Community Effects				
13.1	Routes across Baillieston Interchange between Bargeddie, Crosshill and Swinton	Retain existing path/track network and bridge crossings of Baillieston Interchange to retain existing NMU access in area on fringe of North Lanarkshire SIP and subject to low levels of car ownership. Access to bus services along A89 and A8 also to be maintained.	Shared use farm access/pedestrian/cycle links to be provided at this location. Existing bus stops on the A89 (north east of the Baillieston Interchange) and the A8 (west of the Baillieston Interchange) will be relocated along the same route to maintain bus service access.	Part of scheme

Table 20.1 Schedule of Environmental Commitments

Mitigation No.	Chainage/ location	Purpose	Proposed Mitigation Measure	Timescale
13.2	New Shared Use footpath south of M8 between Baillieston Interchange (east) and the A752 (west)	New section of path to be constructed which will form part of an East-West path which will improve access between communities and employment areas along the A8/M8 corridor.	Provision of a new shared use foot/cycle path will link with a completed East-West path will connect communities and employment areas along the A8/M8 corridor.	Part of scheme
13.3	NCN Route 75 and the A752 Aitkenhead Road and proposed diverted section of NCN Route 75 along SMO5 Right of Way	Retain and improve NMU access between residential communities subject to social deprivation. Maintain National Cycle Network.	Retain existing A752 crossing of the A8 and now M8 and link to proposed SUSTRANS realignment along SM05. Retain right of way reserved for the future NCN route. A new foot/cycle bridge is also to be provided from the existing path from Kirkwood to link into the proposed NCN.	Part of scheme
13.4	Douglas Support Estate, Bankhead and Shawhead Farm	Maintain existing links to Leisure/recreation area, the Showcase Retail Park and Strathclyde Business Park for local communities subject to social deprivation.	Re-establish previous links with shared used farm access/pedestrian/cycle crossings and paths	Part of scheme

Table 20.1 Schedule of Environmental Commitments

Mitigation No.	Chainage/ location	Purpose	Proposed Mitigation Measure	Timescale
13.5	Routes across the Shawhead Interchange between Shawhead and Shirrel/Bellshill/ Strathclyde Business Park, including NLC long distance path.	Improve existing poor quality NMU infrastructure across Shawhead interchange. Improve access for communities subject to social deprivation in Shawhead. Facilitate NLC long distance path commitment	Combination of new and improved infrastructure, including shared foot/cycleways and foot/cycle bridges, which will provide continuous pedestrian links between Shawhead, Strathclyde Business Park and Shirrel. New shared farm access/pedestrian/cycle crossings of A8 and M8 between Shirrel and Carnbroe to facilitate an alternative NLC long distance path.	Part of scheme
13.6	New Shared Use foot/cycle path south of A8 between Shawhead Interchange (east) and the existing farm overbridge for the Motherwell to Cumbernauld rail line	To provide another section of an East-West path, linking the communities and employment areas along the A8/M8 corridor.	The construction of a new shared use path parallel to the southern side of the A8 between the Shawhead Interchange (east) and existing farm bridge over the Motherwell to Cumbernauld rail line.	Part of Scheme

Table 20.1 Schedule of Environmental Commitments

Mitigation No.	Chainage/ location	Purpose	Proposed Mitigation Measure	Timescale
13.7	New Shared use Cycle path parallel to southern side of A8 westbound on slip from the Eurocentral interchange to a new A8, Carnbroe Footbridge (Structure 22)	To complete the East-West path linking the communities and employment areas along the A8/M8 corridor.	The construction of the final section of shared use foot/cycle path to complete an East-West Path.	Part of scheme
13.8	Paths south from North Calder Heritage Trail via Calderbank and Eurocentral, including B799	Retain existing foot/cycle path infrastructure across Eurocentral. Improve access to employment for residents of Calderbank. Retain existing bus stop provision and facilitate NLC proposal for regional cycleway using the B799.	Incorporate shared use foot/cycleways and crossings of Eurocentral interchange. A realignment of the B799 will incorporate a shared foot/cycleway for NLC proposed regional cycleway and relocated bus stops.	Part of scheme

Table 20.1 Schedule of Environmental Commitments

Mitigation No.	Chainage/ location	Purpose	Proposed Mitigation Measure	Timescale
Vehicle Travellers				
14.1	Throughout Scheme	Reduce adverse changes to driver views and to enhance driver views of open countryside. Ameliorate driver stress	Appropriate bridge design where new watercourse crossings and pedestrian bridges are proposed to create a positive visual feature. Earthworks design to integrate as far as possible into surroundings. Appropriate seeding/planting of earthworks to reflect surrounding vegetation. Planting of hedgerows, and roadside vegetation and the establishment of tree screens where new junctions, slip roads and crossing points are proposed. Appropriate design, landscaping and planting along the motorway and APR, along with suitable road layouts, furniture, lighting and signage designed to improve confidence in route selection and decision making at junctions.	

Table 20.1 Schedule of Environmental Commitments

Mitigation No.	Chainage/ location	Purpose	Proposed Mitigation Measure	Timescale
Water Quality and Drainage				
15.1	Throughout scheme	Prevent, reduce or offset potential adverse effects on surface and ground waters during construction. Avoid increased flooding risk.	Construction Phase : Avoid work within watercourses or banks where possible to protect in-stream and bankside habitats. Bottomless arch culverts will be used. Temporary crossing of the North Calder Water to be via Bailey bridge. Contractor to establish safe storage for on-site materials such as oils, fuels, concrete and cement products, to prevent potentially contaminating spills. Oil/fuel/chemical storage areas to be bunded and away from watercourses, water bodies, ditches and drains. No batching or mixing of concrete, or refuelling, near to watercourses, ditches or ponds. Provision of erosion control measures, cut-off ditches, silt traps, containment bunds and storage reservoirs of appropriate size in line with SEPA requirements, and in advance of works commencing on site Provision of clearly defined 'no access' areas adjacent to sensitive watercourses. Runoff interception and control measures for grouting operations (where required) to include settlement ponds and provision for the removal and safe disposal of settled material off site as necessary. Necessary licences to be obtained from SEPA in advance of works. SEPA PPGS and Special Requirements to be followed. Contingency procedures in case of emergencies/unforeseen events to be set in place by the Contractor as part of the Environmental Management Plan (EMP).	Attenuation ponds and site runoff management controls to be established in advance of construction.

Table 20.1 Schedule of Environmental Commitments

Mitigation No.	Chainage/ location	Purpose	Proposed Mitigation Measure	Timescale
15.2	Throughout	Convey surface run-off from the road surface to the receiving watercourses without detrimental effect on water quality and associated ecosystems. Ensure no adverse impact on surface water flows, or flood risk. Treat and control road surface runoff as near to the source as possible protecting downstream habitats.	Operation of Scheme: Sustainable Urban Drainage system to include: Gullies and Catch pits to trap sediments and retain a proportion of the suspended solids. Filter drains to convey road surface runoff to the discharge point and filter out pollutants and slow flow velocity. Swales to remove pollutants before water enters the watercourse. Oil interceptor at the drainage outfalls to defend against oil on the road being washed into the drainage system. Storage containment at drainage outfalls - defence against accidental spillage of harmful liquids on the road. Silt forebays provide for settlement of suspended solids Extended detention basins with wet pool provide attenuation and treatment of the road runoff, prior to discharge into the water course. Ecological value and diversity is promoted through micro-wetland areas in the base of the basins.	SUDs in place in advance of scheme operation.
15.3	SUDs ponds	Maintain/enhance local biodiversity	Planting of SUDs pond perimeters to create new wetland habitat to complement nearby habitats and (where practicable) addition of material from donor pond(s) nearby to speed natural colonisation.	In advance of scheme operation
15.4	Luggie Burn (chainage 1700)	Maintain flow of burn and minimise impact of road construction over part of its length.	Open base culvert design (where crossed by the new road) will be used to maintain existing watercourse bed, designed to maintain free passage of fish along the watercourse. Remaining length of open watercourse will be protected during the construction phase. Detailed design and method to be agreed with SEPA and necessary licence obtained.	Permanent in advance of scheme operation

Table 20.1 Schedule of Environmental Commitments

Mitigation No.	Chainage/ location	Purpose	Proposed Mitigation Measure	Timescale
15.5	Un-named Burn 2 (chainage 2400)	Maintain flow of burn and minimise impact of road construction over part of its length	Diversion of the watercourse parallel to the proposed road over a length of 190m before it crosses the proposed road at chainage 2400. The diversion joins the existing watercourse immediately downstream of the culvert. Bottomless arch culverts 2m wide by 1.4m high will be used, where culverting cannot be avoided. The culverts will incorporate otter ledges and freeboard above 1 in 100 year flood level to ensure safe passage for wildlife. Use River Restoration Guidance in design of new lengths of open watercourse.	Permanent in advance of scheme operation
15.6	Kennel Burn (chainage 9500)	Maintain burn flows and enhance 'natural' characteristics of burn	The burn will be diverted in an open channel for a length of about 400m before it crosses the proposed road at chainage 9200. Bottomless arch culverts 2m wide by 1.4m high will be used, where culverting cannot be avoided. The culverts will incorporate otter ledges and freeboard above 1 in 100 year flood level to ensure safe passage for wildlife. Use River Restoration Guidance in design of new lengths of open watercourse.	Permanent in advance of scheme operation
15.7	Baillieston Surface Water Trunk Sewer (chainage 500-850)	Maintain flow	Divert Baillieston Surface Water Sewer (BSWS) upstream of its existing outfall at Un-named Burn 1. The BSWS which drains part of the M8 motorway to the west of the Baillieston junction and discharges into the Burn between mainline road chainages 500-850 over a length of 370m will be diverted and join the culverted section of the burn south of the proposed road.	Permanent in advance of scheme operation

Table 20.1 Schedule of Environmental Commitments

Mitigation No.	Chainage/ location	Purpose	Proposed Mitigation Measure	Timescale
15.8	Chainage 750. North Calder Water at chainage 2050, and 4850. Existing Scottish Water Sewer at chainage 6300. Existing ditch at chainage 7600 Kennel Burn at chainage 9500. Existing ditch at chainage 10400 North Calder Water south of Shawhead junction. Existing ditch north of Chapelhall junction. Unnamed	Evaluate the impact of combination of point source discharges on the water level and flooding on existing development.	Undertake drainage impact assessment during detailed specimen design stage.	In advance of scheme construction-

Table 20.1 Schedule of Environmental Commitments

Mitigation No.	Chainage/ location	Purpose	Proposed Mitigation Measure	Timescale
	Burn 4 south of Chapelhall junction.			
15.9	Chainages 750, 2050, 4850, 6300, 7600, 9500, 10400, 10520 and at Shawhead Junction south of M8, at A725 chainage -50, Chapelhall Junction South of M8 at B799 chainage 0 (zero) and Chapelhall Junction north of M8 at B802 chainage 200	Convey surface run-off from the road surface to the receiving watercourses without detrimental effect on water quality and associated ecosystems. Prevent, reduce or offset potential effects. Treat and control road surface runoff as near to the source as possible protecting downstream habitats.	Provision of extended detention basins with wet pool as part of SUDS facilities, including at each outfall: an oil interceptor, spillage containment (defence against accidental spillage of harmful liquid such as chemical etc. on the road) a forebay basin with 20% of the volume of the basin to provide for settlement of coarse silts.	Permanent in advance of scheme operation

Table 20.1 Schedule of Environmental Commitments

Mitigation No.	Chainage/ location	Purpose	Proposed Mitigation Measure	Timescale
15.10	North Calder Water	Protect natural cross section of NCW at motorway crossing	Set bridge abutments well back from river banks and maintain natural bank profile. Single span bridge construction method to avoid in-river works. Maintain free passage of fish.	Incorporate into specimen design.
15.11	All receiving watercourses, water bodies, ditches etc. along the route.	Protect watercourses and water bodies during the construction phase.	Existing watercourses, field drains or any other source of surface water runoff will be intercepted and temporarily re-routed around or culverted through working areas. Settling ponds will be provided for runoff discharges from construction areas to intercept and store/treat runoff prior to entry into the watercourses.	Establish in advance of construction activity
15.12	All outfalls to watercourses	Protect receiving watercourses from erosion damage to the banks and bed at the outfalls from the extended detention basins	Employ erosion protection measures where necessary, using soft engineering techniques, including stone pitching and reinforced grass.	During construction of drainage features before operation phase
Geology and Soils				
16.1	All	Prevent ground instability	A suitable method statement for stabilisation (possibly grouting) work will be prepared to minimise damage and/or disruption to surrounding land, vegetation and natural features. Boreholes and proposed work within locally designated SINCs will be discussed in advance with North Lanarkshire Council. Pre-works surveys for protected species (in particular the possible presence of badger setts) will also be carried out at the appropriate season where groundworks to be carried out.	In advance of construction of road

Table 20.1 Schedule of Environmental Commitments				
Mitigation No.	Chainage/ location	Purpose	Proposed Mitigation Measure	Timescale
16.2	All	Prevent spread of contamination	It is unlikely that construction of the road will increase contamination exposure. Any necessary protective will be agreed with the appropriate regulatory authorities in advance of work. The risk to construction and maintenance workers from mobilisation of and exposure to contaminants will be reduced to acceptable levels by ensuring appropriate personal protective clothing and equipment is adopted and standard health and safety procedures are followed.	In advance of construction activity on site and ongoing during construction phase. Ongoing during operation phase specifically for maintenance workers

GLOSSARY

1,3-Butadiene	A gaseous hydrocarbon which may be found in vehicle exhaust. Classified as a known carcinogen (C_4H_6).
95 Percentile Flow (Q_{95})	The flow in cubic metres per second that is equalled or exceeded for 95% of the time; a significant low flow parameter particularly relevant in the assessment of river water quality consent conditions.
Above Ordnance Datum (AOD)	The mean sea level at Newlyn (UK) used as a base measurement on Ordnance Survey Maps for contours.
Acoustics	The study of sound, especially its generation, transmission, and reception.
Alluvial	Fine-grained fertile soil consisting of mud, silt and sand deposited by flowing water on flood plains, in river beds and in estuaries.
Amber List Species	Bird species with an unfavourable conservation status in Europe; those whose population or range has declined moderately in recent years; those whose population has declined historically but made a substantial recent recovery; rare breeders; and those with internationally important or localised populations.
Ambient Noise	The all-encompassing sound at any point in time.
Ancient Woodland	Woodlands that occupy sites which have been wooded continuously for several hundred years. In Scotland these are woods present before 1750.
Anthropogenic	As a result of man's actions
Aquifer	A body of porous and permeable rock through which appreciable amounts of water can flow.
Area of Landscape Importance	Local area designation.
As	Arsenic
Attenuation	Increase in duration of flow hydrograph with a consequent reduction in peak flow.
B	Boron

Bait Marking Survey	A survey to determine the extent of badger territory by checking for coloured pellets in latrines/dung pits.
Benthic	Of, relating to, or occurring at the bottom of a body of water.
Benzene	A colourless, flammable liquid hydrocarbon (C_6H_6). Derived from petroleum.
Bing	Waste heap.
Biodiversity	Biological diversity, or richness of living organisms present in representative communities and populations.
Biodiversity Action Plan (BAP)	UK's initiative to maintain and enhance biodiversity. Provides detailed plans for the protection of listed habitats and species. There is a UK BAP and local area BAPs (LBAPs).
Biological Oxygen Demand (BOD)	The amount of dissolved oxygen required to meet the metabolic needs of micro organisms in water rich in organic matter.
Borrow Pits	A borrow pit is a term used in construction and civil engineering. It describes an area where material (usually soil, gravel or sand) has been dug for use at another location.
Bryophyte	Mosses, liverworts and hornworts
Calcifugous	Thrives in acid soils
Carboniferous	A past geological time period when large amounts of coal were produced by natural processes.
Carr Woodland	Type of wet woodland which occurs on poorly drained or seasonally wet soils and is typically composed of alder, willow or birch.
Catchment	The area contributing flow to a point on a drainage system.
Cd	Cadmium
Cist Burial	A cist is a small burial chamber dating from the Bronze Age usually built of single stone slabs.

Coffer Dams	A barrier constructed to exclude water from an area that is normally submerged. Made commonly of wood, concrete or steel sheet piling. Often temporary to allow construction on the foundation of bridges and similar structutres.
Compulsory Purchase Order (CPO)	A legal document giving the government (Scottish Ministers) power to compulsorily purchase the areas of land necessary for construction of a road (or other scheme).
Contaminated Land	The Environmental Protection Act 1990 defines Contaminated Land as 'any land which appears to the local authority as to be in such condition, by reason of substances, 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 water is being, or likely to be caused'.
Couch	Area of flattened vegetation or scraped out soil used as a resting place by otters.
Cr	Chromium
Cu	Copper
Curtilage Land	Enclosed area of land adjacent to a house
Decibel (dB)	The range of audible sound pressures is approximately 0.00002 Pa to 200 Pa. Using decibel notation presents this range in a m ore manageable form, 0 dB to 140 dB. Mathematically: Sound Pressure Level (dB) = 20 log (p_t/p_o) Where $p_o = 2 \times 10^{-5}$ Pa.
'A' weighting dB(A)	The human ear does not respond uniformly to different frequencies. A-weighting is commonly used to simulate the frequency response of the ear.
Designed Landscape	An area of significant parkland and woodland, generally centred upon a mansion house or castle, which has been laid out for artistic effect and identified in the 'Scottish Inventory of Gardens and Designed Landscapes' (Countryside Commission for Scotland and Historic Buildings and Monuments Directorate, 1987). Now maintained by SNH and Historic Scotland.

Desk Study	Assessment of a site usually preceding ground investigations typically incorporating a review of available site information, consultation with relevant bodies and a site visit.
Do-minimum	The base situation where there are no modifications to the existing road network. May also refer to the minimum modifications which will necessarily take place in the absence of a proposed scheme.
Drift (Superficial Deposits)	Drift geology overlying bedrock.
Dual Two Lane All Purpose Road (D2AP)	Comprises 2 x 7.3m carriageways, one in each direction, separated by a 2.5m central reserve. Each carriageway has 2 x 3.65m lanes.
Ecology	The study of the interrelationship between organisms and their environment including both the abiotic and the biotic elements of the natural world.
Edge Effects	Occur at habitat boundaries where two distinct communities meet. The boundary is blurred as each community contains elements of the other.
Environmental Impact Assessment (EIA)	The process by which information about the environmental effects are evaluated and mitigation measures are identified.
Extended Phase 1 Habitat Survey	Accepted methodology recommended in the current guidelines for baseline ecological assessment published by the Institute of Environmental Assessment. This level of survey includes the documentation of habitats to a recognised standard as described in the Handbook for Phase 1 Habitat Survey, but also includes the recording of signs indicating the presence or possible/potential presence of protected species.
Façade	Measurement made at 1m from façade (façade effect +2.5/3dB(A))
Fen	Peatlands which receive water, nutrients and minerals from the soil, rock and ground water as well as from rainfall. The water table is at or just below the surface.
Floodplain	Land adjacent to a river which is subject to regular flooding.

Fragmentation	The process by which large habitat blocks become split up into smaller (and often less viable) sites, e.g. by expansion of towns and villages, the development of roads etc.
Gantries	Bridge-like framework used to support travelling crane.
Geomorphology	The branch of geology concerned with the structure, origin and development of topographical features of the earth's crust.
Glacial Till	Deposits lain down after the retreat of glaciers and ice sheets. Consists of an unstratified heterogeneous mixture of rock fragments, ranging in size from clay particles to boulders, and varying in composition according to the nature of the bedrock. Synonymous with boulder clay.
Gravimetric	Concerned with or using measurement by weight.
Groundwater	Water below the surface of the ground in the saturation zone and in direct contact with the ground or subsoil.
Grouting	The process of pumping a cementitious liquid into abandoned mine workings under a road to fill up the voids created by the mine workings - thus preventing future subsidence.
Hg	Mercury
High Forest	Shady, closed-canopy woodland.
Homogeneous	Of uniform nature.
Impact	Any changes attributable to the proposed scheme that have the potential to have environmental effects (i.e. the cause of the effects).
Improved Grassland/Pasture	Grassland that has been subject to a level of fertilisation and/or weed control (but not reseeded) to the extent that most of the original species have disappeared, leaving a low number of dominant vigorous species, with a resultant low richness. Semi-improved - grassland that has been subject to some fertilisation and/or weed control, but which still retains some species characteristic of the unimproved state.

	Unimproved - grassland that has not been subject to fertilisation and/or weed control and which is usually species-rich.
Incised River Valley	Narrow steep-sided valley cut deeply into plateau farmlands.
Invasive	A non-native species which spreads rapidly, leading to the loss of local native species which it out competes.
L_{Aeq}	Equivalent Continuous Sound Level. A notional steady sound level which would cause the same A-weighted sound energy to be received as that due to the actual, possibly fluctuating, sound level over a given period of time.
L_{A10}	The A-weighted noise level exceeded for 10% of the measurement period. A unit generally used in the assessment of road traffic noise.
L_{A90}	The A-weighted noise level exceeded for 90% of the measurement period. This unit is generally used to describe the background noise climate.
Landform	Combination of slope and elevation producing the shape and form of the land surface.
Landscape	Human perception of the land, conditioned by knowledge and identity with a place.
Listed Building	Building included on the list of buildings of special architectural or historic interest and afforded statutory protection under the 'Planning (Listed Buildings and Conservation Areas) (Scotland) Act 1997' and other planning legislation. Classified Categories A-C.
Long-established Woodland	Been continuously wooded since 1860.
Mesotrophic	Standing fresh water with medium levels of nutrients
Minerotrophic	Containing minerals (including nutrients) from beyond the margins of the peatland, usually from groundwater and surrounding soils and rock.
Mitigation	Term used to indicate avoidance, remediation or alleviation of adverse impacts.

MTBE	Methyltertiary-Butyl Ether
National Vegetation Classification	A classification of British plant communities based on their association of component species.
Naturalised	Non-native species that has become established in a new environment as if it was native.
Ni	Nickel
Notable Species	Scarce invertebrate or floral species - occurring in 16-100km squares in Britain.
Open Space	Any land laid out as public parks or used for the purpose of public recreation, or land which is a disused burial ground.
PAH	Poly Aromatic Hydrocarbons
Pb	Lead
PCB	Polycyclic Chlorinated Biphenyls
Piling	Installation in the ground of support columns for surface structures, where surface and shallow deposits have insufficient strength.
Plateau Farmland	Gently undulating lower slopes of plateau moorlands, dominated by pastoral farmland.
PM_{10}	Particles measuring 10µm or less. The standard was designed to identify those particles likely to be inhaled by humans and has become the generally accepted measure of particulate material in the atmosphere in the UK and in Europe.
Poaching	Breaking up land or making muddy by trampling.
Prime Quality Land	In Scotland agricultural land is classified by the Macaulay Land Use Research Institute (MLURI) according to its capability for crop production. There are seven grades and Grades 1, 2 and 3.1 are recognised as being the best and most versatile and are collectively known as Prime Quality Land.
PRoW	Public Rights of Way

Ramsar	Site designated under the Convention of Wetlands of International Importance. The Convention was adopted in Ramsar, Iran, in 1971 and ratified by the UK Government in 1976. The objective of the Convention is 'the conservation and wise use of wetlands by national action and international co-operation as a means to achieving sustainable development throughout the world'.
Raised Bog	Occur on areas with impeded drainage. The peat is several metres thick and forms a distinctly raised dome.
Rank grassland	Grassland that has not been cut or grazed for some time and has become tall, tussocky and dominated by coarse species of grass.
Receptor	Those habitats or species subject to the impacts of a proposal.
Red List Species	Bird species that are globally threatened according to IUCN criteria; those whose population or range has declined rapidly in recent years; and those that have declined historically and not shown a substantial recent recovery.
Regionally Important Geological Sites	Sites designated by regional geological groups on locally developed criteria, currently the most important places for geology and geomorphology outside statutorily protected land such as Sites of Special Scientific Interest (SSSI).
Remediation	Act or process of correcting a fault or deficiency.
Riffle	Shallow, fast-flowing water with a distinctly disturbed surface, usually over a gravel substrate.
Riparian Zone	Habitat alongside water courses influenced by the river.
River Terrace	Abandoned floodplain that forms when their associated rivers flowed at high levels in the past.
Saltmarsh	Inter-tidal sand-, silt- or mud-based habitats colonised by halophytic (salt tolerant) plant species.

Scheduled Monument	A monument which has been scheduled by the Scottish Ministers as being of national importance under the terms of the ancient Monuments and Archaeological Areas Act 1979'.
Scottish Semi-Natural Woodland Site	Semi-natural woods are those composed predominantly of native trees and shrub species that have not been planted.
Se	Selenium
Secondary Woodland	Woodland occupying a site that has not been wooded continuously. It may be a product of natural succession or of planting on formerly unwooded land.
Semi-Natural Vegetation	Vegetation which has been modified by humans but is still of significant nature conservation interest because it is composed of native plant species, is similar in structure to natural types and supports native animal communities.
Shoals and rifts	Shallow areas in water.
Site of Importance for Nature Conservation (SINC)	Local Nature Conservation designation.
Site Integrity	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 levels of populations for which it was classified.
Sites of Special Scientific Interest (SSSI)	Areas of national importance. The aim of the SSSI network is to maintain an adequate representation of all natural and semi-natural habitats and native species across Britain. The site network is protected under the provisions of Sections 28 and 19 of the Wildlife and Countryside Act 1981 as well as the Amendment Act 1985 and the Environmental Protection Act 1990.
Slacks	Area of low flow in a river.
Special Area of Conservation (SAC)	An area designated under the EC Habitats Directive to ensure that rare, endangered or vulnerable habitats or species of community interest are either maintained at or restored to a favourable conservation status.
Special Protection Area	An area designated under the Wild Birds Directive to

(SPA)	protect important bird habitats.
Spoil	Waste material from excavation.
Spraint	Otter droppings.
Substrate	Surface on which organism grows or is attached.
Succession	A series of changes in the composition of the plant or animal life of an area beginning with the colonisation of bare rock or soil by plants such as algae and lichens and ending with a stable climax community which is in equilibrium with the environment.
Sustainable Urban Drainage System (SUDS)	A sequence of management practices and control structures designed to drain surface water in a more sustainable fashion than some conventional techniques.
Surcharge	The placement of material above the required fill level during earthworks to provide compression and strengthening of underlying material.
Swale	A grass-lined channel designed to drain water from a site as well as controlling the flow and quality of the surface water.
Swamp	Generally hold standing water for much of the year, contain tall emergent vegetation typical of the transition between open water and exposed land.
TAG	Transport Analysis Guidance.
Target Notes	Note important points during Phase 1 Habitat Survey and location marked on plan.
TPH	Total Petroleum Hydrocarbons
TPO	Tree Preservation Order
Translocation	The moving of a habitat/species from one location to another.
VOC	Volatile Organic Compounds.
Walkover Survey.	A brief survey carried out by walking through a site for familiarisation.
Water Framework	Wide-ranging European environmental legislation (2000/60/EC). Addresses inland surface waters,

Directive (WFD)	estuarine and coastal waters and groundwater. The fundamental objective of the WFD is to maintain "high status" of waters where it exists, preventing any deterioration in the existing status of waters and achieving at least "good status" in relation to all waters by 2015.
Watercourse	Any natural or artificial channel that conveys surface water.
Wetland	A wet area that has a high proportion of emergent vegetation in relation to open water.
Zn	Zinc
Zone of Visual Influence (ZVI)	Area of land over which a development may be visible, as determined by analysis of OS data and field survey.