SEMMMS A6 to Manchester Airport Relief Road

Balfour Beatty: Consultant Contractor Report

1007/10.2/138

November 2011

STOCKPORT METROPOLITAN BOROUGH COUNCIL

MANCHESTER CITY COUNCIL

Cheshire East Council

SEMMMS Relief Road, A6 to Manchester Airport

Design Freeze 5
Consultant Contractor Report
Draft
15 November 2011

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INTRODUCTION

The current SEMMMS proposed scheme is to provide a 10km dual carriageway that will run from the A6 at Hazel Grove through to the Airport spur road, incorporating an existing section of A555. The road will pass through Stockport, Cheshire East and Manchester Council areas.

Within this proposal the SEMMMS Team have requested Balfour Beatty provide: -

- An Appraisal of the Project from the construction aspect to identify and comment on construction constraints, mitigation measures, and any other issues associated with the items detailed below.
- Prepare a Construction Report for use as information prior to preparation of Draft Orders and the Environmental Statement.

1. Phasing of the works

- Comments on overall duration for completion of the works.
- Any programme constraints from a construction point of view that would require appropriate phasing of the works.
- Any works that could be undertaken in advance to assist the overall programme or provide mitigation against the main construction work.
- Comments on works to be carried out following completion of the Metrolink Airport Extension Line and Ringway Road Improvement Scheme.

Comments on overall duration for construction of the works

We have produced a high level time location programme, see Appendix E programme Reference SEMMMS Indicative Time Location Programme Rev CC. For continuity and ease of reference, we have used the same areas as defined in the earthworks volumes at design freeze 5.

We have assumed that it would be permitted to carry out the following enabling works during a 39 week environmental mitigation period, in addition to the 104 week construction period:

- Boundary fencing
- Site Clearance
- Ecology mitigation
- Topsoil strip

We would recommend that the optimum starting time for the works is a Q2 start for construction as there are several utility services that require diverting that are likely to be seasonally constrained. If this is not possible then the construction period may be extended by up to 12 months depending on seasonal environmental mitigation constraints.

In order to gain programme certainty, we have assessed potential phasing for the key following areas:

- A6/SEMMMS Junction
- Hazel Grove/Buxton Railway Bridge
- Woodford Road
- Chester Road Junction/Bramhall Oil Terminal
- Woodford Road Junction
- Styal Road
- Ringway Road West/Ringway Road Junction

Programme Constraints and phasing of the works

We have looked at a number of the critical junctions and have made the following observations.

A6/SEMMMS Junction

- The acceptability of the earthworks material in this area will be key to minimising any haulage of material on the existing highway network.
- The main T junction and link roads can be constructed offline with no significant traffic management issues.
- The tie ins will need to be constructed with single lane working under traffic lights at off peak times and completed once the traffic is diverted onto the new alignment.
- To minimise disruption to traffic on the A6 we have assumed that the A6 bus bridge will be constructed after the A6 is diverted to its new alignment. Therefore the permanent bus route will not be in place until several months later.

Hazel Grove/Buxton Railway Bridge

- Completion of the railway structure in advance will not have significant project programme benefits. However as part of a risk mitigation strategy in order to book railway possessions and manage the completion of this item of work it may be beneficial to allow Network Rail to procure this structure through their framework and minimise interfaces. Also the potential to move earthworks material along the line of the scheme maybe beneficial rather than utilising the public highway.
- The permanent diversion route of the major 600mm DI water main to the west of the existing railway is not known.
- There maybe potential to divert over a permanent service bridge incorporated in to the construction of the new Railway underbridge on the west side. The service bridge could also be utilised for diversion of the railway services prior to the railway possession required for the installation of the new structure.

Woodford Road

- In order to construct the new structure and approach embankment a temporary highway diversion will need to be constructed to the west of the existing road. This will allow the substructure foundations and pier(s) to be constructed.
- The temporary highway diversion will require additional land to be temporarily acquired to the west of the existing highway as part of the scheme.
- Protection of the Oil pipeline and treatment of the 700mm CI water main will need to be extended to accommodate the temporary highway diversion.
- The services in the existing highway footprint will need diverting twice once along the temporary diversion and once permanently over the new structure depending on the requirements of the specific Statutory Undertakers

Chester Road Junction/Bramhall Oil Terminal

- Consideration will need to be given to the timing of the change in priorities and the commissioning of the junction prior to the opening of the main scheme.
- It maybe possible to construct the permanent tie-ins with temporary ramps back onto the existing carriageways to allow the current layout to remain until the new road scheme is ready to open. Or it maybe preferable to construct and move the traffic into its permanent alignment at an early stage. The scheme specific traffic figures could inform the decision.
- Access to Bramhall oil terminal will need to be considered and the specific requirements of the owner of the oil terminal. In order to construct the new access road into the oil terminal; a temporary highway diversion will be required. Initial thoughts are that the new Chester Road link will need to be constructed early in the overall project programme and a temporary access road provided to the west of the existing access road and future embankment footprint to the north of the SEMMMS road to allow for the construction of the permanent access road to the terminal. This will require acquisition of further land on a temporary basis.

Woodford Road Junction

- As part of initial slip road construction early service diversion works are required to the west of the junction. The LP gas mains and electric will require diverting further to the west to allow bridge and road construction and to minimise the depth of any statutory diversions.
- At Woodford Road West side the mainline/side road tie in could be simplified and brought further east and be more complimentary to the existing carriageway levels. The current tie in tapers very slowly in over 200m. A more complimentary tie in will reduce any traffic management impacts during construction of the mainline carriageway and and slip roads. The existing roundabout may require replacement with a temporary T junction to allow construction in the early phases.
- A plant crossing on Woodford Road will be required to take the material from west to east for the early works while the slip roads and the new

western structure are completed before the remaining plug of material can be moved east

Styal Road
See later in report

Ringway Road West/Ringway Road Junction

- Option to permanently divert all services to new permanent SEMMMS road alignment as part of the works being undertaken by the Ringway Road Improvement Scheme.
- New SEMMMS dual carriageway is 2 to 3m lower than the existing Ringway Road under the flightpath. The lowest finished road level FRL indicated is about 72.25 (incl 0.25m crossfall). Network F could be vertically challenging and we would need to understand the drainage network better to confirm it is achievable. The existing highway is at 75.0m which will require deep drainage to be installed and service diversion works must consider the permanent drainage in this area. Potential risk a further pumping station is required to meet all requirements.
- Temporary pumping maybe required during construction as the new westbound carriageway of SEMMMS will be open before the drainage is completed to the new eastbound carriageway and Network F outfall may not be completed.

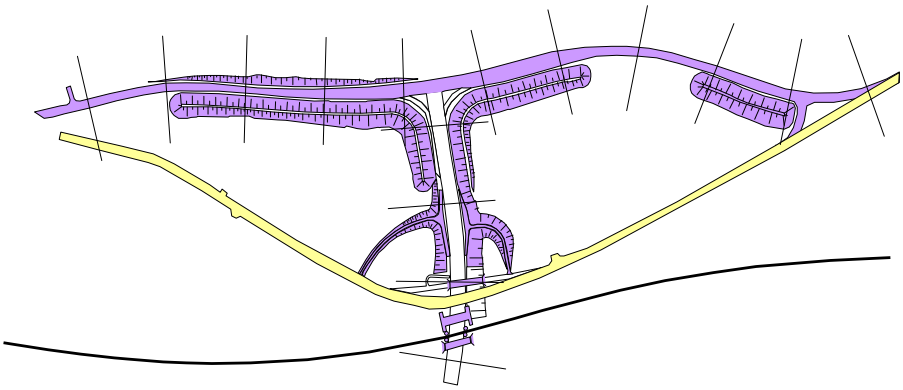
Phasing Diagrams

KEY:

- Live traffic
- Works in Progress
- Works Completed
- Works Outstanding
- Flight Path
- Demolition

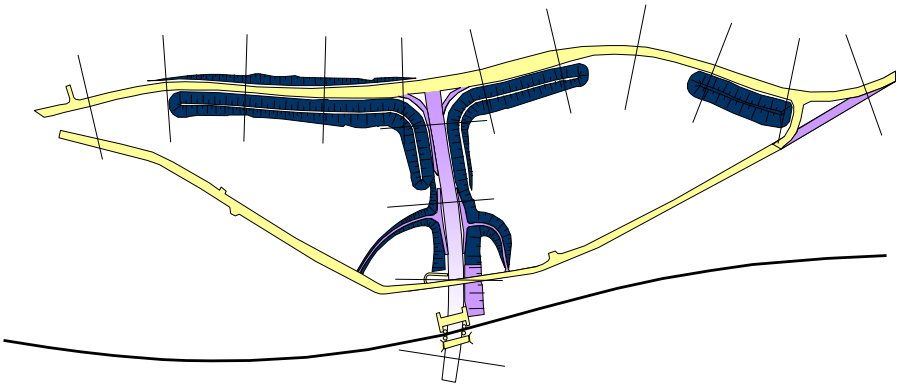
A6/SEMMMS Junction

Phase 1 **Approximate Timescale: 9 months**



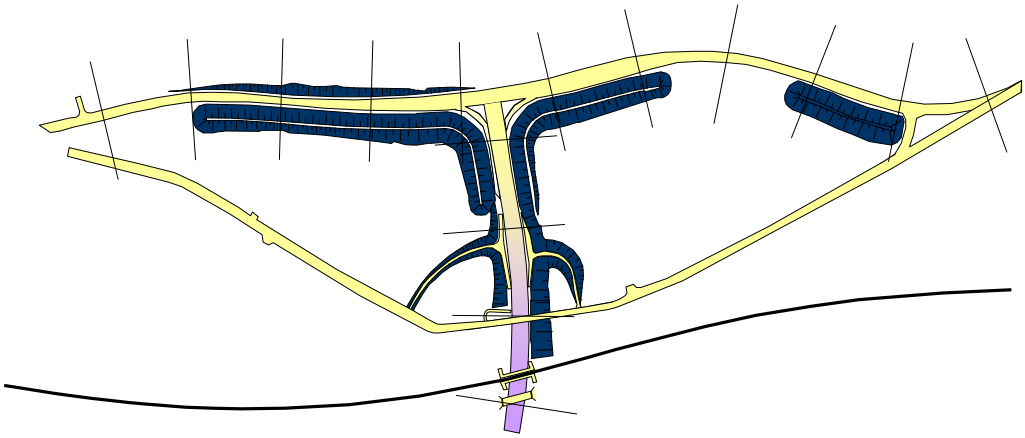
Scope of Works:
1. 1st Stage Cut/Fill to mainline and side roads and excavation for bridge works
2. Install mainline and side road drainage
3. Construct A6 Bus Bridge and Service bridge
4. Railway Bridge Piling operation
5. Construct Hazel Grove/Buxton Railway Bridge offline (Top-Down construction)

Phase 2 **Approximate Timescale: 3 weeks**



Scope of Works:
1. Construct pavement on A6 Bus Bridge
2. Divert A6 traffic over A6 Bus Bridge.
3. Divert 600mm dia water service over service bridge
4. 1st Stage Cut for remainder of mainline works
5. Construct pavement for mainline and side roads.

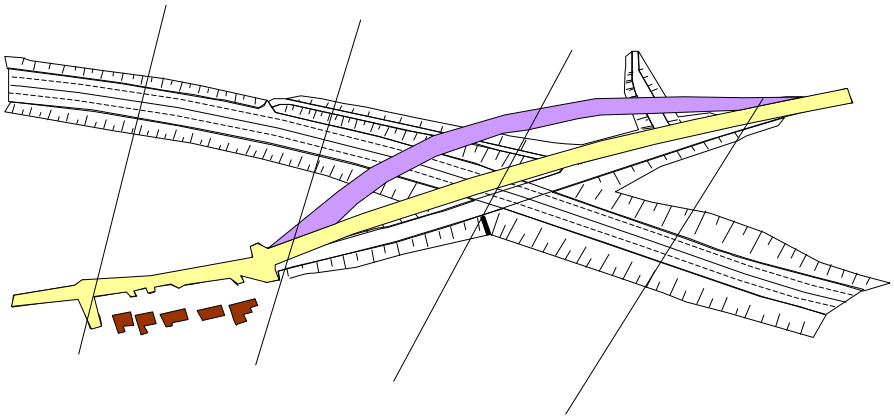
Phase 3 **Approximate Timescale: 54hr possession & 2 weeks**



Scope of Works:
1. Major Rail possession to move bridge into place.
2. Construct pavement for mainline carriageway.

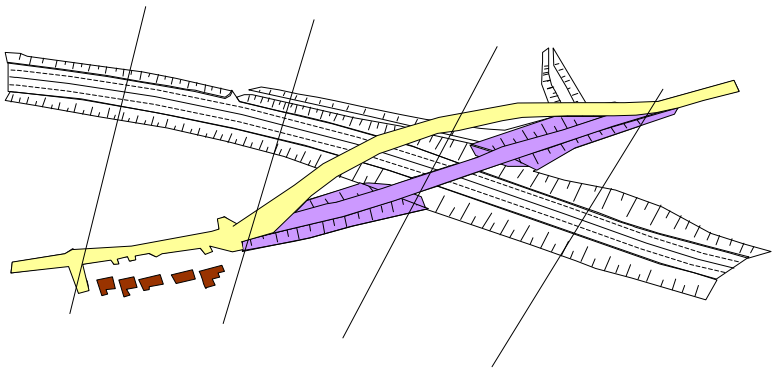
Woodford Road

Phase 1 **Approximate Timescale: 2 weeks**



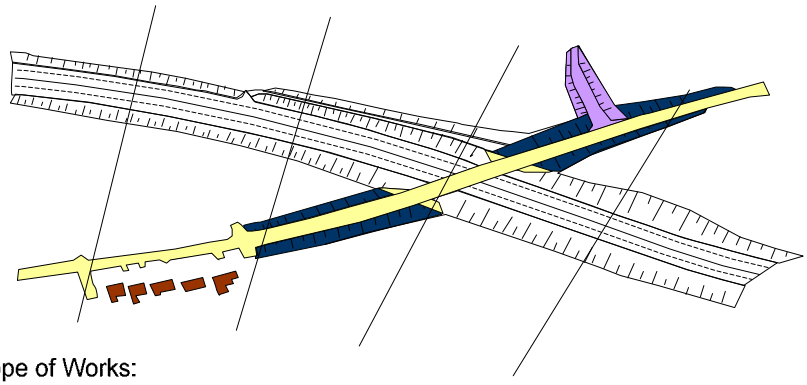
Scope of Works:
1. Divert services temporarily along Diversion route
2. Construct pavement for Diversion route

Phase 2 **Approximate Timescale: 6 months**



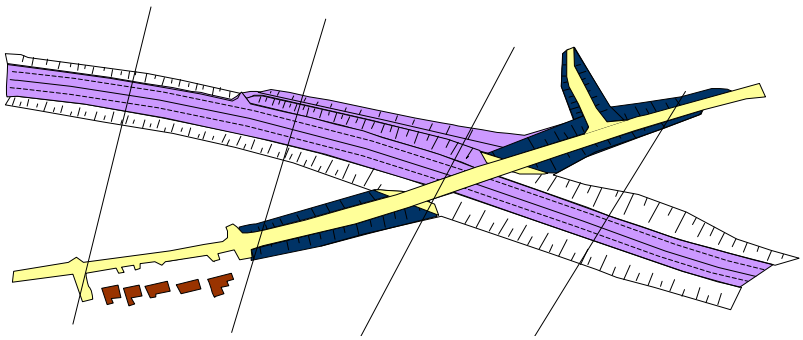
Scope of Works:
1. Switch traffic onto Diversion road
2. 1st Stage: Excavation for bridge construction
3. Construct Woodford Road Bridge
4. 2nd Stage: Fill embankments
5. Construct Pavement for Woodford Road

Phase 3 **Approximate Timescale: 3 weeks**



Scope of Works:
1. Divert services back along Woodford Road
2. Switch traffic onto Woodford Road and remove diversion
2. 1st Stage: Fill embankments on Side Road
3. Install Side Road drainage
4. Construct pavement for Side Road

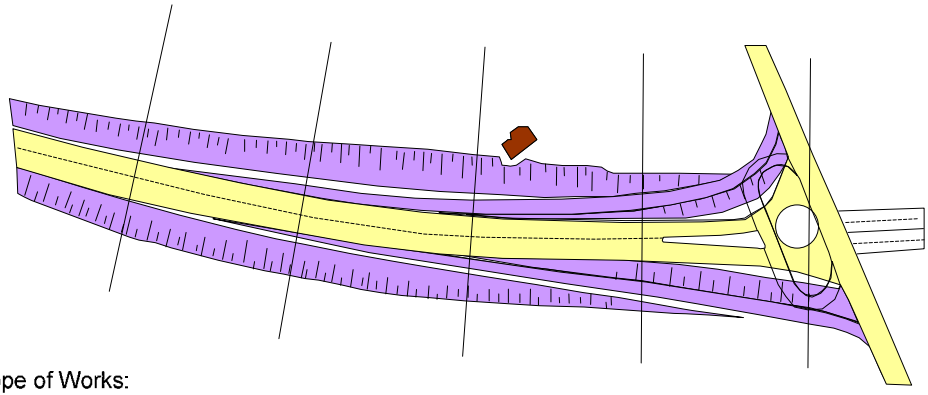
Phase 4 **Approximate Timescale: 5 weeks**



Scope of Works:
1. Open Side Road
2. 1st Stage: Excavate plug for mainline carriageway
3. Install mainline drainage
4. Construct pavement for mainline carriageway

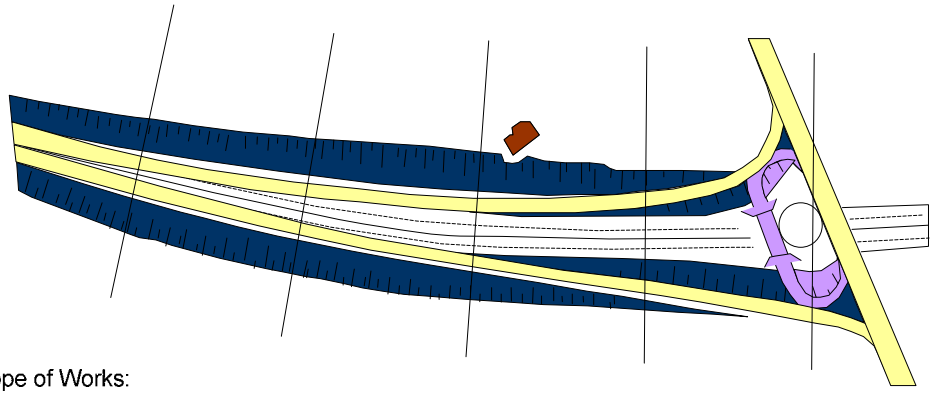
Woodford Road Junction

Phase 1 **Approximate Timescale: 9 weeks**



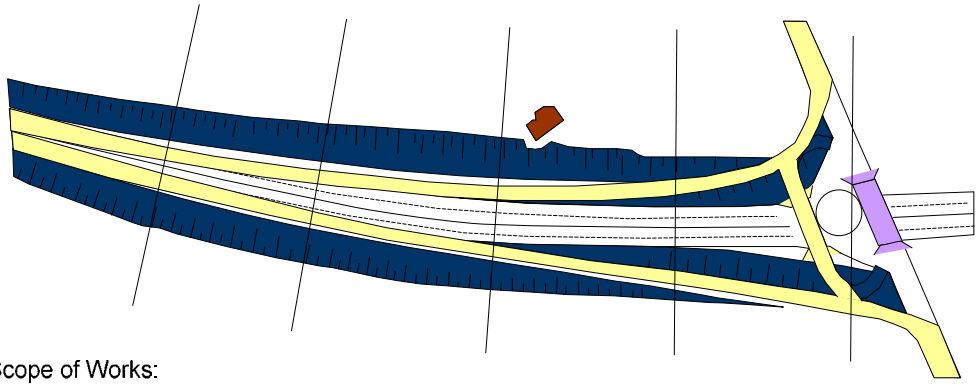
Scope of Works:
1. Divert services further west into cutting and back up slip roads
2. 1st Stage Fill to slip roads
3. Construct pavement to slip roads

Phase 2 **Approximate Timescale: 6 months**



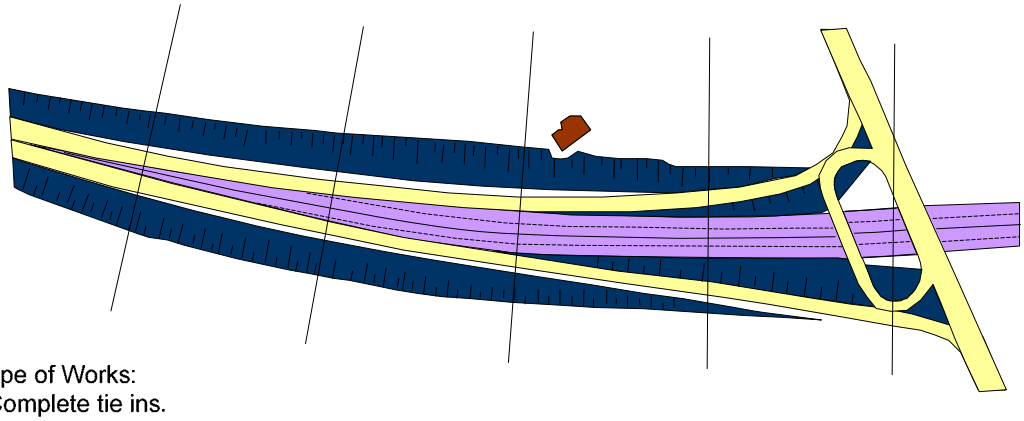
Scope of Works:
1. Switch traffic onto slip roads
2. 1st Stage excavation for bridge works
3. Construct Woodford Road Junction West Bridge
4. 2nd Stage: Fill embankments
5. Construct Pavement over bridge

Phase 3 **Approximate Timescale: 6 months**



Scope of Works:
1. Switch Woodford Road traffic onto west bridge
2. Remove existing Woodford Road pavement
3. Construct Woodford Road Junction East bridge
4. 2nd Stage: Fill embankments
5. Construct Pavement over bridge

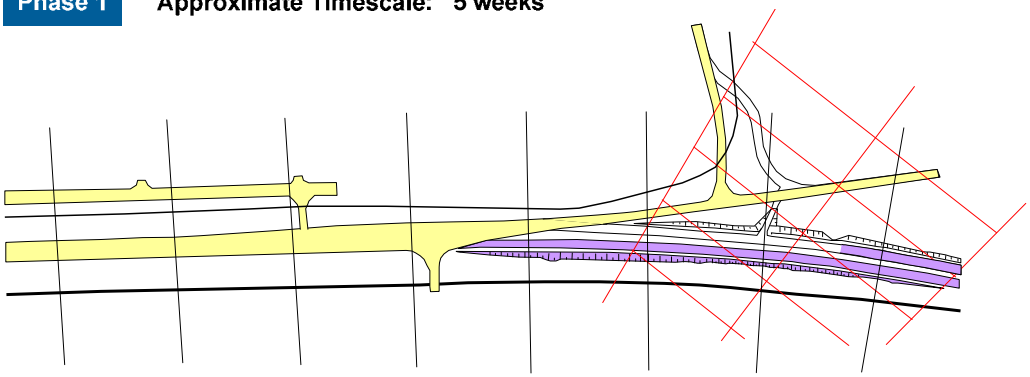
Phase 4 **Approximate Timescale: 6 weeks**



Scope of Works:
1. Complete tie ins.
2. Install mainline drainage
3. Construct mainline carriageway.

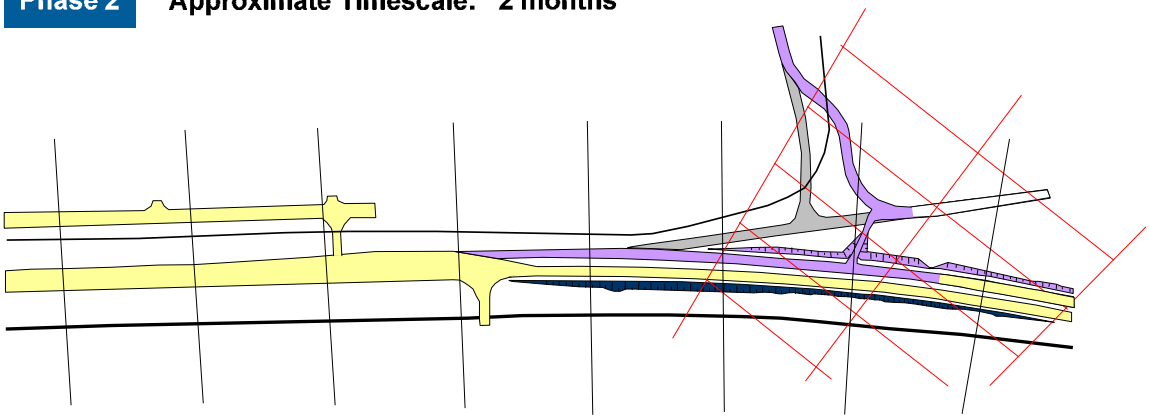
Ringway Road West/Ringway Road Junction

Phase 1 **Approximate Timescale: 5 weeks**



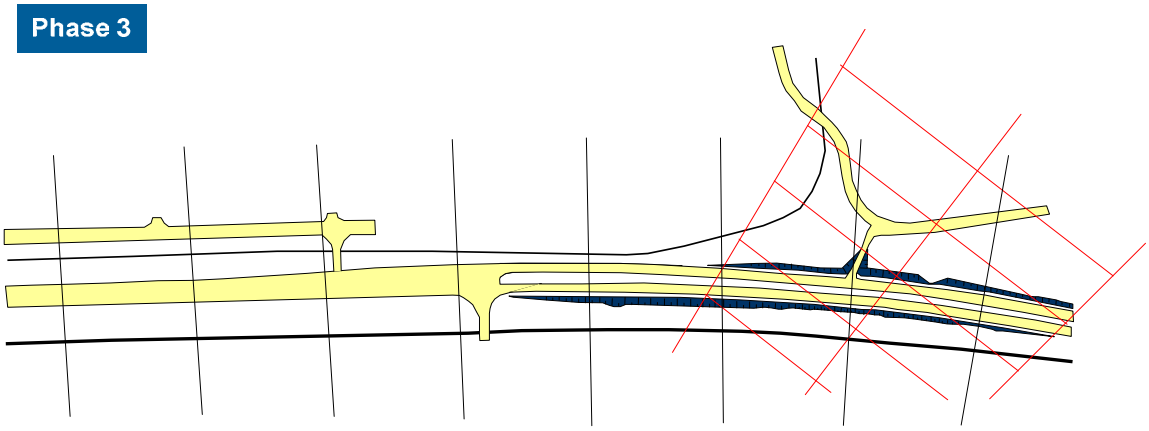
Scope of Works:
1. All services to be permanently diverted to new road alignment up to SEMMMS layout in advance of Ringway Road Improvement Scheme
2. 1st Stage Excavation to Eastbound carriageway
3. Construct pavement to Eastbound and part of Westbound carriageway up to Styal Road

Phase 2 **Approximate Timescale: 2 months**



Scope of Works:
1. Switch Ringway Rd traffic onto Mainline Eastbound carriageway leading to Styal Road, will become dual carriageway east of side road
2. Link to existing Ringway Road closed
3. 1st Stage Excavation for Westbound carriageway and Side Road
4. Demolish part of the Ringway Rd leading up to the Side Road.
5. Construct Pavement for Westbound mainline carriageway and side road.

Phase 3



Scope of Works:
1. Switch traffic onto new Westbound and Eastbound carriageways.

Earthworks considerations

- Construct rail bridges pre-contract – If undertaken, it would remove possessions, reduce programme time and assist in earthwork haul movement during the main construction works. It would also negate the need for a temporary Bailey bridge crossing. This will assist site access through the site i.e. movement of materials, fuels, plant and more efficient earthworks overall. If no early bridge construction or temporary Bailey bridge options are put in place, then there will be a requirement to haul the material via the public highway to facilitate cut fill operations.

- Although current design profiles indicates that the earthworks are in overall shortfall, this is favorable to the Contractor as other surplus material will become available throughout the works and can be used to balance the earthworks overall. Materials that assist are namely drainage and structure excavations. Thereafter, any shortfall can be removed, if required, by adjusting some of the landscape/screening profiles.

- It is noted in the statement within Initial Geotechnical Design Report, dated 29 November 2010, undertaken by AECOM Limited that the slope angles should be reviewed at detailed design stage to determine whether there is any scope for any further steepening. However our view is that as the scheme has a shortfall of acceptable cutting material, steepening the cut slopes will only increase the short fall. If any flexibility can be considered, then it should be given to embankment fill slopes albeit excluding those with landscape and screening bunds adjoining.

- Maintain current landscape bund capacity in order to reduce off site disposal of acceptable topsoil Class 5A and marginal materials. Placement of landscape and screening bunds designated under Series 600, Class 4, including topsoil material. Flexibility of embankment fill profile as indicated with cross-sections shown with Appendix D.

- Possible stabilisation of the cut material in-situ and that placed on the embankments as fill could reduce the need to excavate for capping layer and import capping layer material. Introducing this option would reduce excavation in cuttings available for fills and require additional cut material from the works to satisfy the stabilised material required in lieu of imported capping layer. This could be undertaken by keeping the landscape bunding profiles flexible in the final design and any consultation meetings with landscape architects and planning. Note: With pavement specification CBGM sub base may also decrease blacktop thickness, which will again assist the overall balancing of the earthworks materials.

2. Site access and construction arrangements.

- Access points likely to be required from the public highway, and any other locations, to the site across the three boroughs.
- Anticipated possible locations for the contractor's site compounds with the factors to be taken into consideration in selection of the location.

- Issues over maintaining the existing traffic flows on the highway network during construction, particularly at junctions and structures.
- Locations where there is a need for significant working space beyond the alignment footprint (CPO boundary).
- *Feasibility issues with construction of proposed new traffic signalised junctions at Manchester Airport and Airport City without any significant effect on traffic flows. NOT APPLICABLE.*
- Issues associated with the construction of structures over/under Network Rail lines.
- Locations where there is a significant effect on maintaining Public Rights of Way.
- Locations where there is a significant effect on maintaining Private Means of Access.
- Any significant mitigation measures required minimising the effect of construction activities – noise, vibration, dust etc.

Access Points

Allowable Site Access routes are illustrated within Appendix A. Specific areas to note are: -

- Access is required along Woodford Road for bridge construction and side road construction traffic for the structures at the WCML railway structure and the Woodford Road diversion and structure.
- Access is required along A523 Macclesfield Road to the South of Hazel Grove to allow access along the full length of the scheme.

Contractor's site compound

Factor for choosing the location for the temporary site compound are: -

- Contiguous with the works – which mitigates planning risk
- Definition of the site boundary particularly as there is a long section that has minimal works.
- Sufficiency of services, gas/water/sewage/communications
- Central location
- Easy access to the highway
- Suitably sized area for delivery of materials to a secure compound
- Landowner willing to negotiate if land not acquired as part of the scheme
- Space for Screening from neighbours/third parties
- Any existing industrial facilities/offices.
- Cost
- Approximately two hectares of land in the middle of the project

Potential locations to be investigated are adjacent to: -

- A34 Junction with existing Manchester Airport Eastern Link Road
  2 no. LV electric running across Link Road from Beech Farm to Longsight Lane on the east side of the junction.
  No water or gas nearby.
- A5149 Chester Road, near new T junction and Chester/SEMMMS Link Road
  Chainage 12500

Oil pipeline running just south of T Junction
Major 700 DI Water main running further south from oil pipeline.
Electric and gas nearby.

In addition to the main compound, it may be necessary to provide some smaller satellite offices and lay-down areas at key locations e.g. rail crossing locations at Relief Road chainages 8500, 11900, 2300 (Styal Road) as well as at other structures locations and main junctions.

Issues maintaining the existing traffic flow on the highway network
The majority of works are offline hence there are no specific areas of concern for maintaining existing traffic flows. However, due to the proposed structures, particularly the proposed rail bridges, the movement of surplus earthwork excavations from areas may need to be hauled via public highway to other locations within the works. There will be some disruption where tie-ins need to be completed. This can be mitigated through the design being sympathetic to the existing levels of carriageway and off peak working. If a pavement requires reconstruction due to the required design levels being below the existing pavement then the traffic management arrangements are significantly more complex than a simple overlay. The construction of tie-ins with the existing road network and the side road bridges will require temporary traffic management. This will involve the use of single way working under temporary traffic signals, possibly limited to off-peak times.

There may be a significant interface with the traffic on the A34 however there are currently insufficient details to comment. The works may need to be carried out during off peak periods if that is possible. If not the central reserve may need to be hardened and a 2+2 contraflow implemented to allow sufficient working space.

Traffic management measures would have the greatest impact on Macclesfield Road, Woodford Road, Chester road, Existing A555, Woodford Road Junction, A34 Junction, Wilmslow Road Junction, Styal Road and at the Ringway Road West where traffic and detailed measures would be agreed with the appropriate highway authorities.

Working space
Consideration for working space needs to be considered at the railway bridges and any new culverts where the existing watercourses may need improvement beyond the normal CPO required for the highway scheme, for example.

The works at Styal Road and Buxton Road may need further evaluation as the working space will depend on the solution. Also the permanent solutions may require more land to be acquired for the scheme to achieve cost effective solutions.

Surface Water Run Off
There are a large number of watercourses that cross or run along the site. During the construction period it will be necessary to install temporary measures to prevent surface water run off from the site into watercourses, particularly during the bulk earthworks operations. At each watercourse it would be prudent to install silt traps,

temporary bunding and possibly chemical dosing plant. Sufficient areas will need to be provided within the CPO for these measures. The early installation of attenuation ponds can greatly assist during the construction period to deal with any surface water run off.

Noise/Noise Levels and Working Hours
Construction of the scheme will inevitably create noise from the movement and operation of plant on the site relating to earthworks. The level experienced depends on the source and the distance to the listener, together with additional factors such as intervening obstacles and the level of ambient, background noise.

The disturbance caused by construction noise in turn depends on the duration and frequency of the noise. Higher noise levels tend to be tolerable intermittently as opposed to a continuous sound. Mostly, construction noise would result from the movement and operation of plant on the site and will be low level and intermittent.

Levels of acceptable noise and working hours would need to be agreed with the individual Councils following discussions with their Environmental Health
Officer and would be included in the contract documents prior to the commencement of works. Normal working hours are likely to be 7am to 6pm Mondays to Fridays and 8am to 5pm (possibly 1pm depending on locality). Work on Saturdays will be outside these hours, subject to agreement with the relevant local authority.

The stated noise control measures will be in place to ensure construction noise is minimised; stringent measures will be taken to protect the ecology and the drainage system of the area during the construction phase; construction traffic will be restricted to main roads and within the site boundary and dust and dirt nuisances will be kept to an absolute minimum by employing the proven working practices.

Vibration from construction works is potentially more noticeable, although at the distances involved, it is unlikely to be a material consideration in terms of either human perception or building damage.

Dust/Emissions
Air quality can be affected by dust-raising activities during construction and by emissions from construction vehicles, both on site and travelling to and from the site.

Dust emissions can lead to increased deposition rates in the surrounding area, which can cause soiling of cars, windows, washing etc. and so could cause nuisance.

Mitigation measures to control dust during construction would typically be specified in contract documentation. Such measures would include:

- Regular water-spraying and sweeping of roads to minimize dust and remove mud and debris;
- Using wheel washes for all vehicles leaving the site;
- Sheeting vehicles carrying dusty materials to prevent materials being blown from the vehicles whilst travelling;
- Enforcing speed limits for vehicles on unmade surfaces;

- Dampening down of surfaces prior to them being worked;
- Storing dusty materials away from site boundaries.

There is limited scope for reducing gaseous emissions from plant and construction traffic affecting adjacent residential areas. This can be minimised by ensuring that such equipment only operates as required i.e. is not allowed to idle for long periods. Where static plant is involved, this should be located as far as practicable from sensitive properties.

3. Earthworks operations

- General appraisal of the suitability of excavated materials and the earthworks balance.
- Programme issues and constraints related to earthworks operations.
- Disposal of surplus material from the site, possible locations and the extent of HGV movements.
- Probable haul routes through the site.
- Likely types and numbers of earthworks plant.
- Treatment and protection of existing watercourses, habitats and sensitive areas.
- Issues and opportunities for movement of surplus material, including licensing and consideration of Materials Management Plan.
- Comments on sustainability issues, in particular the potential for recycling and reducing the need to import materials.

References

The following documents have been referred to:

- Initial Geotechnical Design Report, dated 29 November 2010, undertaken by AECOM Limited (formerly Faber Maunsell), important related earthwork information is highlighted below:-
- The following aspects have been reviewed based on the Design Freeze 3 alignment: Earthworks (stability and reuse)

Cutting stability

Historical Reports (Faber Maunsell Preliminary Sources Study Report (PSSR), 2006) indicate that cut slopes of 1 vertical (v):2.5 horizontal (h) should be acceptable throughout. This angle of slope demonstrates Factors of Safety in excess of 1.3 and is also considered suitable for construction and landscaping activities, such as grass cutting.

Following a review of the laboratory data, comparison with slope stability charts and by observation of slopes in similar ground conditions, this recommendation is still considered valid, with the exception of the cutting between CH 10080 and CH10175, which is to be excavated through firm alluvial clays. Cut slopes of 1v:3h are recommended at this location.

Pavement Design, Subgrade and Capping

Recommendations for a preliminary pavement design have been undertaken based on assumed California Bearing Ratio values (CBR). On cohesive material the lower of

the insitu/laboratory CBR and the long term CBR values (derived from plasticity data of cohesive deposits) has been used to recommend capping thicknesses in accordance with IAN 73/06 Rev 1. In areas where cuttings are in rock beneath the water table, a capping thickness of 600mm is proposed to act as a drainage layer (CH8250-8820 and CH8825-9150)). Embankments are assumed to be constructed out of cohesive fill with minimum shear strength of 50kPa, CBRs of 2% are therefore proposed with a capping thickness of 270mm.

SMBC in their issued earthwork quantities have adopted a 700mm carriageway construction depth. Presumably SMBC have based this on 450mm pavement depth for overall frost resistance and a capping layer depth of 250mm.

Assessment of Potential Contamination
The Faber Maunsell Geo-environmental Interpretative Report, dated October 2005, stated that other than agricultural usage, the railway lines at Hazel Grove and Bramhall, the oil depot and associated pipelines at Bramhall, there is no evidence of historical activities that could be classed as potentially contaminated land uses. A thin layer of Made Ground of gravel was also noted at Hazel Grove, which may have been deposited to help improve site drainage or access. These sites were investigated and reported in the October 2005 report.

The Geo-environmental report stated that there was no identified direct evidence of ground contamination on the sites, nor pollutant linkages to potentially sensitive receptors. In conclusion, there are no significant contamination issues to human health or controlled ground waters identified from the work undertaken. The overall environmental liability associated with these sites, and the risks associated with site development for the By-pass usage are considered to be low.

Statement noted within Initial Geotechnical Design Report, dated 29 November 2010, undertaken by AECOM Limited mentions the slope angles should be reviewed at detailed design stage to determine whether there is any scope for any further steepening. However the Contractor's view is that as the scheme has a shortfall of acceptable cutting material then steepening the cut slopes will only increase the short fall.

If any flexibility should be considered then it should be given to embankment fill slopes albeit excluding those with landscape and screening bunds adjoining.

- Ground investigation Report dated 18 February 2011, undertaken by AECOM Limited.
- Earthworks Disposition Table August 2011 (provided by SMBC) - Appendix B

Quantities
The quantities used in this report have been provided by:

- Earthworks Disposition Table provided by SMBC - Earthwork calculations (Aug 2011) - Appendix B

- Contractor's assessment of earthwork quantities for comparison purposes against those of SMBC - Appendix C

The Route and the Split of the Earthwork Sections

The updated earthworks review consists of constructing a new 10.5km dual carriageway. The route starts at the A6 interchange and runs south-westward into a cutting passing under the Stockport-Buxton railway. The route turns westward to run due west towards the A523 Macclesfield road. The route then turns south-westward over open landcrossing over the West Coast mainline on an embankment. The route continues westward through open land to the south of Bramhall and connects to the existing A555. It also incorporates an existing 2.7km section of road that has already been constructed between Woodford Road and Wilmslow Road on the A555 At the western end of the existing A555 the alignment continues west, crossing the Styal Railway and turning northwards along the existing Styal road and turns westwards again onto Ringway Road Junction.

The earthwork volume calculations information have been assessed and issued by SMBC. The overall scheme has been broken down by SMBC into the following sections and we have adopted this: -

- Section 1 - Relief Road Mainline – Chainage 8300 - 8550. (Hazel Grove/Buxton proposed Rail Bridge. Includes A6 Buxton Rd realignment)
- Section 2 - Relief Road Mainline – Chainage 8550 - 10305. (Proposed Hazel Grove/Buxton Rail Bridge to Proposed Mill Hill Hollow Bridge/Norbury Brook)
- Section 3 - Relief Road Mainline – Chainage 10305 - 11910. (Proposed Mill Hill Hollow Bridge/Norbury Brook/Norbury Brook to proposed West Coast Mainline Rail Bridge)
- Section 4 - Relief Road Mainline – Chainage 11955 -13800. (Proposed West Coast Mainline Rail Bridge to tie-in to existing A555 dual carriageway. Including Oil Terminal Jct and Chester Road Link)
- Section 5 - Existing A555/A34 Junction improvements
- Section 6 - Relief Road Mainline – Chainage 180 – 3350. (Existing A555 to Ringway Road West Junction. Including Styal Road, three rail bridge crossings and Wilmslow Road Junction)

The above sections are made up of sub-divided elements, however they are combined here to assist in the Contractor's assessment. It is possibly appropriate when considering the earthworks at a more detailed stage that Section 6 should be split into three separate sections due to the rail crossings i.e. Section 6 – Relief Road – Mainline – Chainage 180 - 2050, Section 7 – Relief Road – Mainline – Chainage 2150 - 2400 and Section 8 – Relief Road – Mainline – Chainage 2450 -3350.

Earthworks Assessment

From the Ground Investigation Report dated 18 February 2011, undertaken by AECOM Limited, the cutting material is generally acceptable glacial tills coming within the Series 600, Class 2C cohesive material. Therefore we have reviewed the information supplied on the current appraisal of acceptable classification material and

consider it to be meaningful and correct that all excavated materials from the cuttings along the route of the works may be incorporated within the fill embankments and the adjacent landscaping/screening bunding.

The earthworks quantities used below are those issued from a schedule of quantities supplied by SMBC. This schedule has been validated using the MX Models provided by SMBC to produce check quantities. We have used the same parameters, namely the 300 millimetre topsoil strip and resoil depths and a 700 millimeter road construction depth, as SMBC have adopted to ensure a correct comparison. The full comparison is shown in Appendix C.

The summary of the comparison figures are as follows:-

OVERALL QUANTITY SUMMARY	TOPSOIL	CUT	FILL	RESOIL
CONTRACTOR ASSESSED QUANTITIES	180,689	638,286	774,037	112,404
SMBC ASSESSED QUANTITIES	172,124	625,946	748,836	111,780
OVERALL VARIANCE	-8,564	-12,340	-25,201	-624
OVERALL PERCENTAGE VARIANCE	4.74%	1.93%	3.26%	0.55%

The quantities are within acceptable percentage variances. Therefore, for simplicity, when referring to and discussing quantities hereafter the figures provided from SMBC, Appendix B, will be used.

The SMBC final summary totals are:-

Cut (cu.m)	Fill (cu.m)	Fill shortfall (cu.m)	Topsoil Strip (cu.m)	Resoil (cu.m)	Surplus topsoil (cu.m)
625,946	748,836	-122,890	172,124	111,780	60,345

Maintaining the current landscape bund capacity will assist in reducing the off site disposal of acceptable topsoil Class 5A and marginal materials. Allowing placement of landscape and screening bunds designated under Series 600, Class 4, including topsoil material will greatly assist the overall shortfall. This flexibility of the embankment fill profile is shown within cross sections in Appendix D.

This will reduce the overall shortfall down to 122,890 – 60,345 = 62,545 m^3
It is advantageous to the Contractor to have an available shortfall as drainage and structural arisings can be used to accommodation this shortfall. Thereafter, any shortfall can be removed, if required, by adjusting some of the landscape/screening profiles.

The following reviews each earthwork section as noted above:-

- Section 1 - Relief Road Mainline – Chainage 8300 - 8550. (Hazel Grove/Buxton proposed Rail Bridge. Includes A6 Buxton Rd realignment)

In reviewing this earthwork section, the A6 realignment is approximately 1300 metres in length and SEMMMS, chainage 8300 to 8550 is 250 metres in length. At chainage 8550, the proposed Hazel Grove and Buxton Rail bridge curtails and isolates this section of the earthworks from the next. However, the majority of the earthworks can be undertaken as they are mostly offline.

The figures are as follows:-

Section 1						
Cut (cu.m)	Fill (cu.m)	Surplus cut (cu.m)	Topsoil Strip (cu.m)	Resoil (cu.m)	Surplus topsoil (cu.m)	Total surplus (cu.m)
70509	47225	23284	19280	13164	6116	29400

Local cut to fill will be carried out using conventional earthwork plant, namely large to medium hydraulic excavators along with 30-40 tonne articulated dumptrucks and where necessary 20 tonne licensed road haulage. Compaction will be undertaken by dozer and roller.

The total of surplus topsoil and cutting needs to be hauled through to the shortfall in Section 3, Relief Road Mainline – Chainage 10305 – 11910. If time constraints within the programme do not allow access underneath the new proposed Hazel Grove and Buxton Rail Bridge, then this material will need to be hauled via the public highway into site access at Macclesfield Junction, chainage 9500.

- Section 2 - Relief Road Mainline – Chainage 8550 - 10305. (Proposed Hazel Grove/Buxton Rail Bridge to Proposed Mill Hill Hollow Bridge/Norbury Brook)

Section 2						
Cut (cu.m)	Fill (cu.m)	Surplus cut (cu.m)	Topsoil Strip (cu.m)	Resoil (cu.m)	Surplus topsoil (cu.m)	Total surplus (cu.m)
95731	77849	17882	28470	15599	12871	30753

Local cut to fill will be carried out using conventional earthwork plant, namely large to medium hydraulic excavators along with 30-40 tonne articulated dumptrucks and where necessary 20 tonne licensed road haulage. Compaction will be undertaken by dozer and roller.

The total of surplus topsoil and cutting needs to be hauled through to the shortfall in Section 3, Relief Road Mainline – Chainage 10305 – 11910. This material will be hauled through the online works, with temporary traffic management and four way traffic lights used at existing road crossings at Macclesfield Road, chainage 9500 and at Woodford Road, chainage 11500.

- Section 3 - Relief Road Mainline – Chainage 10305 - 11910. (Proposed Mill Hill Hollow Bridge/Norbury Brook/Norbury Brook to proposed West Coast Mainline Rail Bridge)

Section 3						
Cut (cu.m)	Fill (cu.m)	Fill shortfall (cu.m)	Topsoil Strip (cu.m)	Resoil (cu.m)	Surplus topsoil (cu.m)	Total shortfall (cu.m)
87488	252693	-165205	35306	22132	13174	-152031

Local cut to fill will be carried out using conventional earthwork plant, namely large to medium hydraulic excavators along with 30-40 tonne articulated dumptrucks and where necessary and appropriate 20 tonne licensed road haulage to deposit surplus material from other section of the works. Compaction will be undertaken by dozer and roller.

This area following local cut to fill requires some 152,000m^3 additional fill to both embankments and adjacent landscapes. If, where required, the embankments and landscapes/screening bunds are constructed as per the revised typical cross sectional detail shown within Appendix D, then the landscape volumes can be a Class 4 landscape infill material. This allows maximum use of the site won acceptable Class 1/2 materials to be utilised in the structural embankment cores and the Class 4 inclusive of topsoil can be used for the landscape shoulder fills. This maximises and uses efficiently all site won cut material. Overall, adopting this process reduces the shortfall of fill material by correctly and sustainably making use of some 60,000m^3 of surplus topsoil.

- Section 4 - Relief Road Mainline – Chainage 11955 -13800. (Proposed West Coast Mainline Rail Bridge to tie-in to existing A555 dual carriageway. Including Oil Terminal Jct and Chester Road Link)

Section 4						
Cut (cu.m)	Fill (cu.m)	Surplus cut (cu.m)	Topsoil Strip (cu.m)	Resoil (cu.m)	Surplus topsoil (cu.m)	Total surplus (cu.m)
253106	238542	14564	41652	38136	3516	18080

Substantial local cut to fill will be carried out in this section using conventional earthwork plant, namely large to medium hydraulic excavators along with 30-40 tonne articulated dumptrucks and where necessary 20 tonne licensed road haulage. Compaction will be undertaken by dozer and roller.

The total of surplus topsoil and cutting needs to be hauled through to the shortfall in Section 3, Relief Road Mainline – Chainage 10305 – 11910. If time constraints within the programme do not allow access over the new

proposed West Coast Mainline Rail Bridge, then this surplus material will need to be hauled via the public highway into site access at Woodford road, chainage 11500. To assist, some of the surplus acceptable from this Section could be hauled via the public highway to the shortfall of acceptable material (6,114 m^3) at Section 5 at the A34/A555 junction improvements, as any haulage to Section 5 must come via the public highway.

- Section 5 - Existing A555/A34 Junction improvements

Section 5						
Cut (cu.m)	Fill (cu.m)	Fill shortfall (cu.m)	Topsoil Strip (cu.m)	Resoil (cu.m)	Surplus topsoil (cu.m)	Total shortfall (cu.m)
4517	10631	-6114	4930	2825	2105	-6114

Local cut to fill will be carried out using conventional earthwork plant, namely medium hydraulic excavators, either tracked or wheeled, along with the necessary 20 tonne licensed road haulage. Compaction will be undertaken by dozer and roller.

As stated in Section 4 above, it would be viable to haul the shortfall of acceptable fill from this section direct to Section 5 when required. The surplus of topsoil would be required to be hauled again via the public highway to Section 3, chainage 10305 – 11910.

- Section 6 - Relief Road Mainline – Chainage 180 – 3350. (Existing A555 to Ringway Road West Junction. Including Styal Road, three rail bridge crossings and Wilmslow Road Junction)

Section 6						
Loc Cut (cu.m)	Fill (cu.m)	Fill shortfall (cu.m)	Topsoil Strip (cu.m)	Resoil (cu.m)	Surplus topsoil (cu.m)	Total surplus (cu.m)
al 114595	121896	-7301	42487	19925	22562	15261

cut to fill will be carried out using conventional earthwork plant, namely large to medium hydraulic excavators along with 30-40 tonne articulated dumptrucks and where necessary 20 tonne licensed road haulage. Compaction will be undertaken by dozer and roller.

The shortfall of acceptable material required within this section can be accommodated by the selected use of acceptable as per the Appendix D cross section i.e. by maximizing the acceptable Class 1/2 material in a structural core embankment and allowing the adjacent landscape/screen bunding to acceptable Class 4 including surplus topsoil. Considering this, a revised quantity of surplus topsoil (7960 m^3) would be hauled to the shortfall in Section 3.

In general, haulage, excavation and deposition of site won materials would involve the use of standard construction plant, namely large to medium hydraulic excavators along 30-40 tonne articulated dumptrucks and where necessary 20 tonne licensed road haulage for a period of several months, principally, providing the programme allows, during the summer months when the weather conditions are advantageous for this kind of work.

Currently, there are no requirements to identify suitable sources of materials immediately adjacent to the site and therefore no new borrow pits are anticipated along the line of the new road. If required, local imported granular materials, Class 6C Starter Layers would be brought into the site using 20 tonne licensed road haulage.
An increased amount of construction traffic using the public road network will be required, due to removal of excess material from within each earthwork section to another. This maybe avoidable if advance works on rail crossing structures are introduced.

4. Statutory Undertakers Apparatus

- Comments on proposed diversions and any programme implications.
- Identify any critical diversions.
- Comments on proposed oil pipeline diversion associated with Bramhall Oil Terminal in terms of construction programme and risk mitigation.

At this stage the statutory diversion works are still to be wholly scoped and the diversion routes all identified. It maybe beneficial to carry out a detailed study to develop and value engineer the service diversions fully to mitigate risk and identify the whole scope. When the final scope of the SEMMMS scheme is determined there maybe value in obtaining the C4 estimates for particular statutory undertakers diversions. Currently it is not clear what works are allowed for in the scope as there is insufficient detail and not all works have been priced.

Hazel Grove/Buxton Railway Bridge

- The permanent diversion route of the major 600mm DI water main to the west of the existing railway is not known.
- There maybe potential to divert over a permanent service bridge incorporated in to the construction of the new Railway underbridge on the west side. The service bridge could also be utilised for diversion of the railway services prior to the railway possession required for the installation of the new structure.

Macclesfield Road Junction

- LV and HV and BT cables running along Macclesfield Road require diverting to construct the scheme through the junction. Permanent diversions are not known.

Woodford Road

- The temporary diversion will require land to be acquired to the west of the existing highway as part of the scheme.
- Protection of the Oil pipeline and treatment of the 700mm CI water main will need to be extended to accommodate the temporary highway diversion.
- The services in the existing highway footprint will need diverting twice once along the temporary diversion and once permanently over the new structure depending on the requirements of the Statutory Undertakers.

Bramhall Oil terminal

- Level of relief road at proposed oil diversion route at junction is higher than existing therefore minimising risk due to the increased cover.

Chester Road Junction

- Major 700mm DI water main running transversely through Chester Road link with Mainline, diversion required to allow construction of link road. May only require treatment during construction of oil depot service road.

Woodford Road Junction

- As part of initial slip road construction early service diversion works are required to the west of the junction. The 180mm LP gas mains and HV electric will require diverting further to the west to allow bridge and road construction.

Wimslow Road Junction

- Early service diversion works are required to the west of the junction for a 225mm CI Water main & 4 no. HV running west of junction across proposed mainline route.
- 450mm ST MP & 300mm PE gas main running centrally through both junction roundabouts will require a permanent diversion.

Styal Road Junction

- 6 no. HV & 2 no. LV crossing Styal Road running towards Styal electricity sub station.
- 1 no. 250mm MP gas main & 1 no. 180mm LP gas main running along Styal Road. 2 no. HV cables adjacent to Railway (Airport Spur South) running towards Styal electricity sub station will need diverting to allow for road construction.
- Proposed diversion routes are essential to formulate and understand a sequence of works.

Ringway Road West/Ringway Road Junction

- Option to permanently divert all services to new permanent SEMMMS road alignment as part of the works being undertaken by the Ringway Road Improvement Scheme.

5. Structures

Comments on critical construction issues associated with the following structures. Any significant, or difficult, operations likely to be required during construction of bridge structures, including railway under/over-bridges:

- Buxton Line road under rail bridge
- WCML road over rail bridge
- Styal Road Options 1-3 with focus on preferred option (refer to DF5 - option 1)
- Retaining Walls
- Any significant temporary works likely to be required

Hazel Grove/Buxton Railway Bridge

- Completion of the railway structure in advance will have some project programme benefits as the installation of the underbridge can only be done using an outside rule of route possession OROR which will have to be booked in advance of the main works.
- Depending on timings this could be done during the construction project if the possession were already booked and the construction start date was adhered to.
- However to minimise the project risk it would be better to install the railway underbridge in advance of the main works. For underbridges there needs to be a significant lead time to complete during the project programme.
- A solution is for Network Rail to procure this structure through their framework contractor and minimise any interfaces.
- The structure will need to be constructed offline and the foundation details will need careful consideration to minimise the OROR possession required. There are a number of solutions and it may be necessary to complete the structure over more than 1 OROR possession.
- Also any surplus earthworks materials are trapped until the new A6 link road and the railway bridge are constructed. It has been assumed that the A6 Bus Bridge is not required during the scheme when traffic is diverted via the link road? If it is, then completing the A6 bus link road also becomes important
- The permanent diversion route of the major 600mm DI water main to the west of the existing railway is not known.
- There maybe potential to divert over a permanent service bridge incorporated in to the construction of the new Railway underbridge on the west side. The service bridge could also be utilised for diversion of the railway services prior to the railway possession required for the installation of the new structure.

WCML

This would be a traditional railway overbridge constructed either with precast beams or RC composite structure depending on the span. The substructure could be reinforced earth construction or traditional RC abutments depending on the required span. The superstructure would be installed during ROR possessions.

There are maintenance tracks indicated on both sides of the railway that would increase the span of the structure.

Styal Road (Styal Line)

The main span over the Styal line will be similar in construction to the WCML and no specific issues are envisaged depending on the required span for the new structure. Access for the works is available to both abutments.

Styal Road (Northern Airport span) Option 1 layout

A more thorough review is required as there are a number of constraints.

- The existing Northern spur link
- The existing Southern airport spur
- The overhead catenaries on both that merge to the west of the existing structure.
- The existing abutments are close to the existing railway minimising the span and therefore beam depth.
- Existing o/h catenary is attached to existing structure, new structure as well?
- Signal sighting issues?
- Short ROR possessions.
- Railway services – comms, signalling?

Adoption of the existing structure may be an issue. We understand that the existing structure is currently NR owned and maintained and has been designed for a new dual carriageway in a particular layout without widening.

Traditionally to widen an existing structure over an existing railway requires a similar build. However the existing abutments are close to the tracks, minimising the depth of superstructure and the existing catenary is attached to the superstructure. If the new abutments are constructed adjacent to the railway line then a protection structure maybe required and there maybe sightline issues. If the new abutments are constructed further away there maybe an issue minimising the depth of superstructure to achieve the same finished levels as the existing highway above.

An entirely new structure could be built to replace the existing structure and this would overcome any level issues and adaption of the existing structure.

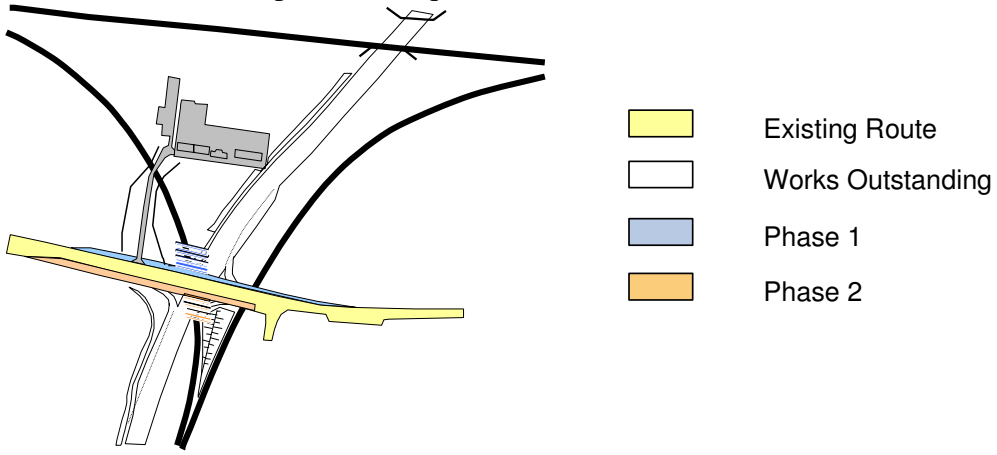
There are two options that we have considered to construct Styal Road Junction Bridge.

<u>Option 1 – widening with precast concrete beams</u>

The pre-cast beams will be installed parallel to the existing structure to minimize the risk of delay during construction, ease of erection and placement.

This would require longer abutments to be constructed than that indicated on the general arrangement drawings and would require additional land to be acquired in the south-west and north-east corners of the bridge.

The existing bund to the west of Styal Road would need to be removed between the railway lines. Possessions are required to facilitate the works which will require power outages reducing the working window during construction. The overhead catenary may need to be altered. Discussions with Network Rail would be required to progress further with this option. A sequence of construction is below.

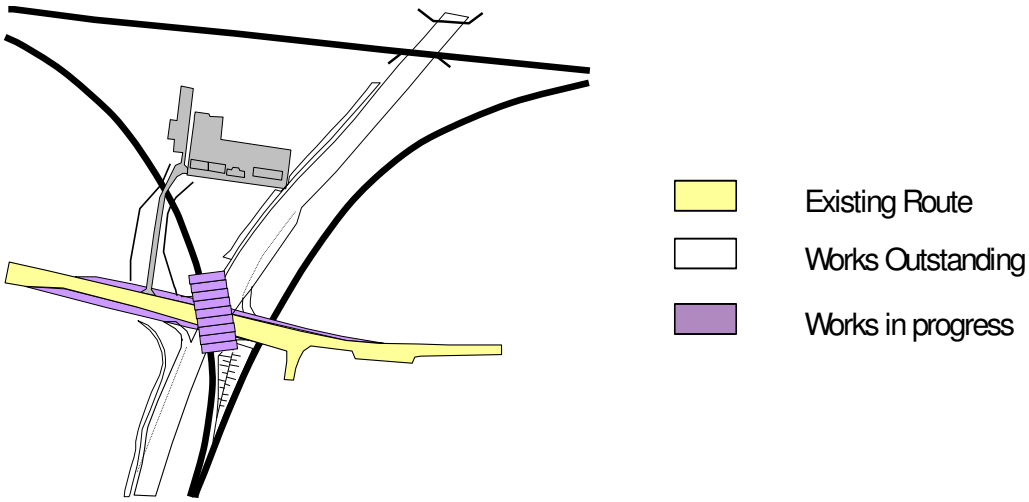


Sequence: Push existing Styal Road traffic to the west side of the road.
De-construct south-east wingwall of existing bridge
Build north + south abutments to the east of Styal Road
Lift in precast beams and complete superstructure
Switch Styal Road traffic onto east side of road over East Bridge
De-construct north-west wingwall
Build north + south abutments west side of existing bridge
Lift in precast beams and complete superstructure
Open Styal Road fully and complete tie-ins to mainline carriageway

Option 2 – Precast System

This bridge will be made up entirely of a precast system with pile foundations. The 'Opti-cadre' pre-cast system is an approach to consider due to its quick installation and erection as well as being able to span the length Styal Road requires.

Sequence: The bridge will need to be constructed in two halves and the existing deck demolished as the work is carried out. Temporary supports to the catenary will be required to replicate the existing support system or permanent solution.



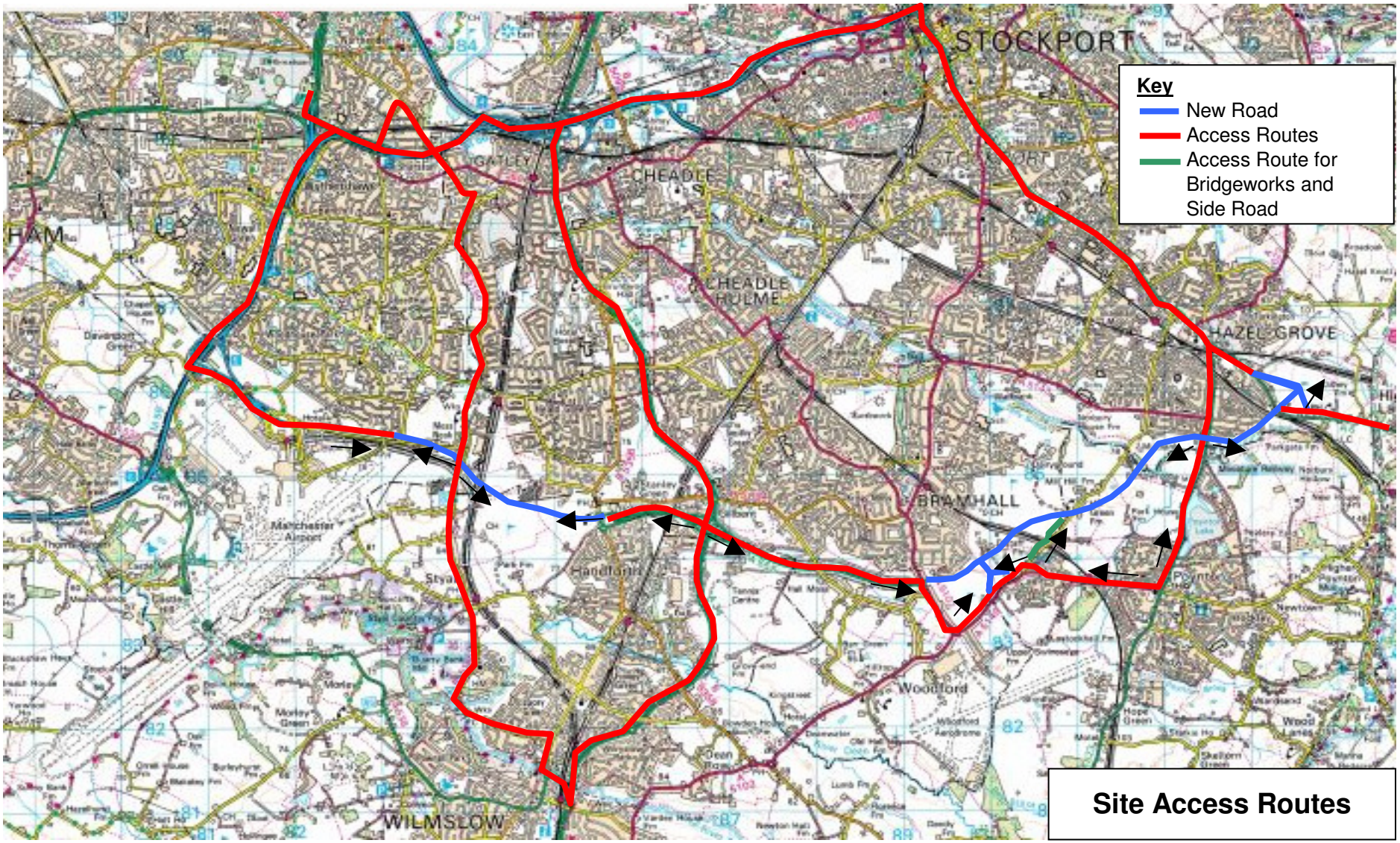
6. Value Engineering

- Identify any part of the design, from a construction point of view, that could be subject to review in any Value Engineering exercise

The service diversions could be subject to a value engineering exercise by obtaining detailed C4 estimates on the more complex expensive diversion routes.

Styal Road – construction sequence needs further evaluation.

7. APPENDIX A


STOCKPORT
CHEADLE
CHEADLE HULME
HAZEL GROVE
BRAMHALL
Woodford
WILMSLOW
Manchester Airport
Handforth
Key
New Road
Access Routes
Access Route for Bridgeworks and Side Road
Site Access Routes

APPENDIX B

VOLUME CALCULATIONS BASED UPON DF5 (Aug 2011)

BBCEL - APPENDIX B

The following calculations are based on the following

1. 700mm Carriageway Construction
2. 230mm Footpath Construction
3. 300mm Earthwork Re-soiling
4. 300mm Topsoil Strip
5. No bulk/shrinkage factors used in these calculations

A6

	A6 Realignment					
Description	**Start Ch**	**End Ch**	**Length**	**Cut**	**Fill**	**Topsoil**
			(m)	**(cu.m)**	**(cu.m)**	**(cu.m)**
A6 Realignment	100	715	615	7427	20842	6469
A6 Realignment	825	1398.143	573.143	18238	13899	6109
Junction	*n/a*		*n/a*	2040	6074	2035
Relief Road	8300	8550	250	42804	6410	4667
				70509	**47225**	**19280**
			Balance	**23284**		

HAZEL GROVE RAILWAY

	Mainline					
Description	**Start Ch**	**End Ch**	**Length**	**Cut**	**Fill**	**Topsoil**
			(m)	**(cu.m)**	**(cu.m)**	**(cu.m)**
Relief Road	8550	8950	400	54525	5198	5998
Relief Road	8950	9460	510	10488	17762	7246
Macc Road	*n/a*		*n/a*	528	3952	2310
Relief Road	9525	10140	615	28123	25971	10544
Relief Road	10140	10305	165	2067	24966	2372
				95731	**77849**	**28470**
			Balance	**17882**		

NORBURY BROOK

	Mainline					
Description	**Start Ch**	**End Ch**	**Length**	**Cut**	**Fill**	**Topsoil**
			(m)	**(cu.m)**	**(cu.m)**	**(cu.m)**
Relief Road	10305	11910	1605	87488	252693	35306
				87488	**252693**	**35306**
			Balance	**-165205**		

WCML RAILWAY

	Mainline					
Description	**Start Ch**	**End Ch**	**Length**	**Cut**	**Fill**	**Topsoil**
			(m)	**(cu.m)**	**(cu.m)**	**(cu.m)**
Relief Road	11955	12300	345	2	134720	9847
Relief Road	12300	12530	230	1170	62171	8134
Oil Terminal Jct	*n/a*		*n/a*	5223	20081	3971
Relief Road	12645	13000	355	53608	5911	6965
Relief Road	13000	13270	270	63198	93	4183
Chester Rd Link	100	485	385	21020	15343	6552
Relief Road	13270	13818.91	548.913	108885	223	2000
				253106	**238542**	**41652**
			Balance	**14564**		
				Cut	**Fill**	**Topsoil**
			Totals	**506834**	**616309**	**124708**
		SMBC Balance		**-109475**		

A34 JUNCTION								
	Mainline							
Description	**Start Ch**	**End Ch**	**Length**	**Cut**	**Fill**	**Topsoil**		
			(m)	**(cu.m)**	**(cu.m)**	**(cu.m)**		
A34 N/B Approach	-	-	295	668	3824	1461		
A555 E/B Off Slip	-	-	256	117	1378	922		
A555 W/B Off Slip	-	-	306	137	4756	1526		
A34 S/B Approach	-	-	235	3596	673	1021		
				4517	**10631**	**4930**		
			Balance	**-6113.7**				
WILMSLOW ROAD								
	Mainline							
Description	**Start Ch**	**End Ch**	**Length**	**Cut**	**Fill**	**Topsoil**		
			(m)	**(cu.m)**	**(cu.m)**	**(cu.m)**		
Relief Road	180	520	340	2727	241	2275		
Relief Road	540	1050	510	64219	755	9833		
Relief Road	1050	2360	1310	15959	107579	21933		
Styal Road Jct	*n/a*		*n/a*	5157	10339	100		
Relief Road	2470	3360	890	26533	2982	8345.8		
				114595	**121896**	**42486.8**		
			Balance	**-7301**				
TIE INTO MPT RINGWAY ROAD IMPROVEMENTS								
				Cut	**Fill**	**Topsoil**		
			Totals	**625946**	**748836**	**172124**		
		MCC Balance		**-122889.7**				
15957	47032	13247						
removal screen mound ch1050-ch2360 = 60k cu.m reduction in fill requirement								
Re-Soiling								
	(sq.m)	**(cu.m)**						
Total	**372599.2**	**111779.8**		**60345**	surplus topsoil			
assumption of 300mm depth re-soiling								

APPENDIX C

SEMMMS **EARTHWORK QUANTITY ASSESSMENT AND COMPARISON SMBC/BBCEL**

Balfour Beatty Civil Engineering

BBCEL ADOPTING SAME PARAMETERS AS SMBC - IN TERMS OF 300MM TOPSOIL AND RESOIL DEPTHS AND 700MM ROAD CONSTRUCTION DEPTH.

	Item	Location	TOPSOIL m3	CUT m3	FILL m3	RESOIL m3	Stand alone Landscape Bunding material - Material class 4 including surplus topsoil - m3	Embankment fill requirement. Class 1/2 material requirement	Structural embankment core BOV then 1:2 - Class 1/2 material requirement	Landscape bunding outwith structural core to required profile. Material class 4 including surplus topsoil - m3
PROPOSED REALIGNED A6 BUXTON ROAD (CH 100-1300), MAINLINE (CH 8300) TO BUXTON RAILWAY BRIDGE (CH. 8550- EARTHWORK SPLIT										
BBCEL 1	1	Realigned A6	8,839	27,960	5,732	2,660		5,732		
	2	Pond / excavation A6 north side	849	1,245	222	764		222		
	3	Landscape bund A6 west of junction	2,867	0	20,182	4,289	20,182	0		
	4	Landscape bund A6 east of junction	1,974	0	14,869	3,149	14,869	0		
	5	Landscape bund A6 east tie-in	1,411	0	12,219	1,411	12,219	0		
	6	Mainline ch 8300 - 8550	5,399	44,449	515	1,595		515		
BBCEL		**BBCEL ASSESSED QUANTITIES**	21,338	73,654	**53,739**	13,868	47,270	6,470	0	0
									53,739	
SMBC		**SMBC ASSESSED QUANTITIES**	19,280	70,509	47,225	13,164				
BBCEL/SMBC		**SUB-SECTION VARIANCE**	-2,058	-3,145	-6,514	-704				
PROPOSED BUXTON RAILWAY BRIDGE (CH. 8550) TO MILL HILL HOLLOW BRIDGE - NORBURY BROOK (CH.10305) - EARTHWORK SPLIT										
BBCEL 2	7	Mainline ch 8550 - 8950	5,427	53,690	1,499	4,898		1,499		
	8	Mainline ch 8950 - 9460 structural fill	5,128	9,579	5,195	396			5,195	
	9	Mainline ch 8950 - 9460 landscape fill against batters	2,009	0	10,927	2,653				10,927
	10	Mainline ch 9460 - 10140 structural fill	9,126	25,923	10,529	3,435			10,529	
	11	Mainline ch 9460 - 10140 landscape fill against batters	3,257	0	17,703	4,583				17,703
	12	Mainline ch 10140 - 10305	2,186	1,512	26,297	2,856		26,297		
BBCEL		**BBCEL ASSESSED QUANTITIES**	27,133	90,705	**72,150**	18,820	0	27,795	15,725	28,630
									72,150	
SMBC		**SMBC ASSESSED QUANTITIES**	28,470	95,731	77,849	18,455				
BBCEL/SMBC		**SUB-SECTION VARIANCE**	1,337	5,026	5,699	-365				
PROPOSED MILL HILL HOLLOW BRIDGE - NORBURY BROOK (CH.10305) TO WEST COAST MAINLINE RAILWAY (CH.11910) - EARTHWORK SPLIT										
BBCEL 3	13	Mainline ch 10305-11910 structural fill including side roads	22,677	85,118	103,401	5,526			103,401	
	14	Mainline ch 11070 - 11459 landscape fill RHS	2,672	0	18,658	4,180				18,658
	15	Mainline ch 11620 - 11910 landscape fill LHS	3,762	0	63,067	4,306				63,067
	16	Mainline ch 11620 - 11910 landscape fill RHS	4,504	0	63,977	5,270				63,977
BBCEL		**BBCEL ASSESSED QUANTITIES**	33,615	85,118	**249,104**	19,281	0	0	103,401	145,703
									249,104	
SMBC		**SMBC ASSESSED QUANTITIES**	35,306	87,488	252,693	19,276				
BBCEL/SMBC		**SUB-SECTION VARIANCE**	1,691	2,370	3,589	-5				
PROPOSED WEST COAST MAINLINE RAILWAY (CH.11910) TO EXISTING A555 TIE IN (CH. 13800) - EARTHWORK SPLIT										
BBCEL 4	17	Mainline ch 11955 - 12300 structural fill	3,958	0	35,426	1,352			35,426	
	18	Mainline ch 11955 - 12300 landscape LHS	6,952	0	99,068	7,274				99,068
	19	Mainline ch 12300 - 13000 structural fill inc junction	17,663	81,024	43,194	9,618			43,194	
	20	Mainline ch 12300 - 13000 landscape fill LHS inc junction	9,213	0	61,053	9,024				61,053
	21	Mainline ch 12300 - 13000 landscape fill RHS	3,736	0	23,605	3,364				23,605
	22	Mainline ch 13000 - 13270	4,781	74,810	553	2,694		553		
	23	Mainline ch 13270 - 13818	1,662	107,802	326	5,769		326		
BBCEL		**BBCEL ASSESSED QUANTITIES**	47,966	263,636	**263,225**	39,095	0	879	78,620	183,726
									263,225	
SMBC			41,652	253,106	238,542	38,136				
BBCEL/SMBC		**SUB-SECTION VARIANCE**	-6,314	-10,530	**-24,683**	-960				
PROPOSED UPGRADE ON EXISTING A555 AT A34 JUNCTION (CH.) - EARTHWORK SPLIT										
BBCEL 5	24	A34 junction	4,791	6,412	12,203	2,838		12,203		
BBCEL		**BBCEL ASSESSED QUANTITIES**	4,791	6,412	**12,203**	2,838	0	12,203	0	0
									12,203	
SMBC		**SMBC ASSESSED QUANTITIES**	4,930	4,517	10,631	2,825				
BBCEL/SMBC		**SUB-SECTION VARIANCE**	139	-1,895	-1,572	-14				
PROPOSED EXISTING A555 TIE IN (CH. 200) TO END RINGWAY ROAD JUNCTION (CH 3300) - EARTHWORK SPLIT										
BBCEL 6	25	Mainline ch180-1050 & Wilmslow Road junction	12,279	65,968	1,653	4,133		1,653		
	26	Mainline ch 1050 - 3360 inc Styal Road junction. **INCLUDING SCREEN BUNDING CH 1050 - 2360 LH & RHS**	33,568	52,792	121,962	14,367			59,961	62,001
			45,847	118,760	**123,615**	18,500	0	1,653	59,961	62,001
									123,615	
SMBC		**SMBC ASSESSED QUANTITIES**	42,487	114,595	121,896	19,925				
		SUB-SECTION VARIANCE	-3,360	-4,165	-1,719	1,424				
OVERALL QUANTITY SUMMARY			**TOPSOIL**	**CUT**	**FILL**	**RESOIL**				
BBCEL		**BBCEL ASSESSED QUANTITIES**	180,689	638,286	**774,037**	112,404	**47,270**	**49,000**	**257,706**	**420,060**
SMBC		**SMBC ASSESSED QUANTITIES**	172,124	625,946	748,836	111,780			**306,707**	
BBCEL/SMBC		**OVERALL VARIANCE**	-8,564	-12,340	-25,201	-624			**774,037**	
		OVERALL PERCENTAGE VARIANCE	**4.74%**	**1.93%**	**3.26%**	**0.55%**				

SUMMARY

BBCEL ASSESSMENT	**BBCEL CUT-FILL SHORTFALL**		638,286	774,037		-135,751
	BBCEL TOPSOIL- RESOIL SURPLUS USED IN LANDSCAPE BUNDS	180,689			112,404	68,285
	ASSESSED OVERALL BBCEL SHORTFALL					**-67,466**
SMBC ASSESSMENT	**SMBC CUT-FILL SHORTFALL**		625,946	748,836		-122,890
	SMBC TOPSOIL- RESOIL SURPLUS USED IN LANDSCAPE BUNDS	172,124			111,780	60,345
	ASSESSED OVERALL SMBC SHORTFALL					**-62,545**

BBCEL COMMENTS:-

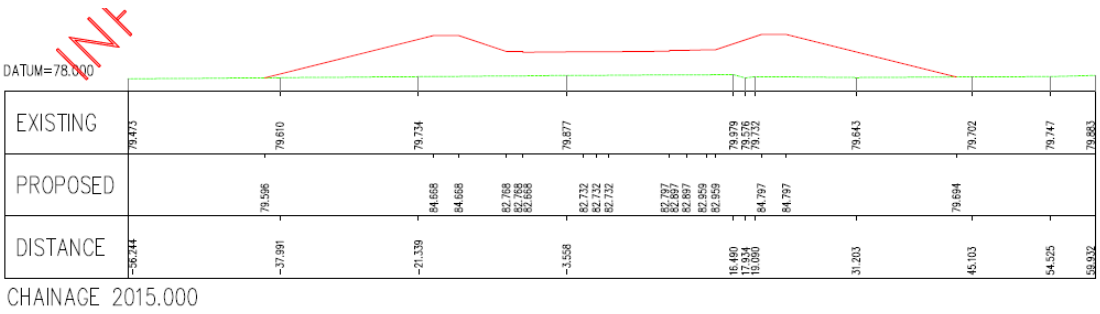
1 **ABOVE FIGURES RETAIN BUNDING BETWEEN CH. 1050 - 2350 LHS &RHS**

2 **ABOVE FIGURES ON RHS SHOW THAT IF STRUCTURAL CORE (CLASS 1/2) ADOPTING (BOV THEN 1:2 FILL SLOPES) ARE USED WHERE LANDSCAPE BUNDING IS PLACED ALONG SIDE THEN THAT OUTER ACCEPTABLE MATERIAL CAN BR CLASS 4 INCLUDING THE USE OF SURPLUS TOPSOIL.**

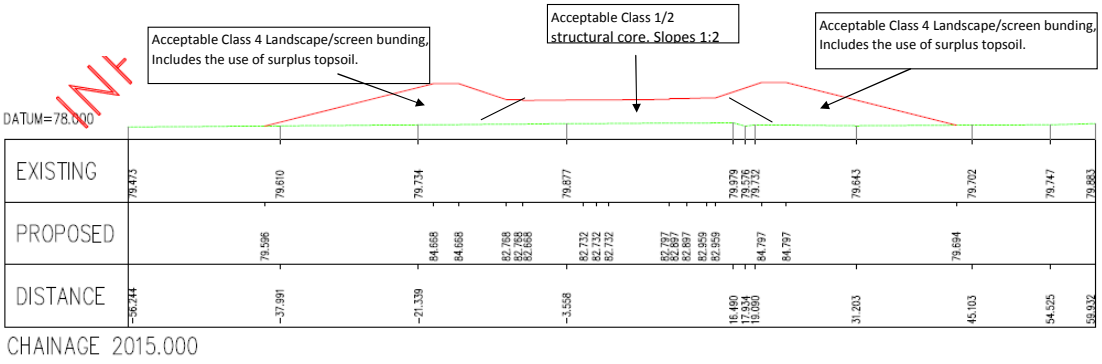
3 **SHORTFALL FAVOURABLE TO BE LEFT FOR CONTRACTOR TO ALLOW ADDITIONAL BALANCING ITEMS TO COME FROM DRAINAGE AND STRUCTURES ARISINGS**

APPENDIX D

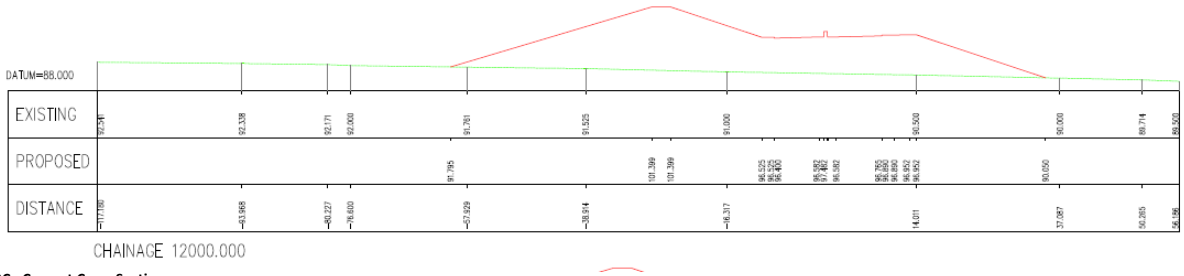
FLEXIBILITY IN UTILISING VARING ACCEPYABLE MATERIALS 9 CLASS 1/2 & 4 WITHIN ENBANKMENT WITH ADJOINING LANDSCAPE BUNDING



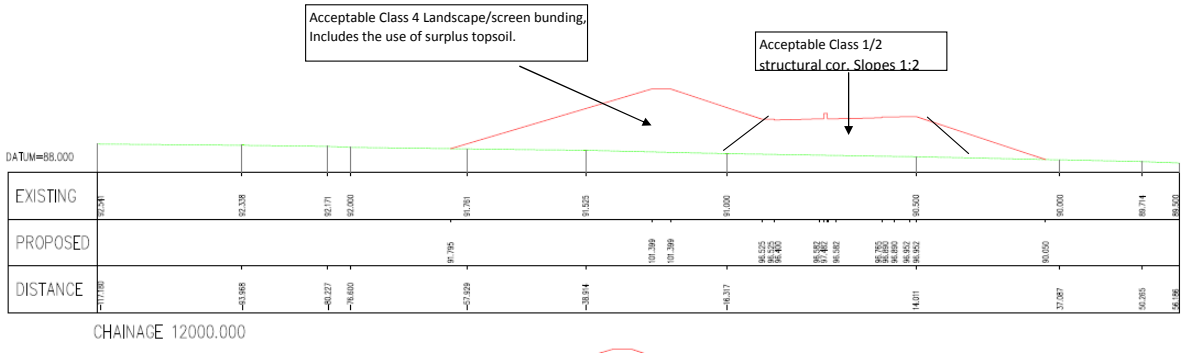
SMBC - Current Cross Section



Proposed revision to maximise acceptable fill to embankments and Class 4 including topsoil to screen bunding

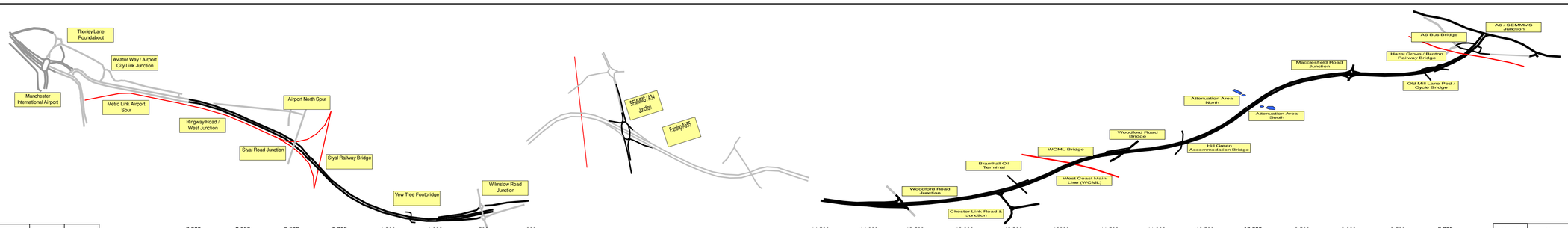


SMBC - Current Cross Section



Proposed revision to maximise acceptable fill to embankments and Class 4 including topsoil to screen bunding

APPENDIX E



Year	Quarter	Month
Year - 1	Q3	
	Q4	
Year 0	Q1	
	Q2	
	Q3	
	Q4	-8
		-7
		-6
		-5
Year 1	Q1	-4
		-3
		-2
	Q2	-1
		0
	Q3	1
		2
		3
	Q4	4
		5
		6
		7
Year 2	Q1	8
		9
		10
	Q2	11
		12
	Q3	13
		14
		15
		16
	Q4	17
		18
		19
Year 3	Q1	20
		21
		22
	Q2	23
		24
		25

14,000 13,500 13,000 12,500 12,000 11,500 11,000 10,500 10,000 9,500 9,000 8,500 8,000 7,500 7,000 6,500 6,000 5,500 5,000 4,500 4,000 3,500 3,000 2,500 2,000 1,500 1,000 500 000

14,500 14,000 13,500 13,000 12,500 12000 11,500 11,000 10,500 10,000 9,500 9,000 8,500 8,000

Environmental Mitigation Period 9 Months

Construction Period 2 Years

Notice to Proceed

Environmental Mitigation Period

Topsoil Strip

Statutory Undertakers - 33kv Gas Cable 3 No Diversions

Statutory Undertakers - National Grid MP Cut & Cap 2 No

Statutory Undertakers - 132kv Gas Assisted Cable Diversion

Statutory Undertakers - BT Cable Diversion 2 No

A555 E/B Off Slip

A34 N/B Approach

A34 S/B Approach

A555 W/B Off Slip

Structure Wilmslow Road Bridge

Structure Styal Railway Bridge

Structure Styal Road Existing Railway Bridge

Structure Yew Tree Footbridge

Drainage Outfall - Network L Proposed Tank

Statutory Undertakers - National Grid LP Install Branch & Saddle

Drainage Outfall - Network M Online Storage

1st Stage - Cut

1st Stage - Fill

Drainage Outfall - Network F to Pumping Station

Drainage

2nd Stage Earthworks

Pavement

Finishes

Construction Completion

Structure Woodford Road Junction Bridge No 1 OB

Statutory Undertakers - Misc Diversions

Structure WCML Bridge OB

Structure Woodford Road Bridge OB

Structure Oil Terminal Accommodation Bridge OB

Structure Woodford Road Junction Bridge No 2 OB

Drainage Outfall - New Pumping Station

Chester Junction Road

Structure - Mill Hey Hollow Bridge

Drainage Outfall - Network B Pond

Drainage Outfall - Network C Pond

Drainage Outfall - Network A Pond

Structure Old Mill Lane Ped / Cycle Bridge

Statutory Undertakers - Water Main Diversions

Structure Hazel Grove / Buxton Railway Bridge

Structure A6 Bus Bridge

Month	Year	Quarter
	Year - 1	Q3
		Q4
	Year 0	Q1
		Q2
		Q3
-8		Q4
-7		
-6		
-5		
-4	Year 1	Q1
-3		
-2		
-1		Q2
0		
1		Q3
2		
3		
4		
5		Q4
6		
7		
8	Year 2	Q1
9		
10		
11		Q2
12		
13		
14		Q3
15		
16		
17		Q4
18		
19		
20	Year 3	Q1
21		
22		
23		Q2
24		
25		

Legends

- Milestone
- Environmental Mitigation Period
- Construction Period
- Ecological Mitigation
- Utility Diversions
- Site Clearance
- Demolition
- Fencing
- Topsoil Strip
- Pre-Ewks Drainage
- Culverts
- TM Phase 1
- TM Phase 2
- TM Phase 3
- TM Phase 4
- Slip Road Construction
- Excavation
- Fill
- Reinforced Soil
- Gabions
- Sheet Piling
- Bored Piling
- Ret Wall
- Granular Fill
- Structures
- Underbridges
- Subways
- Viaducts
- Footbridges
- Drainage
- 2nd Stage Earthworks
- Pavement
- Verge Fill
- Topsoil
- Finishes
- Comms Ducts
- Power
- Lighting Ducts
- Lighting
- Slot Drains
- Safety Fencing
- Kerbing
- Step Barrier
- Paths & Steps
- Signs
- Road Marking
- Loops
- Road Safety Audit Process
- Completion & Handover Activities

SMBC

SEMMMS Relief Road A6 to Manchester

Time Location Programme

Drawn By: Eidolon 1.0c (Build 1.0.3.1481)

Drawing No: P3002/TL/001

Revision: Rev CC

Rendered by Eidolon 1.0c (Build 1.0.3.1481) - 24/Oct/2011 @ 12:05:52

APPENDIX E

Programme Areas

Area	Start Chainage	Finish Chainage
A6		
A6 Realignment	100	715
A6 Realignment	825	1398
Junction	8250	8300
Relief Road	8300	8550
Hazel Grove Railway		
Relief Road	8550	8950
Relief Road	8950	9460
Macclesfield Road	9460	9525
Relief Road	9525	10140
Relief Road	10140	10305
Norbury Brook		
Relief Road	10305	11910
WCML		
Relief Road	11955	12300
Relief Road	12300	12530
Oil Terminal Junction	12530	12645
Relief Road	12645	13000
Relief Road	13000	13270
Chester Link Road	100	485
Relief Road	13270	13818
A34 Junction		
Wilmslow Road		
Relief Road	180	520
Relief Road	540	1050
Relief Road	1050	2360
Styal Road Junction	2360	2470
Relief Road	2470	3360