



SEMMS A6 to Ringway Road West

B008 – West Coast Mainline Over Bridge
Preliminary Design Report
Report No. 47060785-PDR-008

January 2013

PRELIMINARY DESIGN REPORT

Structure Name : West Coast Mainline Over Bridge

Structure Number : B008

Road Number :

Report No. 47060785-PDR-008

Report Control Sheet

Version	Date	Status	Prepared By	Checked By	Approved By
1	04/01/2012	Draft	N.AFSHAR	N.SHEENA/ T.KSHIRSAGAR	N.SHEENA
2	09/05/2012	Draft (Final)	N. Afshar	N. Sheena	N. Sheena
3	24/01/2013	Draft (Final)	M Mfandarahwa	N Sheena	N Sheena

EXECUTIVE SUMMARY	4
1. Description of Site	5
2. Highway Details.....	5
3. Railway Line	6
4. Proposed structure.....	6
5. Span arrangements	6
6. Headroom and Clearances	6
7. Road Restraint system (Bridge Parapets)	7
8. Possession Time.....	7
9. Bridge Articulation	7
10. Preferred Structural Option.....	7
10.1 Superstructure	7
10.2 Substructure	8
11. Construction Sequence.....	8
12. Geotechnical Information	9
12.2 Glacial Till Deposits	9
12.3 Sandstone Strata.....	9
12.4 Groundwater	9
12.5 Preliminary Geotechnical Assessment.....	10
13. Environmental Impact Considerations.....	10
14. Appearance	10

Appendix A: Location Plan

Appendix B: Proposed General Arrangement Drawing
3D Model

Appendix C: Geotechnical Information

EXECUTIVE SUMMARY

The preliminary design commenced with a desk study gathering all the relevant available information which could affect the design. The available geotechnical reports on the scheme were also examined. Constant consultation with Stockport County Council and Network Rail enabled us to thoroughly understand the constraints and to develop a viable engineering solution.

A number of possible options have been considered, and as a result, the proposed structure will be a composite weathering steel plate girder with reinforced concrete deck slab supported on reinforced concrete abutments with wing walls. The bridge deck is simply supported with semi-integral construction to reduce maintenance problems.

The principal constraint affecting the solutions is the track possessions times available. Normal Rules of Route (RoR) possessions are from 22:40 to 05:40 on Tuesdays to Fridays and available for 9 weeks per year.

1. Description of Site

The WCML Bridge is part of the South East Manchester Multi Modal Strategy (SEMMMS) and is proposed to cross over the West Coast Main Line (WCML). The WCML Bridge is to the South of the Bramhall Golf Club and located approximately 350m East of Bramhall Oil Terminal at chainage 11938m.

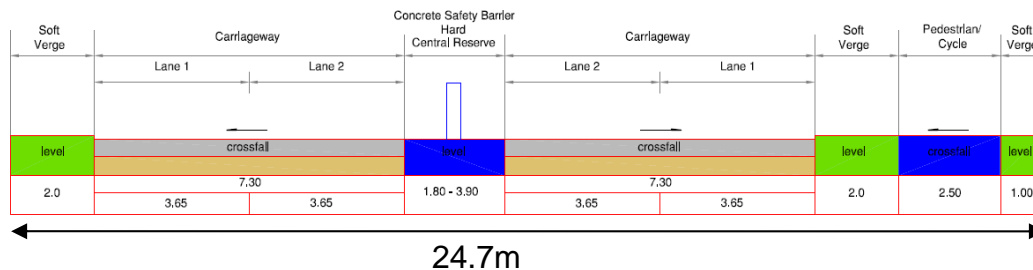
There is a residential area approximately 300m to the South of the proposed bridge. The immediate surrounding area is open farm land to the West and to the East. An aerial location plan at 1:1250 scale with the bridge extents delineated in red is included in Appendix A.

National Grid reference for the crossing is E390456, N384219. The proposed bridge location chainage at Design Freeze 4A is approximately 11938m.



2. Highway Details

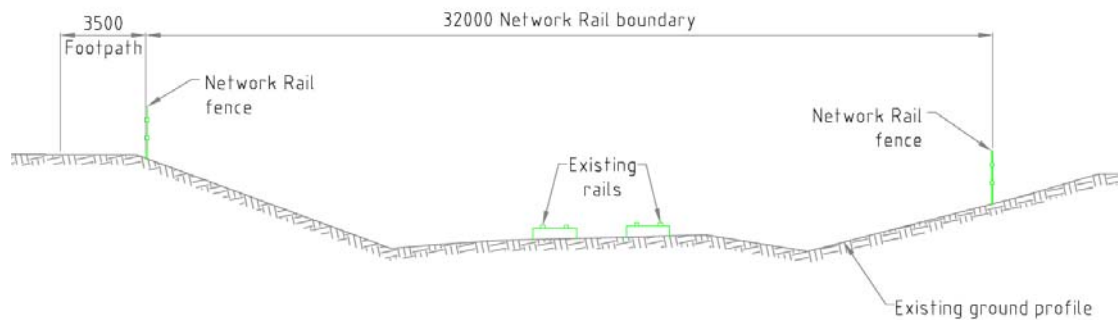
Over Structure – SEMMMS Relief Road (2.0m Soft Verge + 2 X 3.65m Carriageway, North), (2.0m Soft Verge + 2 X 3.65m Carriageway + 2.5m Pedestrian/Cycle, South) & 2.6m Safety Barrier Central Reserved.



Highway cross section over the bridge

3. Railway Line

The WCML is an electrified line and comprises of two tracks. At the crossing, the railway is in a cutting as shown below.



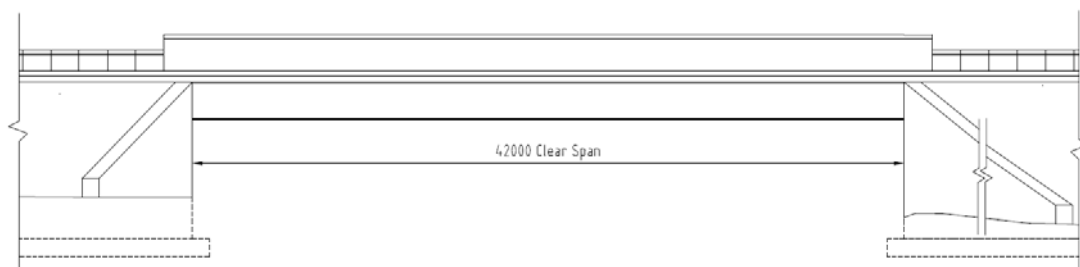
Railway cross section at the crossing

4. Proposed structure

The proposed structure will be a single span simply supported bridge (Semi Integral construction). The superstructure will be in the form of a weathering steel composite plate girder & reinforced concrete slab deck. The bridge superstructure will be supported on full height reinforced concrete abutments on piled foundation. The wing walls on piled foundation are aligned at different angles. The square deck width including the parapet upstands will be 25.7m. Skew angle is approximately 36 degrees. A General Arrangement drawing is included in Appendix B.

5. Span arrangements

Single span of 42.0m measured between abutment faces. This will allow the existing footpath on the West side to be intact and also enough distance on the East side for inspection and possibly replacing the bearings without the need for possession times.



Bridge elevation

6. Headroom and Clearances

Taking into account the latest highway alignment and the proposed construction depth, the provided headroom above the existing tracks is 7.0m. This is much greater than the headroom required above an electrified line.

Therefore there is a possibility for lowering the highway alignment and the bridge including the embankments on both sides of the railway line. However, this needs to be agreed and confirmed by Network Rail. The width of the Network Rail boundary is 32.0m. As mentioned above adequate clearances have been provided on either side including accommodating the footway on West side.

7. Road Restraint system (Bridge Parapets)

Type H4a parapet is in accordance with Road Restraints Risk Assessment Process (RRRAP) and with TD 19/06. The system consists of 1.5m high safety barrier covered in steel units attached together to form a 1.8m high restraint system. The steel used is to BS EN 10025 and BS EN 10219. The standard finish is galvanised finish to BS EN ISO 1461.

8. Possession Time

The rules of route possessions available as follows:

Sunday: from 00.10 Sunday to 08.30 for 13 weeks per year

Monday: from 00.05 Monday to 05.40 for 13 weeks per year

Tuesday to Friday: from 00.10 to 05.40 for 13 weeks per year

Allowing 1.0 hour for handover and hand back to Network Rail, this will leave approximately (6.0 hours Sunday; 3.5 hours Monday; 3.5 hours Tuesday to Friday each day) for productive work.

9. Bridge Articulation

The deck will be simply supported, free at one end and pinned at the other end. The semi integral deck will be supported on bearings under each plate girder with no expansion joints. Semi – integral construction will reduce maintenance problems from penetration of dirt, water and de-icing salts associated with expansion joints.

10. Preferred Structural Option

10.1 Superstructure

(Simply supported, semi-integral weathering steel plate girder and slab deck):

Steel plate girder is normally considered a cost effective solution for a span range of 30m to 45m. The advantages and disadvantages of using steel plate girder composite structure for taking all the restrictions into account are as follows:

Please also refer to drawing No 708 and the 3D model in Appendix B.

Advantages:

- With composite structures, lower construction depth will be achievable. Normal depth to span ratio is 1/20 to 1/30 typical
- Overall, lower weight of superstructure will be achievable. With composite bridge, typically 30-50% reduction of weight

is anticipated over similar concrete decks. As a result, smaller foundation is also possible.

- Very low maintenance with Weathering steel
- Light units for erection will be achievable. As a result, erection will be carried out by smaller cranes.
- Even number of girders achieves better optimisation of material and allows bracing in pairs.
- Permanent formwork provides self supporting system during construction and eliminates false-work.
- It can be transported to site in sections and site jointing could be undertaken in relatively short space of time.
- Fabrication under factory conditions facilitates quality control.
- Reduces site works which is weather dependent

Disadvantages:

- Problem for support lift off due to large span together with high skew.
- Delivery times are dependent on specialist supplier

10.2 Substructure

(In-situ concrete wall abutment with wingwalls)

Considering the topography of the site, existing ground level and the feasibility of the work, a full height concrete abutment is the best possible option. Both abutments and wing walls will be supported on piled foundations.

Taking the geotechnical information into account, piled foundation would be a suitable foundation solution in order to reduce settlements from the embankment and bridge loading, which could affect the track and track bed. Further geotechnical information is included in section 12 of this report.

11. Construction Sequence

Components are of a size that is transportable to the site. An even number of girders allows bracing and transportation in pairs.

Stage 1 Without RoR possessions

- Drive Piles for abutment and wing walls
- Construct the reinforced concrete abutments and wing walls.
- Set the bearings in place
- Assemble girders in pairs with bracings and splices.

Stage 2 During the blockade of the railway

- Erect pair of girders in place and support it on ready assembled bearings.
- Form the deck by concreting on top of the permanent formwork.
- Form the cantilever deck to the sides of the edge beams.

- Install parapets and safety fences.

Detailed construction programme is to be prepared by the contractor.

12. Geotechnical Information

The ground and groundwater conditions for the West Coast Mainline Bridge (WCML) have been assessed using relevant geological maps (Stockport Sheet 98, Solid and Drift Scale 1:50,000) and 7No. Exploratory bore holes logs provided by a number of phases of GI for the area.

12.1 Topsoil

Topsoil was identified at ground surface level in all exploratory holes and has recorded thicknesses between 0.1m and 0.4m.

12.2 Glacial Till Deposits

The glacial till deposits underlying the Topsoil comprised of cohesive and granular materials, and were encountered from 0.1mbgl to rock head (where proven).

The cohesive glacial till deposits (described as fluvial in places) were encountered in all exploratory holes. The logs generally indicate a Firm (occasionally soft) orange, brown mottled grey sandy CLAY over Firm to Stiff grey/brown slightly sandy CLAY with sub-angular to sub-rounded, fine to medium gravel with thicknesses of up to 6.25m.

The granular glacial till deposits (also described as fluvial in places) were encountered in all but one exploratory hole with thickness of 3.1m and 8.85m, and is typically described as medium dense to dense (occasionally very dense) brown, silty fine and medium SAND or sandy SILT.

105 No. Standard Penetration Testing (SPT) were carried out within the glacial till deposits, average SPT 'N' values of 24, confirm the medium dense material in the granular deposits. An average 'N' value of 15 proved the firm CLAY, with the stiff CLAY beneath being confirmed with an 'N' value of 23.

12.3 Sandstone Strata

Rock head was encountered at depths between 10.9mbgl (74.32mAOD) and 17.6mbgl (72.67mAOD), within 5 No. exploratory bore holes. Rock is described weak to very weak, moderately to highly (occasionally completely) weathered, weakly cemented SANDSTONE with very close to closely spaced discontinuities.

The ground conditions encountered within the ground investigation confirm that described on the geological maps of Boulder Clay of Recent and Pleistocene age, over Pebble Beds, of Permian to Triassic age which are part of the Sherwood Sandstone Group. There are no faults recorded within this area.

12.4 Groundwater

Groundwater was encountered in six exploratory bore holes, with overall depths ranging from 2.9mbgl (85.71mAOD) and 14.2mbgl (76.01mAOD), all readings were within the Glacial Till deposits six within the cohesive material and one within the granular material.

There is no known groundwater monitoring information for the site.

12.5 Preliminary Geotechnical Assessment

Piled foundations would be a suitable foundation method in order to reduce settlements from the embankment and bridge loading, which could affect the track and track bed. The piles would need to be installed at existing ground level into the underlying sandstone, the length of which will be confirmed by the pile designer.

The potential for chemical attack on buried concrete within the ground has not been assessed. This will be the responsibility of the foundation designer.

Given that groundwater has been identified in a number of exploratory bore holes, drainage methods will need to be considered in the design. Further investigation into the groundwater levels and changes with seasons, along with flow rates is recommended for the design and drainage methods.

Geotechnical information relevant to the site is included in Appendix C.

13. Environmental Impact Considerations

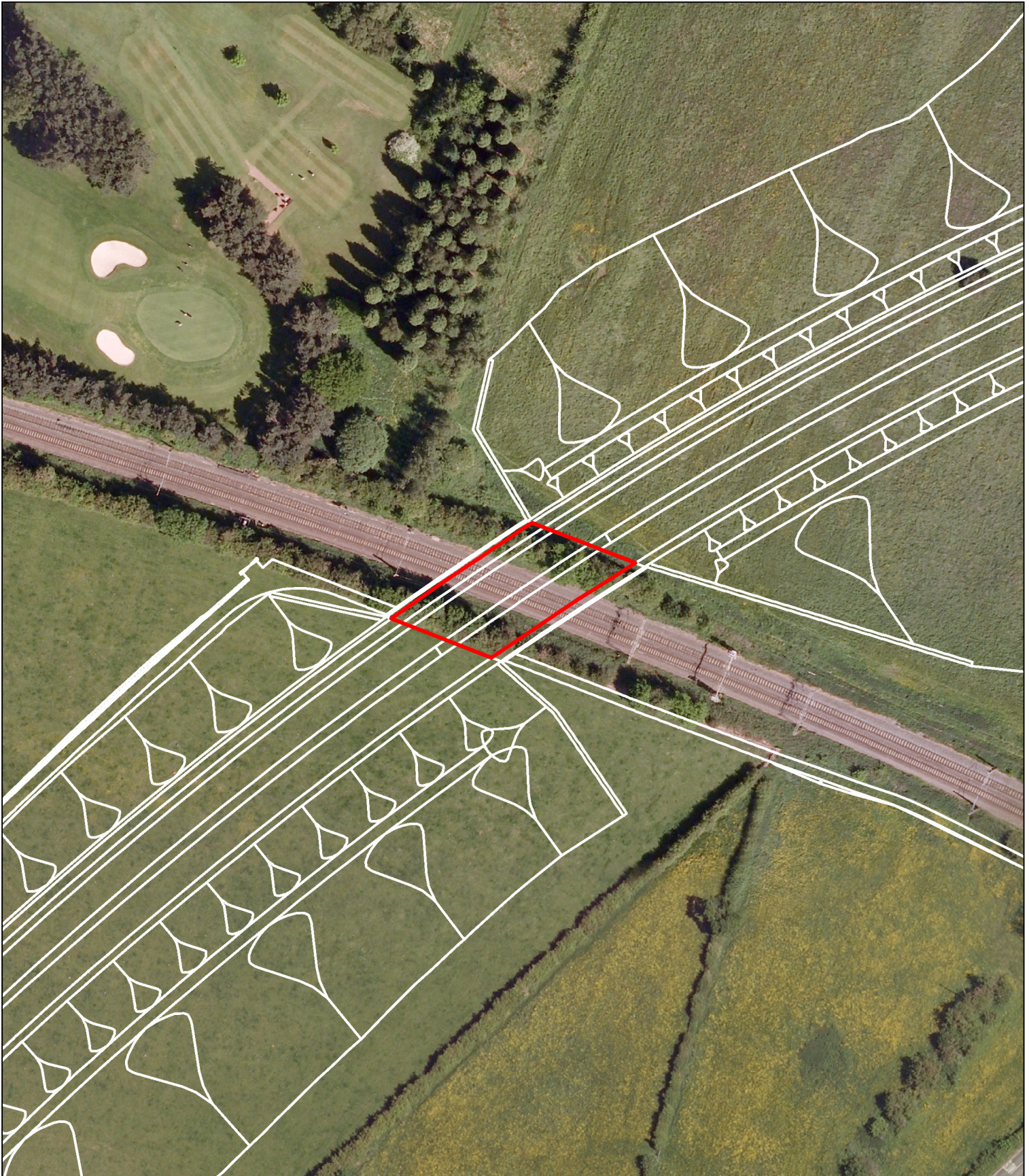
Generally surroundings at the site are open fields apart from the Bramhall golf club to the North. The existing Woodford Road is about 100m away to the South of the site and except where Woodford Road crosses over WCML, the visual impact is minimised. The main environmental impact of the crossing is likely to be on a number of residential premises located about 300m to the South of the bridge. Given the current aspects from these properties, their distance from the site and considering the fact that the area is surrounded by trees and other vegetations, there will be minimal visual impact. If required, noise barriers can be installed, which can be determined in the feasibility stage.


There are other areas in which the scheme will have an environmental impact such as ecology, air quality, transport, hydrology, ground contamination, archaeology, and drainage. It is noteworthy that going over WCML will have less drainage impact. However, SMBC has advised that the above issues will be dealt with by the environmental consultant, Mouchel.

14. Appearance

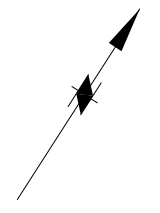
Above the ground level most structural elements are going to be visible at this location. The proposed superstructure will obviously be visible which on elevation comprises of approximately 1.9m deep steel beams and 0.5m string course spanning across WCML. In addition, 1.8m H4a solid steel parapets will be mounted on the string courses either sides of the bridge. The bridge approaches will be carried on approximately 3.5m of embankments on either side of the railway line. Parts of the abutments and wing walls which are of concrete finish would be visible. Subject to planning approval, brick facing of the visible parts of the abutments and wing walls can also be considered to improve the visual impact.

Appendix A: Location plans

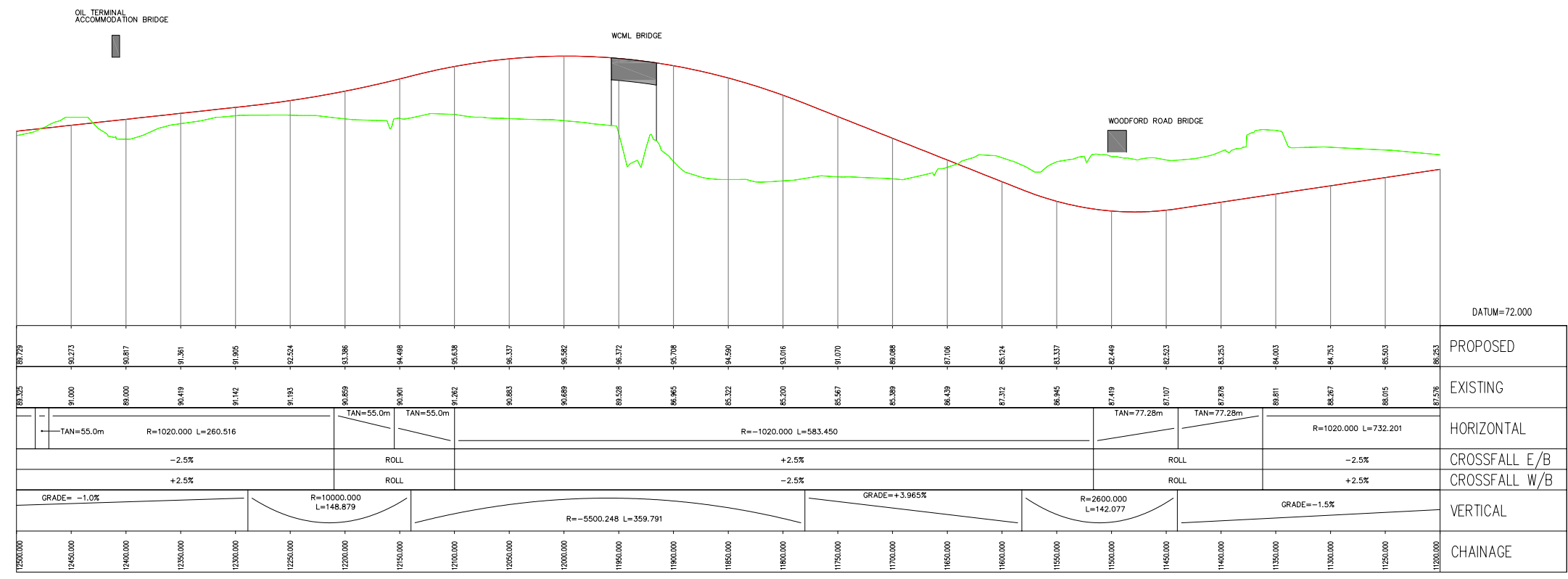
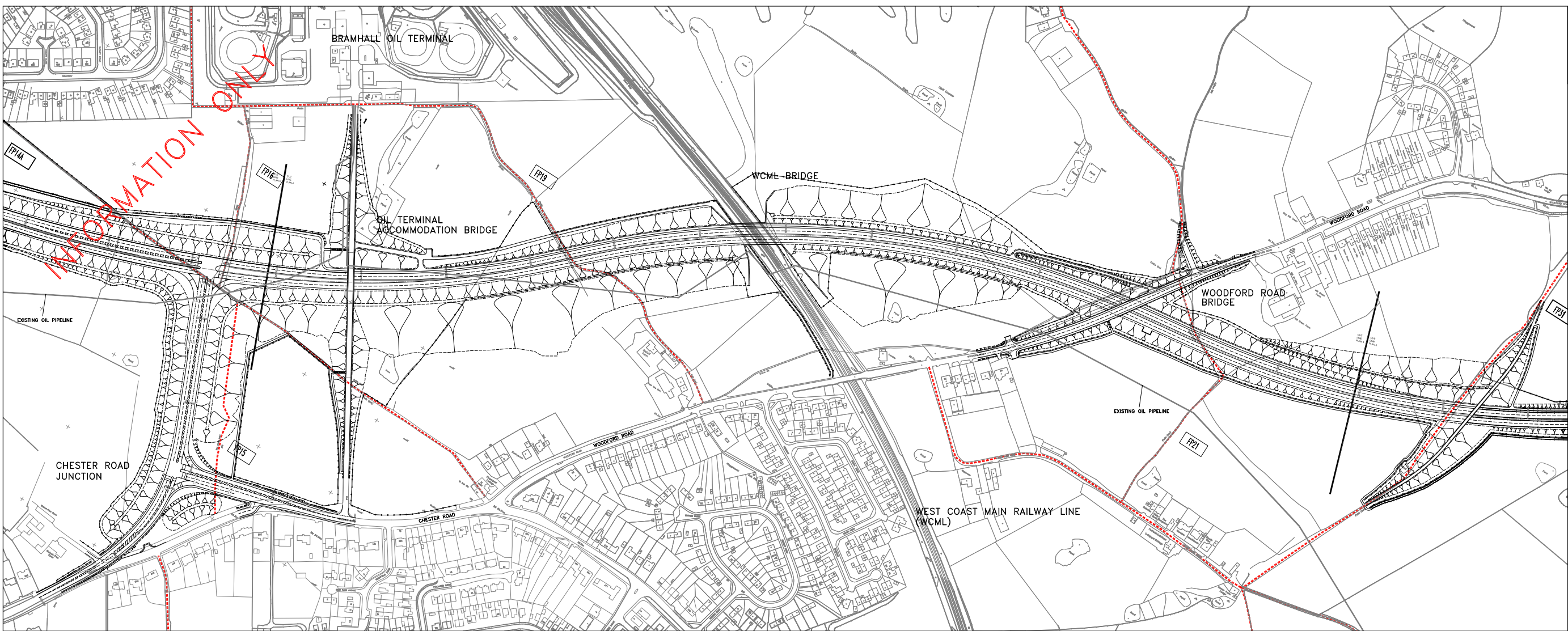


Drawn	CL	Checked	AB	Approved	
Date	17/01/12	Date	17/01/12	Date	
Size	A4	Scale	1 : 1,250		
GIS Task	3788_8	Filename			
Drawing No.	1007-3D-DF5-A6-MA-B008-ALP			Revision	

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- KEY**
- EXISTING DEFINITIVE PROW
 - EXISTING NON-DEFINITIVE PROW
 - EXISTING BRIDLEWAY



SECTION ALONG CENTRELINE OF SEMMMS RELIEF ROAD
A6 JCT TO A555
(SPEED LIMIT 50MPH)

B	SP	NH	15.07.11	EXIST OIL PIPELINE LOCATION REVISED
A	SP	NH	04.07.11	MAINLINE OVER WCML & CHESTER RD JCT APPROACHES REALIGNED

South east manchester multi-modal strategy

STOCKPORT MANCHESTER CITY COUNCIL

103 WELLINGTON ROAD SOUTH STOCKPORT SK1 3TT
TEL: 0161 474 4622 FAX: 0161 476 0721

SEMMS RELIEF ROAD SCHEME A6 - AIRPORT

DRAFT DESIGN FREEZE 5
GENERAL ARRANGEMENT
SHEET 4 of 12

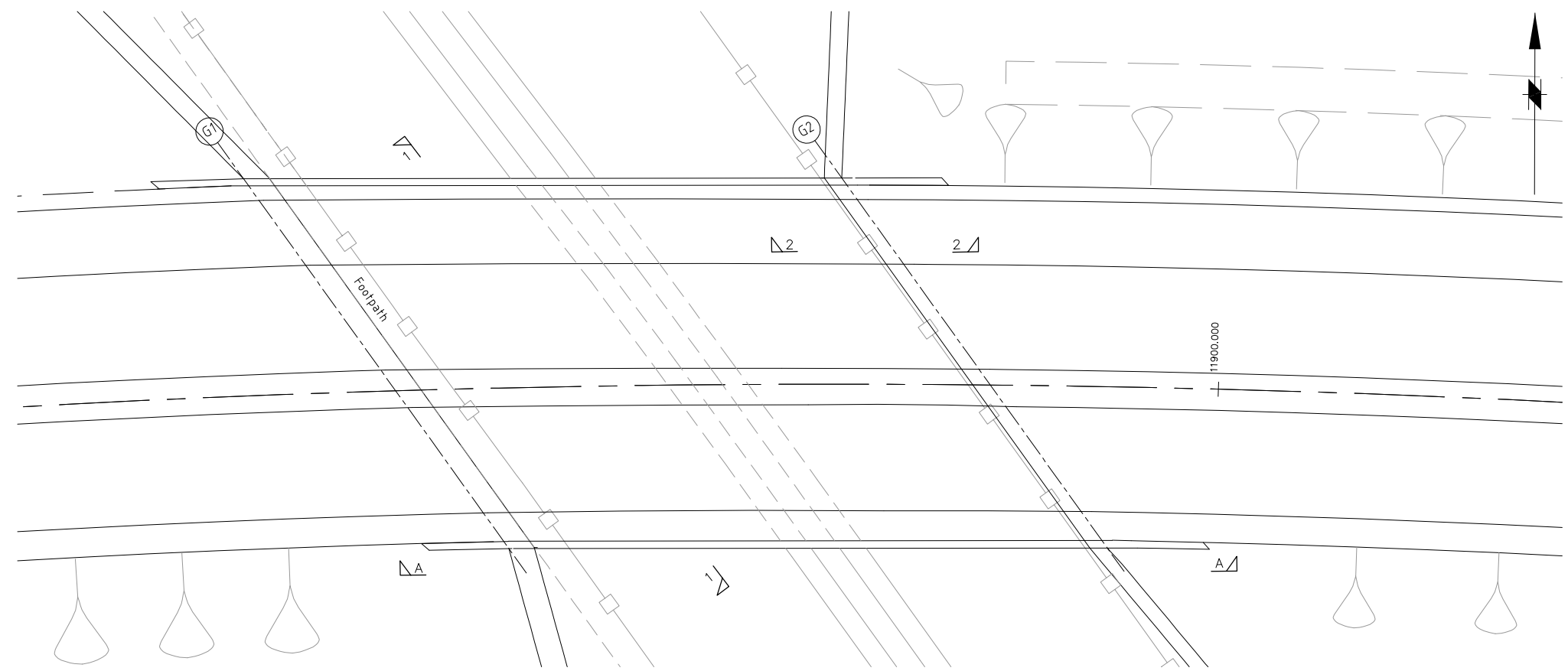
Drawn	Engineer	Checked	Approved
SP	SP	NH	MPR
Date	Date	Date	Date
05/05/11	10/06/11	13/06/11	13/06/11
Size	Scale	PLAN 1:2500 - SECTION HZ 1:2500, VT 1:250	
A1	File name: S:\Projects\SEMMS Major Information\6.0 Highways\6.3 Geometry and Survey		
SCG No.	Drawing No. 1007/3D/DF5/A6-MA/GA/503		
Revision			B

Appendix B: Proposed General Arrangement drawing
3D Model

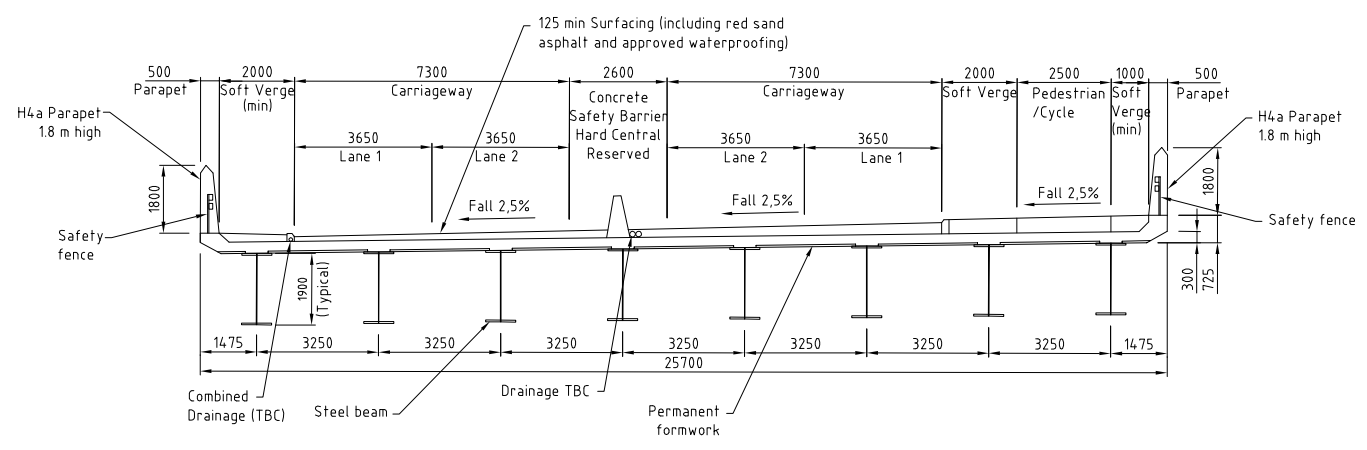
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NOTES

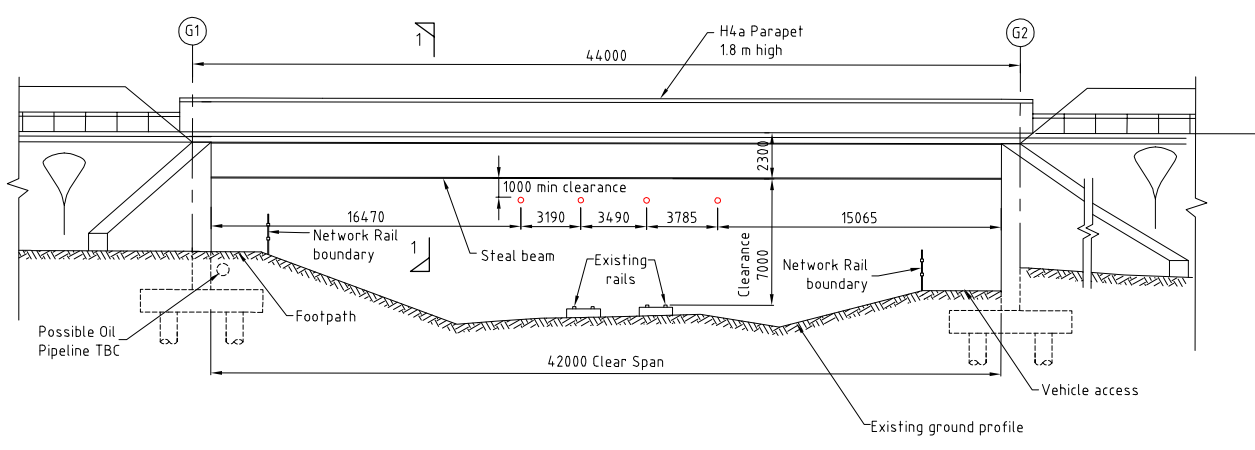
- This drawing has been produced based on the latest MX highway model - Draft Design Freeze 5, as provided by the client (Feb. 2013).
- This drawing has been produced mainly for the purpose of preliminary design.
- Levels are in metres and above Ordnance Datum.
- All dimensions are in millimetres.
- The option shown in this drawing is not for construction.
- The foundation type shown on the drawing is based on the latest available geotechnical information.
- Basic preliminary design has been undertaken to determine the geometry of the section sizes as per client's instruction.
- Concrete strengths--
 Precast panel C32/ 40
 Secant piles C32/ 40
 Abutment diaphragm C32/ 40
 Deck slab C32/ 40
 Parapet edge beams C32/ 40
 Precast beams C50/ 60
- Permanent formwork is required.
- Concrete finishes to be as per MCHW specification series 1700 U.N.O. :-
 Buried foundations : F1, U1
 Abutment columns : F1
 Buried face of abutment : F1
 Waterproofing : F4
 Precast beams : F5
 Precast concrete panel : F4
 Parapet edge beam : F3, U3
 Deck slab top surface : U4



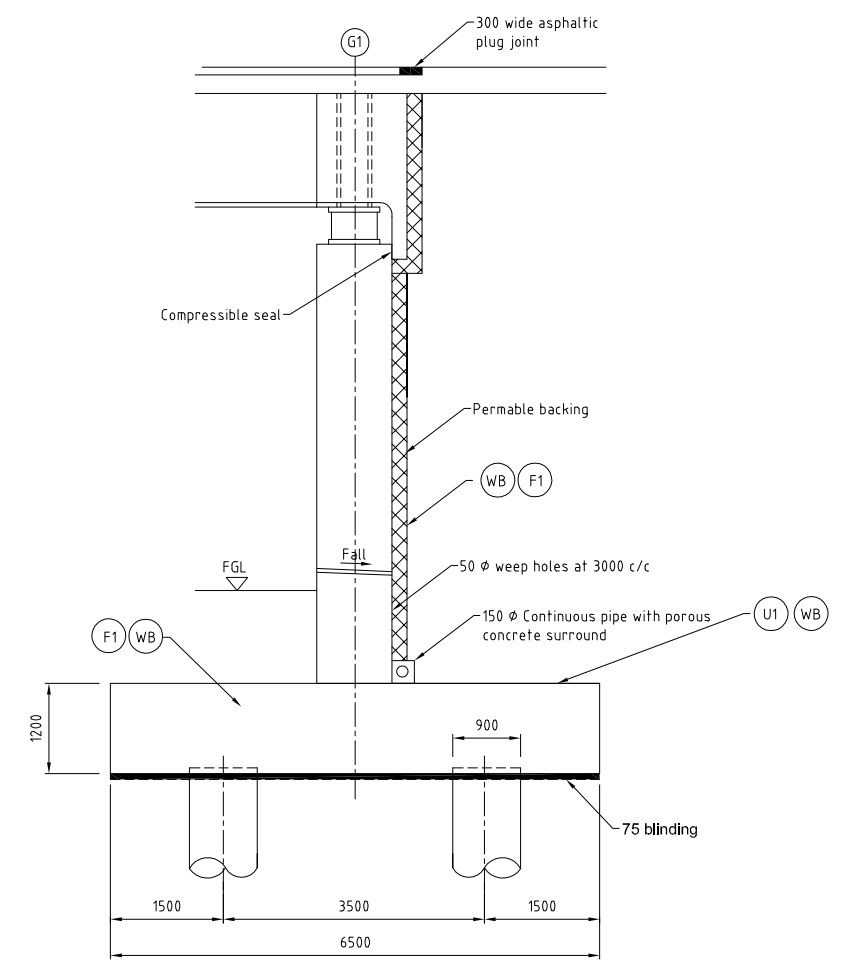
PLAN ON BRIDGE
Scale 1:200



SECTION 1-1
Scale 1:100



ELEVATION A-A
Scale 1:200



SECTION 2-2
Scale 1:50

02	SPH	NA	18/03/13	REVISED INCORPORATING CLIENTS COMMENTS
1	SPH	NS	15/5/12	Elevation & sections amended

Rev.	Drawn	Checked	Date	Revision Details

South east manchester multi modal strategy

STOCKPORT MANCHESTER CITY COUNCIL

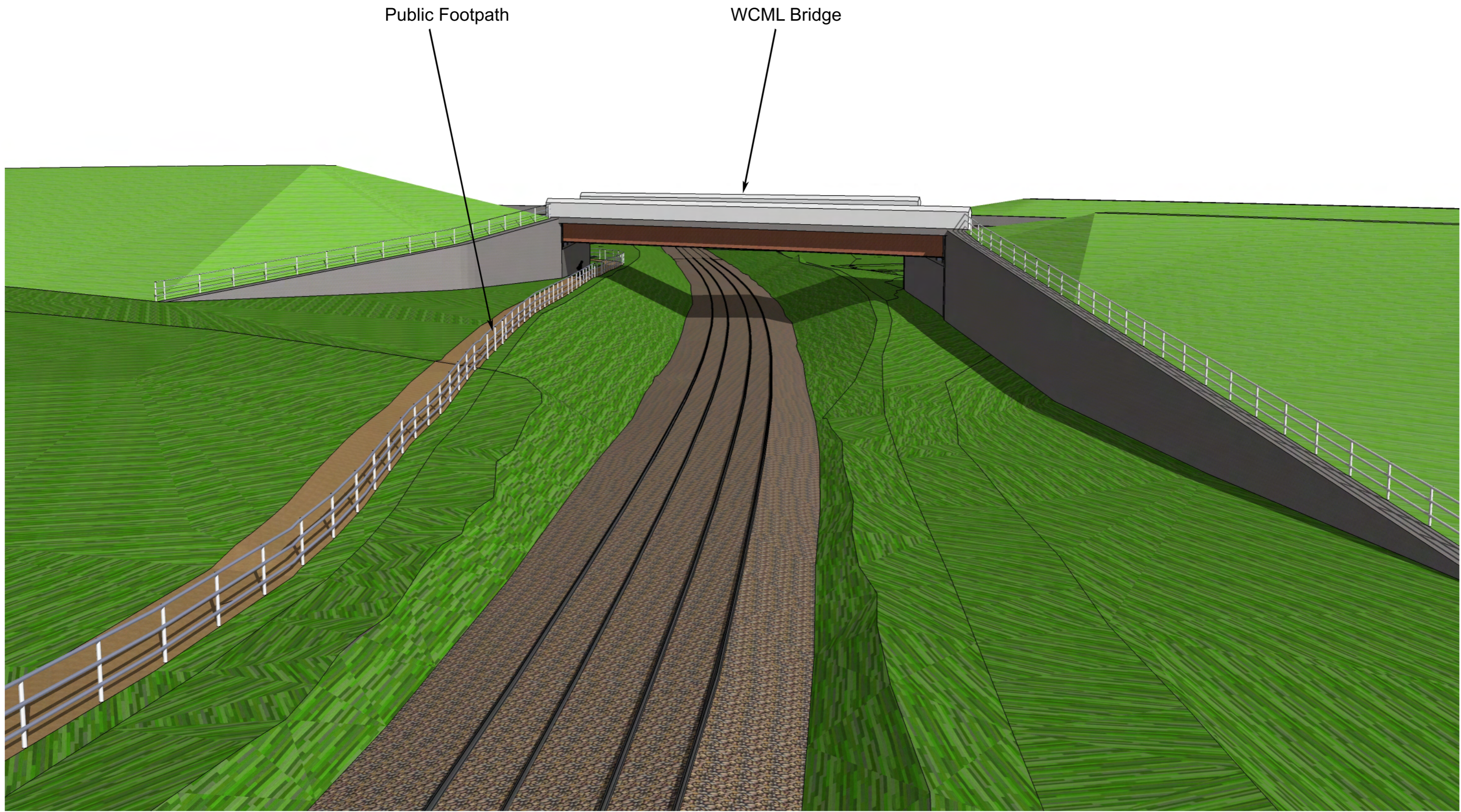
Highways Structures
 FRED PERRY HOUSE, C/O STOCKPORT HOUSE
 PODOLSKY, STOCKPORT SK11 3JE
 TEL: 0161 4744833
 FAX: 0161 4744831

Job Title
SEMMS RELIEF ROAD SCHEME A6-AIRPORT

Drawing Title
GENERAL ARRANGEMENT WCML BRIDGE

Drawn	Engineer	Checked	Approved
RBG	LF	TK	NS
Date	Date	Date	Date
NOV/11	21/12/11	21/12/11	23/12/11
Size	Scale	AS SHOWN	
A1			
SCG No.	Filename		

Drawing No. 1007/3D/DF5/A6-MA/B008/708 Revision 02

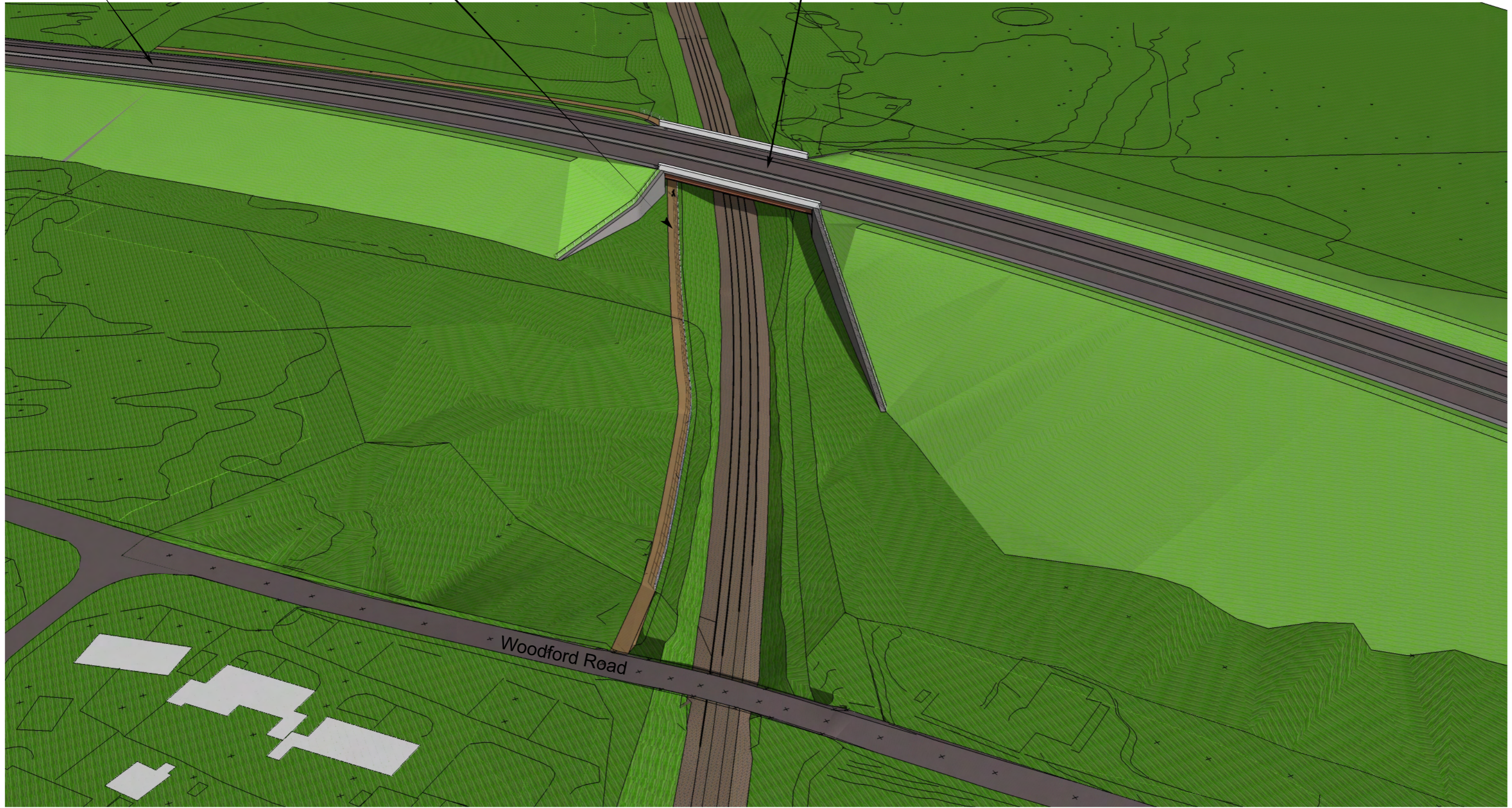


West Coast Mainline Over Bridge
View from Woodford Road

SEMMMS

Public Footpath

WCML Bridge



West Coast Mainline Over Bridge
Aerial View

Appendix C: Geotechnical information

BOREHOLE LOG

Project: SEMMS		Job No: 37732ISG		Borehole No.	
Date: 30-03-2005/31-03-2005		Co-ordinates: E 390373.5 N 384183.6		BH104	
Contractor: GEOTECHNICAL ENGINEERING LIMITED			Engineer: Faber Maunsell Ltd		
Sheet: 1 of 2					

Samples & Tests					Water/ (Flush Return)			Strata				Backfill/ Instrument
Depth	Type No	Test Results	TCR SCR RGD	If (mm)	O.D. Level	Depth (Thickness)	Description	Legend				
					90.32	0.30	TOPSOIL. (Drillers description)					
0.50 0.50-1.00	D 1 D* 1 B 2					(1.40)	Firm locally stiff light grey mottled orange-brown slightly sandy CLAY with rare subangular to rounded fine and medium siltstone gravel. Occasional fine rootlets and fragments of coal. 0.50 - 1.00 With rare fine gravel size pockets of yellow-grey micaceous silt.					
1.00 1.20-1.70	D 3 D* 3 U 4											
1.70	D 5				88.92	1.70						
2.00-2.50 2.00-2.45	B 6 SPT D 7	N = 18(450mm) 3 4/4 4 5 5				(1.30)	Stiff red-brown mottled grey slightly sandy CLAY with a little subangular to subrounded fine and medium gravel of various lithologies including sandstone, siltstone and coal. 2.00 - 3.00 With occasional fine rootlets.					
3.00-3.50	U 8				87.62	3.00						
3.50	D 9						Stiff brown occasionally mottled grey locally slightly sandy CLAY with a little subangular to subrounded fine and medium gravel of various lithologies including sandstone, mudstone and quartz.					
4.00-4.50 4.00-4.45	B 10 SPT D 11	N = 17(450mm) 2 5/4 3 4 6				(3.60)						
5.00-5.50	U 12											
5.50	D 13											
6.00-6.50 6.00-6.45	B 14 SPT D 15	N = 17(450mm) 2 3/4 4 4 5			84.02	6.60	6.00 - 6.50 Recovered as brown sandy clay and brown slightly silty fine and medium sand.					
7.00-7.45 7.00-7.50	D 16 SPT B 17	N = 28(450mm) 4 5/6 7 7 8					Medium dense becoming dense brown becoming red-brown slightly silty fine and medium SAND. 7.00 - 7.50 With occasional medium gravel size pockets of firm red-brown slightly sandy clay. 7.50 - 10.00 With occasional becoming frequent fine gravel size fragments of coal.					
8.00-8.45 8.00-8.50	D 18 SPT B 19	N = 34(450mm) 5 6/7 9 8 10				(3.30)						
9.00-9.45 9.00-9.50	D 20 SPT B 21	N = 29(450mm) 3 4/5 6 9 9			80.72	9.90						

Water Strikes					Method, Equipment and Remarks	
Strike Depth	Casing Depth	Post Mins	Post Depth	Flow Remarks		
					EQUIPMENT: Light cable percussive (shell and auger) rig. METHOD: Hand dug inspection pit 0.00-1.20m. Cable percussion (150mm) 1.20-15.50m. CASING: 150mm diam to 15.00m. BACKFILL: On completion, a standpipe piezometer (19mm) was installed with tip at 14.00m, bentonite seal 15.00-14.00m, granular response zone 14.00-13.50m, bentonite seal 13.50-0.200m, concrete and raised cover 0.20-0.00m. REMARKS: Water added to assist boring 6.60-9.90m, 12.70-15.00m. Method: CP	

AGS3_NEW GLEB | SW BH LOG (CP, RC) | K:\47060785 - SEMMS\050 PROJECT INFORMATION\GINT\47060785-SEMMS.GPJ | AGS3_NEW GDT | 23/11/2011 | 10:44:34



BOREHOLE LOG

Project: SEMMS		Job No: 37732ISG		Borehole No.	
Date: 30-03-2005/31-03-2005		Co-ordinates: E 390373.5 N 384183.6		BH104	
Contractor: GEOTECHNICAL ENGINEERING LIMITED			Engineer: Faber Maunsell Ltd		
Sheet: 2 of 2					

Samples & Tests					Strata				Backfill/ Instrument	
Depth	Type No	Test Results	TCR SCR RGD	If (mm)	Water/ (Flush Return)	O.D. Level	Depth (Thickness)	Description		Legend
10.00-10.45 10.00-10.50	D 22 SPT B 23	N = 9(450mm) 2 3/2 2 2 3						Firm brown slightly sandy micaceous CLAY with frequent fine silt partings. Locally tending to a silt:clay. <i>(continued)</i>		
11.00-11.50	U 24						(2.80)			
11.50	D 25									
12.00-12.45 12.00-12.50	D 26 SPT B 27	N = 9(450mm) 2 2/3 2 2 2						12.00 - 12.50 Becoming sandy, locally tending to a very clayey fine sand.		
						77.92	12.70			
13.00-13.45 13.00-13.50	D 28 SPT B 29	N = 32(450mm) 4 6/7 8 8 9						Dense red-brown very silty fine to coarse SAND.		
14.00-14.45 14.00-14.50	D 30 SPT B 31	N = 35(450mm) 6 5/9 8 9 9					(2.75)			
15.00-15.45 15.00-15.50	D 32 SPT	N = 33(450mm) 5 6/8 9 8 8						15.00 - 15.00 Becoming silty.		
						75.17	15.45			
								End of Borehole		

AGS3_NEW GLEB | SW BH LOG (CP,RC) | K:\47060785 - SEMMS\050 PROJECT INFORMATION\GINT\47060785-SEMMS.GPJ | AGS3_NEW GDT | 23/11/2011 | 10:48:34

Water Strikes					Method, Equipment and Remarks	
Strike Depth	Casing Depth	Post Mins	Post Depth	Flow Remarks		
					EQUIPMENT: Light cable percussive (shell and auger) rig. METHOD: Hand dug inspection pit 0.00-1.20m. Cable percussion (150mm) 1.20-15.50m. CASING: 150mm diam to 15.00m. BACKFILL: On completion, a standpipe piezometer (19mm) was installed with tip at 14.00m, bentonite seal 15.00-14.00m, granular response zone 14.00-13.50m, bentonite seal 13.50-0.200m, concrete and raised cover 0.20-0.00m. REMARKS: Water added to assist boring 6.60-9.90m, 12.70-15.00m. Method: CP	



BOREHOLE LOG

Project: SEMMS		Job No: 37732ISG		Borehole No.	
Date: 25-03-1992/25-03-1992		Co-ordinates: E 390429.0 N 384179.8		EA POYNTON 82_1	
Contractor: GEOTECHNICAL ENGINEERING LIMITED			Engineer: Faber Maunsell Ltd		Sheet: 1 of 1

Samples & Tests				Water/ (Flush Return)		Strata				Backfill/ Instrument
Depth	Type No	Test Results	TCR SCR RGD	If (mm)	O.D. Level	Depth (Thickness)	Description	Legend		
					90.91	0.10	TOPSOIL: (turfed)			
						(0.40)	Firm light brown and grey sandy stony CLAY			
0.50	0.50	D 5113SPT N = 9(450mm) 2 1/2 2 2 3			90.51	0.50	Firm to stiff brown and orange mottled sandy CLAY with occasional gleying on fissured surfaces. At 1.70m: bands of silty sand and a little subrounded fine gravel. Below 2.90m: stiff brown fissured. 4.10m: bands of sand. At 5.30m: poorly laminated silty.			
0.95		D 5111								
1.20		U 5112								
1.70	1.70	D 5113SPT N = 13(450mm) 1 2/2 3 4 4								
2.40		U 5114								
2.90	2.90	D 5113SPT N = 19(450mm) 2 3/4 4 6 5								
3.35		D 5116								
3.60		U 5117					(6.00)			
4.10	4.10	D 5118SPT N = 22(450mm) 2 4/4 5 6 7								
4.55		D 5119								
4.80		U 5120								
5.30	5.30	D 5121SPT N = 16(450mm) 2 2/3 3 4 6								
5.75		D 5122								
6.00		U 5123								
6.50	6.50	B 411 SPT D 5124 N = 72(450mm) 5 6/12 15 21 24			84.51	6.50	Very dense orange-brown fine and medium silty SAND. At 7.50m: medium dense with some medium and coarse. Below 8.10m: dense.			
6.95		D 5125								
7.50		SPT N = 25(450mm) 1 3/5 7 5 8					(2.55)			
7.95		D 5126								
8.10		SPT N = 40(450mm) 2 2/7 8 11 14								
8.55	8.60	D 5127SPT N = 36(450mm) 1 2/6 7 10 13			81.96	9.05	End of Borehole			

Water Strikes					Method, Equipment and Remarks	
Strike Depth	Casing Depth	Post Mins	Post Depth	Flow Remarks	Method: CP	
3.60		20	3.30			

AGS3_NEW GLEB | SW BH LOG (CP/RC) | K:\47060785 - SEMMS\050 PROJECT INFORMATION\GINT\47060785-SEMMS.GP | AGS3_NEW GDT | 23/11/2011 | 10:48:36



BOREHOLE LOG

Project: SEMMS		Job No: 37732ISG		Borehole No.	
Date: 01-05-1992/01-05-1992		Co-ordinates: E 390434.7 N 384212.8		EA POYNTON 82_2	
Contractor: GEOTECHNICAL ENGINEERING LIMITED			Engineer: Faber Maunsell Ltd		Sheet: 1 of 3

Samples & Tests					Strata				Backfill/ Instrument	
Depth	Type No	Test Results	TCR SCR RGD	If (mm)	Water/ (Flush Return)	O.D. Level	Depth (Thickness)	Description		Legend
						89.91	0.30	TOPSOIL: (Turfed)		
0.45	0.45 D 5128SPT	N = 6(450mm) 1 1/1 2 1 2					(0.50)	Firm grey mottled orange-brown and dark grey very sandy fissured CLAY.	XO X O	
0.90	D 5129					89.41	0.80	Firm to stiff grey mottled orange-brown very sandy CLAY.	XO X O	
1.20	U 5130						(0.60)		XO X O	
1.65	1.65 D 5131SPT	N = 21(450mm) 3 4/4 5 5 7				88.81	1.40	Firm to stiff brown fissured slightly sandy CLAY. Occasional gleying. A little fine, medium and coarse subangular gravel. Below 1.65m: stiff. At 3.60m: soft. Below 4.05m: very silty. 5.70m: gleying absent.	XO X O	
2.10	D 5132								XO X O	
2.40	U 5133								XO X O	
2.85	2.85 D 5134SPT	N = 24(450mm) 5 5/6 5 6 7							XO X O	
3.30	D 5135								XO X O	
3.60	U 5136						(4.60)		XO X O	
4.05	4.05 D 5137SPT	N = 27(450mm) 5 6/6 7 7 7							XO X O	
4.50	D 5138								XO X O	
4.80	D 5139								XO X O	
5.25	5.25 D 5140SPT	N = 24(450mm) 3 4/5 5 7 7							XO X O	
5.70	D 5141								XO X O	
6.00	SPT	N = 16(450mm) 3 3/4 4 4 4				84.21	6.00	medium dense light brown fine and medium silty SAND. Trace fine gravel in places.	XO X O	
6.45	D 5142								XO X O	
6.60	6.60 B 412 SPT	N = 16(450mm) 3 4/3 4 4 5							XO X O	
7.05	D 5143								XO X O	
7.20	SPT	N = 18(450mm) 3 4/4 5 4 5							XO X O	
7.65	D 5144								XO X O	
7.80	SPT	N = 21(450mm) 4 3/5 5 6 5							XO X O	
8.00	B 413 U 585						(4.10)		XO X O	
8.25	D 5145								XO X O	
8.40	SPT	N = 25(450mm) 4 5/5 6 7 7							XO X O	
8.85	D 5146								XO X O	
9.00	SPT	N = 28(450mm) 5 6/6 7 7 8							XO X O	
9.45	D 5147								XO X O	
9.60	SPT	N = 16(450mm) 3 3/4 4 4 4							XO X O	

AGS3_NEW GLEB | SW BH LOG (CP/R/C) | K:\47060785 - SEMMS\050 PROJECT INFORMATION\GINT\47060785-SEMMS.GPJ | AGS3_NEW GDT | 23/11/2011 | 10:48:38

Water Strikes					Method, Equipment and Remarks	
Strike Depth	Casing Depth	Post Mins	Post Depth	Flow Remarks	Method: CP	



BOREHOLE LOG

Project: SEMMS		Job No: 37732ISG		Borehole No.	
Date: 01-05-1992/01-05-1992		Co-ordinates: E 390434.7 N 384212.8		EA POYNTON 82_2	
Contractor: GEOTECHNICAL ENGINEERING LIMITED			Engineer: Faber Maunsell Ltd		Sheet: 2 of 3

Samples & Tests				Water/ (Flush Return)	Strata			Backfill/ Instrument
Depth	Type No	Test Results	TCR SCR RQD		O.D. Level	Depth (Thickness)	Description	
10.05	D 5148	SPT N = 18(450mm) 3 4/5 5 4 4		80.11	10.10	Medium dense brown fine very silty SAND (tending to sandy silt) Medium dense brown fine very silty SAND.		
10.20				79.91	10.30			
10.65	D 5149	SPT N = 19(450mm) 5 4/5 4 5 5				(2.80)		
10.80								
11.00	B 414 U 586							
11.25	D 5150	SPT N = 10(450mm) 2 3/2 3 2 3						
11.40								
11.85	D 5151	SPT N = 13(450mm) 3 3/3 3 4 3						
12.00								
12.45	D 5152	SPT N = 17(450mm) 3 4/4 5 4 4						
13.05	D 5153			77.11	13.10	Firm brown very silty poorly laminated CLAY with partings and bands of clayey sandy silt.		
13.20	U 5154							
13.65	D 5155	SPT N = 12(450mm) 2 3/3 3 3 3			(1.10)			
14.00	B 416 U 587							
14.10	D 5156	SPT N = 20(450mm) 4 4/5 5 5 5		76.01	14.20	Medium dense red-brown medium and coarse SAND.		
14.25								
14.70	D 5157	SPT N = 20(450mm) 4 4/4 5 5 6						
14.85								
15.30	D 5158	SPT N = 27(450mm) 5 5/6 6 8 7			(3.10)			
15.90	D 5159	SPT N = 34(450mm) 6 7/7 8 8 11						
16.50	D 5160	SPT N = 40(450mm) 6 7/7 8 12 13						
16.65								
17.10	D 5161	SPT N = 90(250mm) 12 26/40 50 0 0		72.91	17.30	Red-brown completely weathered medium and coarse SANDSTONE. Very weak.		
17.25				72.61	17.60			
						Red-brown highly to moderately weathered poorly cemented medium and coarse SANDSTONE. Very weak with very closely spaced subhorizontal sandy discontinuities. 18.29m: pebble. 18.40m to 18.60m: completely to highly weathered. 19.00m: red-brown weak mudstone inclusions - clayey matrix. 19.10m: to 20.60m: close and medium spaced discontinuities. 21.10m: band of medium, subrounded pebbles (bunter pebble beds).		

Water Strikes					Method, Equipment and Remarks	
Strike Depth	Casing Depth	Post Mins	Post Depth	Flow Remarks	Method: CP	
14.20		20	13.60			

AGS3_NEW GLEB | SW BH LOG (CP/RC) | K:\47060785 - SEMMS\050 PROJECT INFORMATION\GINT\47060785-SEMMS.GPJ | AGS3_NEW GDT | 23/11/2011 | 10:48:38

BOREHOLE LOG

Project: SEMMS		Job No: 37732ISG		Borehole No.	
Date: 01-05-1992/01-05-1992		Co-ordinates: E 390434.7 N 384212.8		EA POYNTON 82_2	
Contractor: GEOTECHNICAL ENGINEERING LIMITED			Engineer: Faber Maunsell Ltd		Sheet: 3 of 3

Samples & Tests					Strata				Backfill/ Instrument	
Depth	Type No	Test Results	TCR SCR RQD	If (mm)	Water/ (Flush Return)	O.D. Level	Depth (Thickness)	Description		Legend
							(6.00)	Red-brown highly to moderately weathered poorly cemented medium and coarse SANDSTONE. Very weak with very closely spaced subhorizontal sandy discontinuities. 18.29m: pebble. 18.40m to 18.60m: completely to highly weathered. 19.00m: red-brown weak mudstone inclusions - clayey matrix. 19.10m: to 20.60m: close and medium spaced discontinuities. 21.10m: band of medium, subrounded pebbles (bunter pebble beds). <i>(continued)</i>		
						66.61	23.60	End of Borehole		

AGS3_NEW GLEB | SW BH LOG (CP/RC) | K:\47060785 - SEMMS\050 PROJECT INFORMATION\GINT\47060785-SEMMS.GPJ | AGS3_NEW GDT | 23/11/2011 | 10:48:38

Water Strikes					Method, Equipment and Remarks
Strike Depth	Casing Depth	Post Mins	Post Depth	Flow Remarks	Method: CP



BOREHOLE LOG

Project: SEMMS		Job No: 37732ISG		Borehole No.	
Date: 26-03-1992/26-03-1992		Co-ordinates: E 390472.0 N 384198.8		EA POYNTON 82_3	
Contractor: GEOTECHNICAL ENGINEERING LIMITED			Engineer: Faber Maunsell Ltd		Sheet: 1 of 2

Samples & Tests					Strata				Backfill/ Instrument	
Depth	Type No	Test Results	TCR SCR RGD	If (mm)	Water/ (Flush Return)	O.D. Level	Depth (Thickness)	Description		Legend
								TOPSOIL: (turfed)		
0.50	0.50	D 516 SPT				89.87	0.40	Firm orange and grey mottled sandy CLAY. Below 1.20m: stiff fissure with some gleying. Below 2.40m: brown. Below 3.60m: very stiff slightly silty.		
		D 5163								
		U 5164								
1.70	1.70	D 516 SPT								
		D 5166								
		U 5167								
2.90	2.90	D 516 SPT					(5.00)			
		D 5169								
		U 501 U 5170								
4.10	4.10	D 517 SPT								
		D 5172								
		U 5173								
5.40	5.40	D 517 SPT				84.87	5.40	Firm brown-orange laminated silty CLAY with thin bands of fine sand.		
		D 5175								
6.00	6.00	B 417 SPT					(0.45)			
		D 5176					84.42			
		SPT					5.85			
6.60	6.60	SPT								
		D 5176								
7.10	7.10	D 517 SPT								
		SPT								
		D 5178								
8.15	8.30	SPT								
		D 5178								
9.00	9.00	B 418 SPT						Dense orange-brown fine silty SAND. Below 6.60m: medium dense. Below 7.70m: red-brown fine and medium silty sand. At 13.00m: silty with coal fragments. At 13.45m: clay band. At 14.55m: clay band.		
		D 5179								
9.45	9.60	SPT								

AGS3_NEW GLEB | SW BH LOG (CP/RC) | K:\47060785 - SEMMS\050 PROJECT INFORMATION\GINT\47060785-SEMMS.GPJ | AGS3_NEW GDT | 23/11/2011 | 10:48:41

Water Strikes					Method, Equipment and Remarks	
Strike Depth	Casing Depth	Post Mins	Post Depth	Flow Remarks	Method: CP	
4.10		20	4.00	Slow rising		

BOREHOLE LOG

Project: SEMMS		Job No: 37732ISG		Borehole No.	
Date: 26-03-1992/26-03-1992		Co-ordinates: E 390472.0 N 384198.8		EA POYNTON 82_3	
Contractor: GEOTECHNICAL ENGINEERING LIMITED			Engineer: Faber Maunsell Ltd		Sheet: 2 of 2

Samples & Tests				Strata				Backfill/ Instrument	
Depth	Type No	Test Results	TCR SCR RGD If (mm)	Water/ (Flush Return)	O.D. Level	Depth (Thickness)	Description		Legend
10.05 10.20	D 5180 SPT	N = 23(450mm) 2 2/3 7 6 7				(8.85)	Dense orange-brown fine silty SAND. Below 6.60m: medium dense. Below 7.70m: red-brown fine and medium silty sand. At 13.00m: silty with coal fragments. At 13.45m: clay band. At 14.55m: clay band. (continued)		
11.30	D 5181 SPT	N = 20(450mm) 2 3/3 4 6 7							
11.75	D 5182								
12.35	D 5183								
12.70	W 5184								
13.00	D 5185 SPT	N = 7(450mm) 1 1/1 1 2 3							
13.45	D 5186								
14.10	D 5187 SPT	N = 11(450mm) 1 1/2 3 3 3							
14.80	U 502 U 5188				75.57	14.70	Stiff brown silty very sandy CLAY with some rounded fine and medium gravel		
15.30	D 5189 SPT	N = 17(450mm) 1 2/3 4 5 5							
15.75	D 5190					(2.90)			
16.35	D 5191								
17.00	SPT	N = 30(450mm) 3 4/4 6 7 13							
17.45	D 5192				72.67	17.60			
17.70	SPT	N = 0(525mm) 50 0/0 0 0 0					Red-brown completely weathered medium grained SANDSTONE.		
18.30	C	N = 0(600mm) 42 50/0 0 0 0				(1.40)			
18.80	C	N = 0(525mm) 50 0/0 0 0 0			71.27	19.00			
								End of Borehole	

AGS3_NEW GLEB | SW BH LOG (CP/RC) | K:\47060785 - SEMMS\050 PROJECT INFORMATION\GINT\47060785-SEMMS.GPJ | AGS3_NEW GDT | 23/11/2011 | 10:48:41

Water Strikes					Method, Equipment and Remarks	
Strike Depth	Casing Depth	Post Mins	Post Depth	Flow Remarks	Method: CP	



BOREHOLE LOG

Project: SEMMS		Job No: 37732ISG		Borehole No.	
Date: 14-04-1992/14-04-1992		Co-ordinates: E 390502.9 N 384216.4		EA POYNTON 82_4	
Contractor: GEOTECHNICAL ENGINEERING LIMITED			Engineer: Faber Maunsell Ltd		Sheet: 1 of 3

Samples & Tests					Strata				Backfill/ Instrument	
Depth	Type No	Test Results	TCR SCR RGD	If (mm)	Water/ (Flush Return)	O.D. Level	Depth (Thickness)	Description		Legend
						87.31	0.30	TOPSOIL: (turfed)		
0.45	0.45 D 5193	SPT N = 10(450mm) 3 3/3 2 3 2						soft to firm grey-brown very sandy CLAY. Below 1.20m: firm to stiff red-brown with a little subangular fine gravel.		
0.90	D 5194									
1.20	U 5195					(2.10)				
1.65	1.65 D 5196	SPT N = 13(450mm) 2 3/3 3 3 4								
2.10	D 5197									
2.40	U 5198					85.21	2.40	Soft grey medium sandy CLAY		
2.85	2.85 D 5199	SPT N = 29(450mm) 4 5/5 7 8 9				84.81	2.80	Stiff brown silty sandy CLAY with some subangular and subrounded fine and medium gravel and occasional gleying on fissure surfaces. At 4.00m: silty. At 6.00m: firm.		
3.30	D 5200									
3.60	U 5201									
4.05	4.05 D 5202	SPT N = 33(450mm) 5 5/6 8 8 11								
4.50	D 5203									
4.80	U 5204					(4.40)				
5.25	5.25 D 5205	SPT N = 32(450mm) 5 5/8 8 7 9								
5.70	D 5206									
6.00	U 5207									
6.45	6.45 D 5208	SPT N = 24(450mm) 4 4/5 5 7 7								
6.90	D 5209									
7.20	B 419					80.41	7.20	Medium dense orange-brown fine sandy SILT.		
7.80	U 588 U 5210						(1.70)			
8.25	8.25 D 5211	SPT N = 22(450mm) 3 4/5 5 6 6								
8.70	D 5212									
9.00	9.00 B 420	SPT N = 18(450mm) 4 5/4 4 5 5				78.71	8.90	medium dense brown fine and medium silty SAND.		
9.60	SPT	N = 20(450mm) 4 4/5 5 5 5								

Water Strikes					Method, Equipment and Remarks	
Strike Depth	Casing Depth	Post Mins	Post Depth	Flow Remarks	Method: CP	

AGS3_NEW_GLB | SW BH LOG (CP/RC) | K:\47060785 - SEMMS\050 PROJECT INFORMATION\GINT\47060785-SEMMS.GPJ | AGS3_NEW_GDT | 23/11/2011 | 10:48:43



BOREHOLE LOG

Project: SEMMS		Job No: 37732ISG		Borehole No.	
Date: 14-04-1992/14-04-1992		Co-ordinates: E 390502.9 N 384216.4		EA POYNTON 82_4	
Contractor: GEOTECHNICAL ENGINEERING LIMITED			Engineer: Faber Maunsell Ltd		Sheet: 2 of 3

Samples & Tests				Strata				Backfill/ Instrument
Depth	Type No	Test Results	TCR SCR RGD If (mm)	Water/ (Flush Return)	O.D. Level	Depth (Thickness)	Description	
10.05 10.20	D 5213 SPT	N = 22(450mm) 4 5/5 5 6 6					medium dense brown fine and medium silty SAND. <i>(continued)</i>	
10.65 10.80	D 5214 SPT	N = 24(450mm) 4 5/6 6 6 6				(4.20)		
11.25 11.40	D 5215 SPT	N = 24(450mm) 5 5/6 6 6 6						
11.85 12.00	D 5216 SPT	N = 27(450mm) 5 6/7 7 6 7						
12.45 12.60	D 5217 SPT	N = 27(450mm) 5 6/6 7 7 7						
13.05 13.20	D 5218 SPT	N = 20(450mm) 3 3/4 4 5 7			74.51	13.10	medium dense red-brown fine, medium and coarse silty SAND.	
13.80 13.80	B 421 SPT	N = 31(450mm) 5 6/6 8 8 9				(1.90)		
14.25 14.40	D 5219 SPT	N = 36(450mm) 6 7/8 8 9 11						
14.85 15.00	D 5220 W 522 SPT	N = 50(200mm) 18 30/50 0 0 0			72.61	15.00	Red-brown moderately to highly weathered fine and medium grained SANDSTONE, weak. Recovered as angular gravel.	
15.60	SPT	N = 0(600mm) 29 50/0 0 0 0						
16.20	SPT	N = 0(600mm) 38 50/0 0 0 0				(3.00)		
16.80	C	N = 50(200mm) 26 34/50 0 0 0						
17.20	C	N = 0(600mm) 41 50/0 0 0 0						
17.80	C	N = 50(200mm) 33 40/50 0 0 0			69.61	18.00	Red-brown highly weathered medium and coarse SANDSTONE. Weak and very weak. Poorly cemented, rare subrounded pebble inclusions, very closely spaced subhorizontal discontinuities.	
						(3.00)		

AGS3_NEW GLEB | SW BH LOG (CP/RC) | K:\47060785 - SEMMS\050 PROJECT INFORMATION\GINT\47060785-SEMMS.GPJ | AGS3_NEW GDT | 23/11/2011 | 10:48:44

Water Strikes					Method, Equipment and Remarks	
Strike Depth	Casing Depth	Post Mins	Post Depth	Flow Remarks	Method: CP	
13.20		20	13.20	Seepage		

BOREHOLE LOG

Project: SEMMS		Job No: 37732ISG		Borehole No.	
Date: 14-04-1992/14-04-1992		Co-ordinates: E 390502.9 N 384216.4		EA POYNTON 82_4	
Contractor: GEOTECHNICAL ENGINEERING LIMITED			Engineer: Faber Maunsell Ltd		Sheet: 3 of 3

Samples & Tests					Strata				Backfill/ Instrument	
Depth	Type No	Test Results	TCR SCR RQD	If (mm)	Water/ (Flush Return)	O.D. Level	Depth (Thickness)	Description		Legend
						66.61	21.00	Red-brown highly weathered medium and coarse SANDSTONE. Weak and very weak. Poorly cemented, rare subrounded pebble inclusions, very closely spaced subhorizontal discontinuities. <i>(continued)</i>	
								End of Borehole		

AGS3_NEW_ELB | SW BH LOG (CP/RC) | K:\47060785 - SEMMS\050 PROJECT INFORMATION\GINT\47060785-SEMMS.GPJ | AGS3_NEW_GDT | 23/11/2011 | 10:48:44

Water Strikes					Method, Equipment and Remarks
Strike Depth	Casing Depth	Post Mins	Post Depth	Flow Remarks	Method: CP

BOREHOLE LOG

Project: SEMMS		Job No: 37732ISG		Borehole No.	
Date: 31-03-1992/31-03-1992		Co-ordinates: E 390470.2 N 384234.3		EA POYNTON 82_5	
Contractor: GEOTECHNICAL ENGINEERING LIMITED			Engineer: Faber Maunsell Ltd		Sheet: 1 of 2

Samples & Tests					Strata				Backfill/ Instrument	
Depth	Type No	Test Results	TCR SCR RGD	If (mm)	Water/ (Flush Return)	O.D. Level	Depth (Thickness)	Description		Legend
						88.21	0.40	TOPSOIL		
0.50	0.50	D 5222 SPT N = 13(450mm) 1 2/2 3 4 4						Firm orange fissured silty sandy CLAY with occasional subrounded fine and medium gravel. At 1.70m: laminated with bands of sand, some coal fragments. At 4.10m: interbedded firm silty sandy clay with fine and medium sand.		
0.95		D 5223								
1.20		U 5224								
1.70	1.70	D 5223 SPT N = 12(450mm) 1 2/2 3 4 3								
2.15		D 5226								
2.40		U 501 U 5227					(4.40)			
2.90	2.90	D 5228 SPT N = 15(450mm) 1 2/3 3 4 5								
3.35		D 5229								
3.60		U 677 U 5230								
4.10	4.10	D 5231 SPT N = 17(450mm) 1 2/3 4 5 5								
4.55		D 5232								
4.80	4.80	B 422 SPT U 589 N = 19(450mm) 1 2/4 5 5 5				88.81	4.80	Medium dense orange-brown fine and medium silty SAND with bands of firm brown sandy clay. At .5.90m: band of orange-brown laminated very silty clay. Below 8.40m: brown.		
5.25		D 5233								
5.90	6.00	D 5234 SPT N = 27(450mm) 3 3/6 6 7 8								
6.45		D 5235								
6.60	6.60	B 423 SPT N = 27(450mm) 2 3/6 6 7 8								
7.20	7.20	D 5236 SPT N = 28(450mm) 2 3/5 7 8 8								
7.80		SPT N = 24(450mm) 1 2/4 6 6 8					(6.00)			
8.25		D 5237								
8.40	8.40	B 424 SPT U 590 N = 25(450mm) 2 2/4 6 8 7								
9.00	9.00	D 5238 SPT N = 29(450mm) 2 4/5 7 8 9								
9.60	9.60	D 5239 SPT N = 28(450mm) 3 4/5 6 8 9								

Water Strikes					Method, Equipment and Remarks	
Strike Depth	Casing Depth	Post Mins	Post Depth	Flow Remarks	Method: CP	
2.90		20	2.75			

AGS3_NEW GLEB | SW BH LOG (CP/RC) | K:\47060785 - SEMMS\05.0 PROJECT INFORMATION\GINT\47060785-SEMMS.GPJ | AGS3_NEW GDT | 23/11/2011 | 10:48:46

BOREHOLE LOG

Project: SEMMS		Job No: 37732ISG		Borehole No.
Date: 31-03-1992/31-03-1992		Co-ordinates: E 390470.2 N 384234.3		EA POYNTON 82_5
Contractor: GEOTECHNICAL ENGINEERING LIMITED			Engineer: Faber Maunsell Ltd	
				Sheet: 2 of 2

Samples & Tests					Strata				Backfill/ Instrument	
Depth	Type No	Test Results	TCR SCR RGD	If (mm)	Water/ (Flush Return)	O.D. Level	Depth (Thickness)	Description		Legend
10.20	SPT	N = 13(450mm) 1 1/1 3 3 6						Medium dense orange-brown fine and medium silty SAND with bands of firm brown sandy clay. At .5.90m: band of orange-brown laminated very silty clay. Below 8.40m: brown. (continued)		
10.80	D 5240SPT	N = 15(450mm) 1 2/3 3 4 5				77.81	10.80	medium dense brown sandy SILT. Below 12.00m: slightly clayey.		
11.20	B 425									
11.40	D 5241SPT	N = 15(450mm) 1 1/2 3 5 5					(1.80)			
12.00	D 5242SPT	N = 16(450mm) 1 2/3 3 4 6								
12.60	D 5243SPT	N = 31(450mm) 3 6/8 7 8 8				76.01	12.60	Stiff brown silty sandy CLAY with a little subangular fine and medium gravel.		
13.20	D 5244SPT	N = 39(450mm) 3 5/9 9 11 10					(1.90)			
13.80	U 502 U 5245									
14.30	D 5246									
14.50	D 5247SPT	N = 39(450mm) 3 5/7 9 11 12				74.11	14.50	Firm red-brown very sandy CLAY.		
15.10	W 5248 C	N = 50(160mm) 12 28/50 0 0 0				73.51	15.10	Red-brown completely weathered medium and coarse grained SANDSTONE.		
16.00	C	N = 0(600mm) 44 50/0 0 0 0				72.51	16.10	End of Borehole		

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Water Strikes					Method, Equipment and Remarks	
Strike Depth	Casing Depth	Post Mins	Post Depth	Flow Remarks	Method: CP	

BOREHOLE LOG

Project: SEMMS		Job No: 37732ISG		Borehole No.	
Date: 26-03-1992/26-03-1992		Co-ordinates: E 390541.2 N 384272.3		EA POYNTON 83_1	
Contractor: GEOTECHNICAL ENGINEERING LIMITED			Engineer: Faber Maunsell Ltd		Sheet: 1 of 2

Samples & Tests					Strata				Backfill/Instrument	
Depth	Type No	Test Results	TCR SCR RGD	If (mm)	Water/ (Flush Return)	O.D. Level	Depth (Thickness)	Description		Legend
						84.97	0.25	TOPSOIL: (turfed)		
0.50	0.50	D 5249SPT						Firm orange-grey very sandy CLAY with pockets of coarse sand. Soft in places.		
							(1.45)			
0.95		D 5250								
1.20		U 5251								
1.70	1.70	D 5252SPT				83.52	1.70	Firm brown fissured sandy CLAY with some subangular and subrounded fine and medium gravel, occasional sand pockets, gleying on some fissured surfaces. Below 2.40m: firm to stiff very sandy. At 5.30m: with pockets of sand.		
2.15		D 5253								
2.40		U 5254								
2.90	2.90	D 5255SPT								
3.35		D 5256								
3.60		U 5257								
4.10	4.10	D 5258SPT					(4.80)			
4.55		D 5259								
4.80		U 5260								
5.30	5.30	D 5261SPT								
5.75		D 5262								
6.00		U 5263								
6.50	6.50	D 5264SPT				78.72	6.50	Stiff red-brown very sandy CLAY with much subangular and subrounded fine and medium gravel.		
6.95		D 5265								
7.20		U 5266								
7.70	7.70	D 5267SPT								
8.15		D 5268								
8.50		U 5269					(4.40)			
9.00	9.00	D 5270SPT								
9.45		D 5271								
9.70		U 5272								

Water Strikes					Method, Equipment and Remarks	
Strike Depth	Casing Depth	Post Mins	Post Depth	Flow Remarks	Method: CP	
5.30		20	5.25			

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BOREHOLE LOG

Project: SEMMS		Job No: 37732ISG		Borehole No.	
Date: 26-03-1992/26-03-1992		Co-ordinates: E 390541.2 N 384272.3		EA POYNTON 83_1	
Contractor: GEOTECHNICAL ENGINEERING LIMITED			Engineer: Faber Maunsell Ltd		Sheet: 2 of 2

Samples & Tests					Strata				Backfill/ Instrument	
Depth	Type No	Test Results	TCR SCR RGD	If (mm)	Water/ (Flush Return)	O.D. Level	Depth (Thickness)	Description		Legend
10.20	10.20	D 5273SPT						Stiff red-brown very sandy CLAY with much subangular and subrounded fine and medium gravel. <i>(continued)</i>		
10.65		D 5274				74.32	10.90	Red-brown completely weathered medium coarse grained SANDSTONE, recovered as sand and fragments of weakly cemented sandstone.		
10.90		SPT								
11.60		SPT					(2.30)			
12.20		C								
13.20		C				72.02	13.20	End of Borehole		

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Water Strikes					Method, Equipment and Remarks
Strike Depth	Casing Depth	Post Mins	Post Depth	Flow Remarks	Method: CP