Tables

Table 1: Evaluation of Potential Contaminant Linkages – Bicester Station

Potential Contaminant	Receptors	Pathways	Phase When Pathway Is Relevant	Evaluation	Plausible Contaminant Linkage?
All contaminants	• Secondary A aquifer (Cornbrash)	Leaching from sorbed phase and dissolution from NAPL.	Construction Post-construction	No evidence of NAPL in logs. Site Investigation to be undertaken and analytical results assessed in relation to potential contamination. Mobilisation of contaminants in groundwater derived from off-site sources possible during and post-construction. Enhanced vertical migration considered unlikely post-construction given the lack of a laterally continuous shallow groundwater. CoCP states that materials re-use criteria will ensure post-construction suitability for use (Section 8).	No
	• Langford Brook	Deposition of air-borne soil particles.	Construction Post-construction	CoCP states that precautions will be taken to prevent air-borne dusts from entering any bodies of water during construction (Section 7). CoCP states that materials re-use criteria will ensure post-construction suitability for use (Section 8).	No

Potential Contaminant	Receptors	Pathways	Phase When Pathway Is Relevant	Evaluation	Plausible Contaminant Linkage?
		Deposition of water-borne soil particles.	Construction Post-construction	CoCP states that precautions will be taken to prevent water-borne dusts from entering any bodies of water during construction (Section 7). CoCP states that materials re-use criteria will ensure post-construction suitability for use (Section 8). Groundwater unlikely to be encountered but could potentially flow towards the water bodies.	No
		Lateral migration in groundwater or NAPL.	Construction Post-construction	No evidence of NAPL in logs. Contaminants derived from site not considered to be significant based on evidence from logs. CoCP states that materials re-use criteria will ensure post-construction suitability for use (Section 8). Mobilisation of contaminants in groundwater derived from off-site sources possible during and post-construction, but groundwater unlikely to be encountered.	No
	• Local employees • Local residents	Dermal contact and ingestion of soil particles (on-site)	Construction Post-construction	CoCP states that work sites will be secured to prevent unauthorised access during construction (Section 4). CoCP states that materials re-use criteria will ensure post-construction suitability for use (Section 8). No visual or olfactory indication of significant on-site impact from available geological logs.	No

Potential Contaminant	Receptors	Pathways	Phase When Pathway Is Relevant	Evaluation	Plausible Contaminant Linkage?
		Dermal contact, ingestion and inhalation of soil particles (off-site)	Construction Post-construction	Dust suppression and prevention measures during construction are included in the CoCP (Sections 4 and 7). CoCP states that materials re-use criteria will ensure post-construction suitability for use (Section 8). No visual or olfactory indication of significant on-site impact from available geological logs.	No
Volatile compounds	• Local employees • Local residents	Vapour inhalation	Construction Post-construction	No odours recorded. CoCP states requirement for suitable monitoring and mitigation during construction where the potential for VOC emissions exists. CoCP states that materials re-use criteria will ensure post-construction suitability for use (Section 8).	No

CoCP – Code Of Construction Practice

Table 1: Evaluation of Potential Contaminant Linkages – Bicester Station

Potential Contaminant	Receptors	Pathways	Phase When Pathway Is Relevant	Evaluation	Plausible Contaminant Linkage?
All contaminants	• Secondary A aquifer (River Terrace Gravels)	Leaching from sorbed phase and dissolution from NAPL.	Construction Post-construction	No evidence of NAPL in logs. Mobilisation of contaminants in groundwater derived from off-site sources possible during and post-construction. Enhanced vertical migration considered unlikely post-construction given the lack of a laterally continuous shallow groundwater. CoCP states that materials re-use criteria will ensure post-construction suitability for use (Section 8).	No
	• Bletchingdon Brook and River Ray	Deposition of air-borne soil particles.	Construction Post-construction	CoCP states that precautions will be taken to prevent air-borne dusts from entering any bodies of water during construction (Section 7). CoCP states that materials re-use criteria will ensure post-construction suitability for use (Section 8).	No

Potential Contaminant	Receptors	Pathways	Phase When Pathway Is Relevant	Evaluation	Plausible Contaminant Linkage?
		Deposition of water-borne soil particles.	Construction Post-construction	CoCP states that precautions will be taken to prevent water-borne dusts from entering any bodies of water during construction (Section 7). CoCP states that materials re-use criteria will ensure post-construction suitability for use (Section 8). Groundwater unlikely to be encountered but could potentially flow towards the water bodies.	No
		Lateral migration in groundwater or NAPL.	Construction Post-construction	No evidence of NAPL in logs. Contaminants derived from site not considered to be significant based on evidence from logs. CoCP states that materials re-use criteria will ensure post-construction suitability for use (Section 8). Mobilisation of contaminants in groundwater derived from off-site sources possible during and post-construction, but groundwater unlikely to be encountered.	No
	• Local employees • Local residents • Onsite Users	Dermal contact and ingestion of soil particles (on-site)	Construction Post-construction	CoCP states that work sites will be secured to prevent unauthorised access during construction (Section 4). CoCP states that materials re-use criteria will ensure post-construction suitability for use (Section 8). No visual or olfactory indication of significant on-site impact from available geological logs.	No

Potential Contaminant	Receptors	Pathways	Phase When Pathway Is Relevant	Evaluation	Plausible Contaminant Linkage?
		Dermal contact, ingestion and inhalation of soil particles (off-site)	Construction Post-construction	Dust suppression and prevention measures during construction are included in the CoCP (Sections 4 and 7). CoCP states that materials re-use criteria will ensure post-construction suitability for use (Section 8). No visual or olfactory indication of significant on-site impact from available geological logs.	No
Volatile compounds	• Local employees • Local residents • Onsite Users	Vapour inhalation	Construction Post-construction	No odours recorded. Detections of soil gas. No known voids or confined space where gas could accumulate. CoCP states requirement for suitable monitoring and mitigation during construction where the potential for VOC emissions exists. CoCP states that materials re-use criteria will ensure post-construction suitability for use (Section 8).	No

CoCP – Code Of Construction Practice

Table XX: Evaluation of Potential Contaminant Linkages – Water Eaton Station

Potential Contaminant	Receptors	Pathways	Phase When Pathway Is Relevant	Evaluation	Plausible Contaminant Linkage?
All contaminants	• Secondary A aquifer (Cornbrash)	Leaching from sorbed phase and dissolution from NAPL.	Construction Post-construction	No evidence of NAPL in logs. Site Investigation undertaken and analytical results assessed in relation to potential contamination. No significant sources of contamination noted. Mobilisation of contaminants in groundwater derived from off-site sources considered unlikely due to low permeability underlying strata. Enhanced vertical migration considered unlikely post-construction given the lack of a laterally continuous shallow groundwater and predominantly hard standing post construction. CoCP states that materials re-use criteria will ensure post-construction suitability for use (Section 8).	No
	• Surface water ponds	Deposition of air-borne soil particles.	Construction Post-construction	No continuous groundwater noted in the available borehole logs. CoCP states that precautions will be taken to prevent air-borne dusts from entering any bodies of water during construction (Section 7). CoCP states that materials re-use criteria will ensure post-construction suitability for use (Section 8).	No

Potential Contaminant	Receptors	Pathways	Phase When Pathway Is Relevant	Evaluation	Plausible Contaminant Linkage?
		Deposition of water-borne soil particles.	Construction Post-construction	CoCP states that precautions will be taken to prevent water-borne dusts from entering any bodies of water during construction (Section 7). CoCP states that materials re-use criteria will ensure post-construction suitability for use (Section 8). A continuous body of Groundwater is considered unlikely to be encountered therefore the risk of lateral migration is considered negligible.	No
		Lateral migration in groundwater or NAPL.	Construction Post-construction	No evidence of NAPL in logs. Contaminants derived from site not considered to be significant based on evidence from logs. CoCP states that materials re-use criteria will ensure post-construction suitability for use (Section 8). A continuous body of Groundwater is considered unlikely to be encountered therefore the risk of lateral migration is considered negligible	No

Potential Contaminant	Receptors	Pathways	Phase When Pathway Is Relevant	Evaluation	Plausible Contaminant Linkage?
	• Local employees • Local residents	Dermal contact and ingestion of soil particles (on-site)	Construction Post-construction	CoCP states that work sites will be secured to prevent unauthorised access during construction (Section 4). CoCP states that materials re-use criteria will ensure post-construction suitability for use (Section 8). No visual or olfactory indication of significant on-site impact from available geological logs and analytical results.	No
		Dermal contact, ingestion and inhalation of soil particles (off-site)	Construction Post-construction	Dust suppression and prevention measures during construction are included in the CoCP (Sections 4 and 7). CoCP states that materials re-use criteria will ensure post-construction suitability for use (Section 8). No visual or olfactory indication of significant on-site impact from available geological logs.	No
Volatile compounds	• Local employees • Local residents • Future Site users	Vapour inhalation	Construction Post-construction	No significant odours recorded. CoCP states requirement for suitable monitoring and mitigation during construction where the potential for VOC emissions exists. CoCP states that materials re-use criteria will ensure post-construction suitability for use (Section 8).	No

CoCP – Code Of Construction Practice

Annex A

Logs

Annex A1

Bicester

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WINDOWLESS SAMPLER LOG

Project	Site	Consultant	EXPLORATORY HOLE No
East West Rail		Atkins	LRX WS01 - Wk45
Job No: J11631	Date: 07-02-13 07-02-13	Ground Level (m)	Co-Ordinates ()
Contractor: Bridgeway Consulting			Sheet: 1 of 1

SAMPLES & TESTS				STRATA					
Depth	Type No	Test Result	Water	Reduced Level	Legend	Depth (Thickness)	DESCRIPTION	Field Test kPa HSV PP	Instrument/ Backfill
0.00-0.20	B					(0.45) 0.45	Grey CLEAN BALLAST of igneous rock.		
0.45-0.65	B					0.65	MADE GROUND: Yellowish brown sandy CLAY. Sand is fine to coarse.		
0.75-0.90	B					0.75 (0.45) 1.20	Yellowish brown COBBLES of sandstone. Dark brown sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is angular to subrounded fine to coarse sandstone.		
1.20-1.80	B							98	
1.20-1.65	S	N7				(0.60) 1.80	Firm high locally medium strength brown with pockets of greyish green sandy CLAY. Sand is fine to medium. Rare angular to subrounded fine mudstone and flint gravel. Slight organic odour. Some selenite crystals and rare black speckling.Pockets of greyish green more frequent with depth.	88	
1.80-2.00	D					2.00		61	
2.00-2.10	D					2.10			
2.00-2.45	S	N7					Firm yellowish brown sandy slightly gravelly CLAY. Sand is fine to medium. Gravel is angular to subangular fine to coarse sandstone and flint. Becoming more sandy and gravelly with depth.	59	
2.10-3.00	B							68	
3.00-3.45	S	N9				(1.57)	Loose yellowish brown slightly sandy GRAVEL. Sand is medium to coarse. Gravel is subangular to rounded fine to coarse flint and sandstone.	58	
3.60-3.67	S	N50/ 30 mm				3.67	Firm medium strength grey mottled brown with rare yellow pockets CLAY. Rare angular fine sandstone and mudstone gravel. Becoming dark green with depth.		

Progress and Water Observations

Date	Depth	Water Dpt	Dia. mm	% Rec
07-02-13	1.20	DRY	N/A	N/A
07-02-13	2.00	DAMP	87	100
08-02-13	3.00	DRY	77	80
08-02-13	3.60	DRY	67	80

GENERAL REMARKS

1. Position scanned with CAT & genny prior to excavation.
2. Inspection pit excavated to 1.20mbgl prior to drilling.
3. Hole Drilled at London Road level crossing.

All dimensions in metres Scale 1:50	Client: Chiltern Railways Ltd	Method/ Plant Used: Dart Competitor Rig	Logged By: ZS

GINT STD AGS 3_1 LAB.GLB BCL WS FIELD TEST K:\SITE INVESTIGATION\GINT PROJECTS\CURRENT PROJECTS\J11631 - EAST WEST RAIL.GPJ GINT STD AGS 3_1 LAB.GDT 22/07/2013 10:16:03

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WINDOWLESS SAMPLER LOG

Project	Site	Consultant	EXPLORATORY HOLE No
East West Rail		Atkins	**BT WS01 - Wk 9**

Job No	Date	Ground Level (m)	Co-Ordinates ()	Sheet
J11631	30-05-13 30-05-13			1 of 1

Contractor: Bridgeway Consulting

SAMPLES & TESTS				STRATA					
Depth	Type No	Test Result	Water	Reduced Level	Legend	Depth (Thickness)	DESCRIPTION	Field Test kPa HSV PP	Instrument/ Backfill
						0.20	MADE GROUND: Black gravelly clayey SAND. Sand is fine to coarse. Gravel is angular to subangular fine to coarse ballast. Rare metal wire. Rare rootlets.		
0.20	B								
0.20	D								
0.20	ES						Very soft grey mottled black/brown CLAY.		
0.60	B					(1.00)			
0.60	D								
0.60	ES					1.20			
1.20-1.60	D						Black slightly gravelly clayey SAND. Sand is fine to coarse. Gravel is subangular to subrounded fine to medium flint.		
1.20-1.65	S	N4				(0.40)			
						1.60			
1.65-1.80	B						Soft low sterngth greyish blue sandy CLAY. Sand is fine to coarse.	25	
1.80-2.00	D					(0.60)		25	
2.00-2.45	S	N4				2.20			
2.25-2.80	B						Soft low strength light brown slightly sandy CLAY. Sand is fine to coarse.	25	
						(0.80)		38	
2.80-2.90	D					3.00		38	
3.00-3.35	S	N7					Firm medium strength brownish blue slightly sandy CLAY. Sand is fine to coarse.		
3.05-3.80	B					(0.80)		58	
						3.80		50	
								63	
3.80-4.00	D						Firm medium strength dark brown very sandy CLAY. Sand is medium to coasre.	75	
4.00-4.45	S	N8				(0.50)		75	
						4.30		58	
4.40-4.50	D						Firm medium strength yellowish brown slightly sandy CLAY. Sand is fine to coarse.	67	
4.50-4.85	B					(0.55)			
						4.85	Becoming very sandy from 4.8m.		
4.85-4.90	D					4.90	Strong grey LIMESTONE.		

Progress and Water Observations

Date	Depth	Water Dpt	Dia. mm	% Rec
30-05-13	1.20	DRY	N/A	N/A
30-05-13	2.00	DRY	87	80
30-05-13	3.00	DRY	87	100
30-05-13	4.00	DRY	77	100
30-05-13	4.90	DRY	67	90

GENERAL REMARKS

1. Position scanned with CAT & genny prior to excavation.
2. Inspection pit excavated to 1.20mbgl prior to drilling.
3. Hole Drilled at 19m 40ch West.

All dimensions in metres Scale 1:50	Client Chiltern Railways Ltd	Method/ Plant Used Premier Rig	Logged By AH

GINT STD AGS 3_1 LAB.GLB BCL WS FIELD TEST K:\SITE INVESTIGATION\GINT PROJECTS\CURRENT PROJECTS\J11631 - EAST WEST RAIL.GPJ GINT STD AGS 3_1 LAB.GDT 28/06/2013 14:40:42

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WINDOWLESS SAMPLER LOG

Project	Site	Consultant	EXPLORATORY HOLE No
East West Rail		Atkins	BT WS02 - Wk 9
Job No: J11631	Date: 30-05-13 30-05-13	Ground Level (m)	Co-Ordinates ()
Contractor: Bridgeway Consulting			Sheet: 1 of 1

SAMPLES & TESTS				STRATA					
Depth	Type No	Test Result	Water	Reduced Level	Legend	Depth (Thickness)	DESCRIPTION	Field Test kPa HSV PP	Instrument/ Backfill
0.00-0.45	B					(0.45)	MADE GROUND: Dark brown slightly gravelly sandy CLAY. Sand is fine to coarse. Gravel is angular to subangular fine to coarse sandstone and ballast.		
0.30	D					0.45			
0.30	ES						Light brown mottled grey slightly gravelly sandy CLAY. Sand is fine to coarse. Gravel is subangular to subrounded fine to medium sandstone. Occasional rootlets.		
0.45-1.20	B					(0.75)			
0.70	D								
0.70	ES					1.20			
1.20		N4					Soft low strength brownish green slightly gravelly sandy CLAY. Sand is fine to coarse. Gravel is subangular to subrounded fin eo to coarse limestone.		
1.60-1.70	D							38	
1.70-2.00	B					(1.50)		38	
2.00-2.45	S	N4							
2.05-2.50	B							25	
2.50-2.70	D					2.70		38	
2.75-3.00	B					3.00	Firm low and medium strength dark brown very sandy CLAY. Sand is fine to coarse.	75	
3.00	D		1				Soft low strength dark brown becoming yellowish brown very sandy CLAY. Sand is fine to coarse.		
3.00-3.45	S	N6				(1.00)		25	
3.60-3.70	D							25	
						4.00		25	
4.00-4.45	S	N8					Loose yellowish brown slightly gravelly clayey SAND. Sand is fine to coarse. Gravel is subangular to subrounded fine to medium quartzite, limestone and flint.		
						(0.78)			
						4.78			
4.80-5.00	D						Soft low strength dark grey CLAY.	25	
5.00-5.45	S	N8				(0.82)		38	
						5.60			
5.60-5.70	D					5.70	Strong grey LIMESTONE.		

Progress and Water Observations

Date	Depth	Water Dpt	Dia. mm	% Rec
30-05-13	1.20	DRY	N/A	N/A
30-05-13	2.00	DRY	87	25
30-05-13	3.00	DRY	87	80
30-05-13	4.00	3.2	77	60
30-05-13	5.00	3.2	77	60
30-05-13	5.70	3.2	67	10

GENERAL REMARKS

1. Position scanned with CAT & genny prior to excavation.
2. Inspection pit excavated to 1.20mbgl prior to drilling.
3. Hole Drilled at 19m 47ch West.

All dimensions in metres Scale 1:50	Client: Chiltern Railways Ltd	Method/ Plant Used: Premier Rig	Logged By: AH

GINT STD AGS 3_1 LAB.GLB BCL WS FIELD TEST K:\SITE INVESTIGATION\GINT PROJECTS\CURRENT PROJECTS\J11631 - EAST WEST RAIL.GPJ GINT STD AGS 3_1 LAB.GDT 28/06/2013 14:40:44

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WINDOWLESS SAMPLER LOG

Project	Site	Consultant	EXPLORATORY HOLE No
East West Rail		Atkins	**WS05B - Wk20**
Job No: J11631	Date: 16-08-12 16-08-12	Ground Level (m)	Co-Ordinates ()
Contractor: Bridgeway Consulting			Sheet: 1 of 1

SAMPLES & TESTS			STRATA						
Depth	Type No	Test Result	Water	Reduced Level	Legend	Depth (Thickness)	DESCRIPTION	Field Test kPa HSV PP	Instrument/ Backfill
0.30 0.30	B D					(0.80) 0.80	MADE GROUND: Dark brown gravelly fine to coarse SAND. Gravel is angular to rounded fine to coarse ballast, flint and quartzite. Some roots.		
0.95 0.95 1.20-2.00	B D L		1 1			(0.40) 1.20 1.30	MADE GROUND: Light brownish yellow slightly gravelly clayey SAND. Sand is fine to coarse. Gravel is angular to subrounded flint, sandstone and quartzite. Rare roots.		
							Orangey brown clayey SAND & GRAVEL. Sand is fine to coarse. Gravel is subangular fine to coarse sandstone.		
						(0.70) 2.00	Soft to firm medium strength dark brown CLAY.	69	

Progress and Water Observations

Date	Depth	Water Dpt	Dia. mm	% Rec
16-08-12	1.20	1.20	N/A	N/A
16-08-12	2.00		87	100%

GENERAL REMARKS

1. Position scanned with CAT & genny prior to excavation.
2. Inspection pit excavated to 1.20mbgl prior to drilling.
3. Hole Drilled at 20m 41ch East.

All dimensions in metres Scale 1:50	Client: Chiltern Railways Ltd	Method/ Plant Used: HHWS	Logged By: GD

GINT STD AGS 3_1 LAB.GLB BCL WS FIELD TEST K:\SITE INVESTIGATION\GINT PROJECTS\CURRENT PROJECTS\J11631 - EAST WEST RAIL.GPJ GINT STD AGS 3_1 LAB.GDT 28/06/2013 14:40:54

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WINDOWLESS SAMPLER LOG

Project	Site	Consultant	EXPLORATORY HOLE No
East West Rail		Atkins	**WS43B - Wk28**
Job No: J11631	Date: 11-10-12 11-10-12	Ground Level (m)	Co-Ordinates ()
Contractor: Bridgeway Consulting			Sheet: 1 of 1

SAMPLES & TESTS				STRATA					
Depth	Type No	Test Result	Water	Reduced Level	Legend	Depth (Thickness)	DESCRIPTION	Field Test kPa HSV PP	Instrument/ Backfill
0.10	D					0.20	TOPSOIL: Brown and dark grey slightly gravelly sandy SILT. Sand is fine to coarse. Gravel is angular to subangular fine to coarse limestone and flint. Some roots.		
0.50	D		1 2			(1.00)	Soft greenish grey mottled orangey brown CLAY.		
1.00	D					1.20			
1.20-1.40	B						Soft very low and low strength brown slightly sandy CLAY with rare subrounded fine mudstone gravel. Sand is fine to medium.	25	
1.40-1.90	B					(0.70)		17	
1.55-1.85	U					1.90		19	

Progress and Water Observations

Date	Depth	Water Dpt	Dia. mm	% Rec
11-10-12	0.60	0.6	N/A	N/A
11-10-12	1.20	0.9	N/A	N/A
11-10-12	1.90	0.9	87	50

GENERAL REMARKS

1. Position scanned with CAT & genny prior to excavation.
2. Inspection pit excavated to 1.20mbgl prior to drilling.
3. Hole drilled at 19m 33ch East.

All dimensions in metres Scale 1:50	Client: Chiltern Railways Ltd	Method/ Plant Used: HHWS	Logged By: NY

GINT STD AGS 3_1 LAB.GLB BCL WS FIELD TEST K:\SITE INVESTIGATION\GINT PROJECTS\CURRENT PROJECTS\J11631 - EAST WEST RAIL.GPJ GINT STD AGS 3_1 LAB.GDT 28/06/2013 14:40:59

21-Oct-03 10:35

P.01

SP 52.25

LONDON RD BICESTER

Owner	Licence No.	Nat. Grid Ref. 5864 2202	
Occupier	IGS Ref. No.	Status	
Ground Level m OD	ft. OD	Aquifer GREAT OOLITE	
Level of Well Top m OD	ft. OD		
Rest Water Level m bwt	ft. bwt	Summary of Geological Section	Thickness / Depth
(Date) m OD	ft. OD	Great Oolite Sands	
Construction Bore			

Depth bwt	Dia.	Linings (below well top) From	To	Dia.	Type
120'	6"				

Abstraction Rates — Type of Pump

gph — Chem./Bact. Anal. YES NO

gpd — Well Driller

If insufficient space has been allowed, continue in 'Notes' overleaf.

British Geological Survey

British Geological Survey

NGRC
BOREHOLE RECORDS
ADJUSTMENT FORM

QUARTER SHEET SP 52 SE .

BH REGISTRATION NUMBER 161 - 186 .

RECORDS ENTERED AND HELD BY WALLINGFORD

BH REGISTRATION NUMBER(S)

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WINDOWLESS SAMPLER LOG

Project	Site	Consultant	EXPLORATORY HOLE No
East West Rail		Atkins	**WS43AAA**
Job No: J11631	Date: 15-11-12 15-11-12	Ground Level (m)	Co-Ordinates ()
Contractor: Bridgeway Consulting			Sheet: 1 of 1

SAMPLES & TESTS			STRATA						
Depth	Type No	Test Result	Water	Reduced Level	Legend	Depth (Thickness)	DESCRIPTION	Field Test kPa HSV PP	Instrument/ Backfill
0.10-0.30	B					0.35	MADE GROUND: Silty gravelly sand with ash. (Driller's description)		
0.10	D								
0.10	ES					0.60	MADE GROUND: Orange sand. (Driller's description)		
0.40-0.60	B						Firm orangey brown mottled grey very low strength slightly sandy CLAY with some roots. Sand is fine to medium.		
0.45	D								
0.45	ES					(1.20)			
0.60-1.00	B								
0.90	D								
1.00	ES								
1.20-1.80	B					1.80		13	
2.00-3.00	B						Firm to stiff brown low strength mottled grey CLAY.		
						(1.20)		38	
						3.00			
3.00-4.70	B						Stiff dark grey and orangey brown high strength slightly gravelly CLAY. Gravel is subangular to subrounded fine to medium limestone with some shells.		
						(1.70)		113	
						4.70			

Progress and Water Observations

Date	Depth	Water Dpt	Dia. mm	% Rec
15-08-12	1.20	DRY	N/A	N/A
15-08-12	2.00	DRY	87	100
15-08-12	3.00	DRY	77	100
15-08-12	4.00	DRY	67	100

GENERAL REMARKS

1. Position scanned with CAT & genny prior to excavation.
2. Inspection pit excavated to 1.20mbgl prior to drilling.

All dimensions in metres Scale 1:50	Client Atkins	Method/ Plant Used Dart Competitor Rig	Logged By GD

GINT STD AGS 3_1 LAB.GLB BCL WS FIELD TEST K:\SITE INVESTIGATION\GINT PROJECTS\CURRENT PROJECTS\J11631 - EAST WEST RAIL.GPJ GINT STD AGS 3_1 LAB.GDT 23/11/2012 17:54:21

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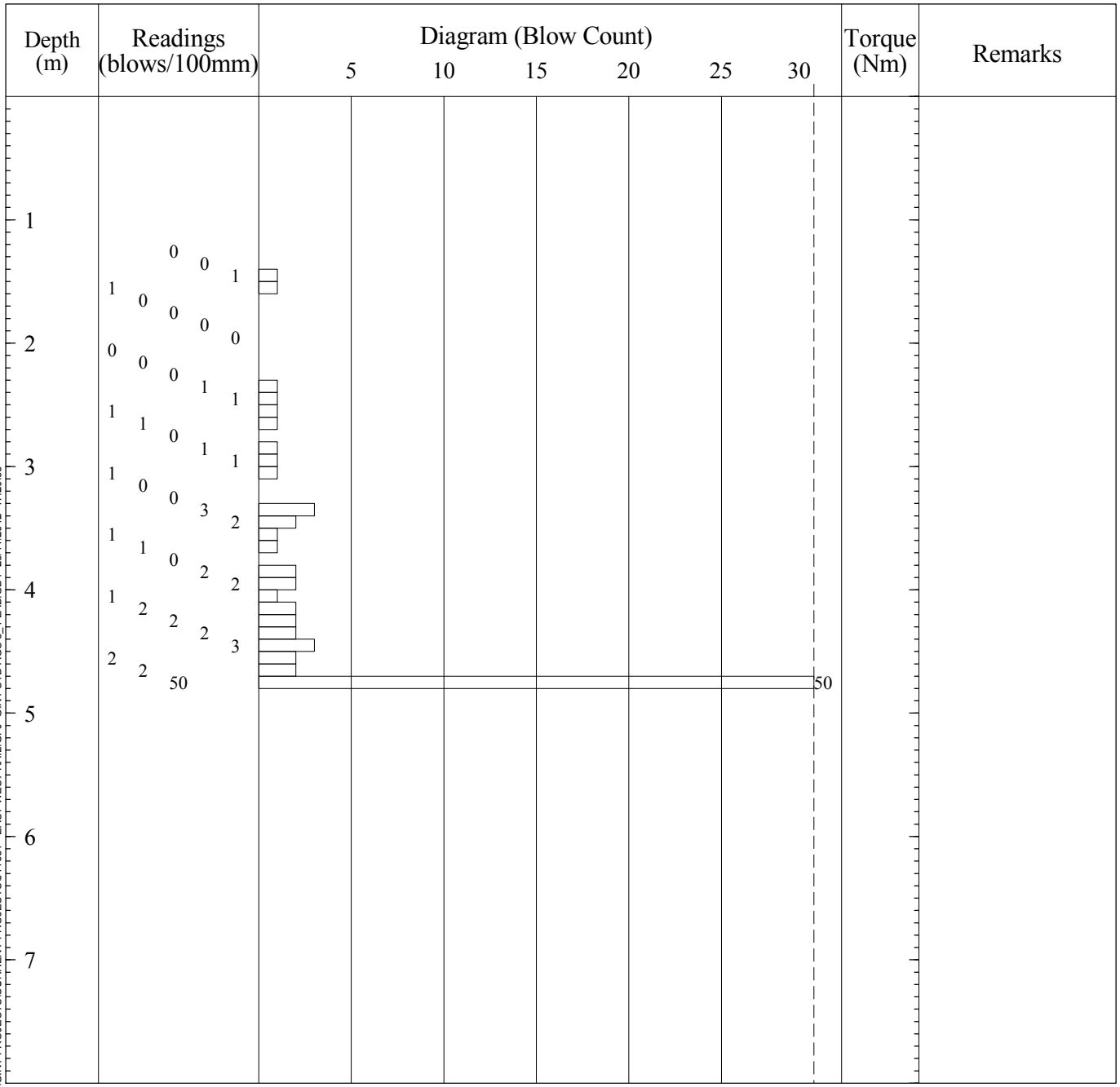
DYNAMIC PROBE LOG

Project	Site	Consultant	PROBE No
East West Rail		Atkins	**WS43AAA**
Job No: J11631 / Date: 15-11-12 15-11-12	Ground Level (m)	Co-Ordinates ()	
Contractor: Bridgeway Consulting			Sheet: 1 of 1



Hammer Wt (kg)	63
Hammer Drop (mm)	760
Cone Dia (mm)	50
Cone Type	Sacrificial
Damper	

GENERAL REMARKS

1. Position scanned with CAT & genny prior to excavation.
2. Inspection pit excavated to 1.20mbgl prior to drilling.

All dimensions in metres Scale 1:50	Client Atkins	Method/ Plant Used Dart Competitor Rig	Logged By GD

GINT STD AGS 3_1 LAB.GLB DCLP K:\SITE INVESTIGATION\GINT PROJECTS\CURRENT PROJECTS\J11631 - EAST WEST RAIL.GPJ GINT STD AGS 3_1 LAB.GDT 23/11/2012 17:20:53

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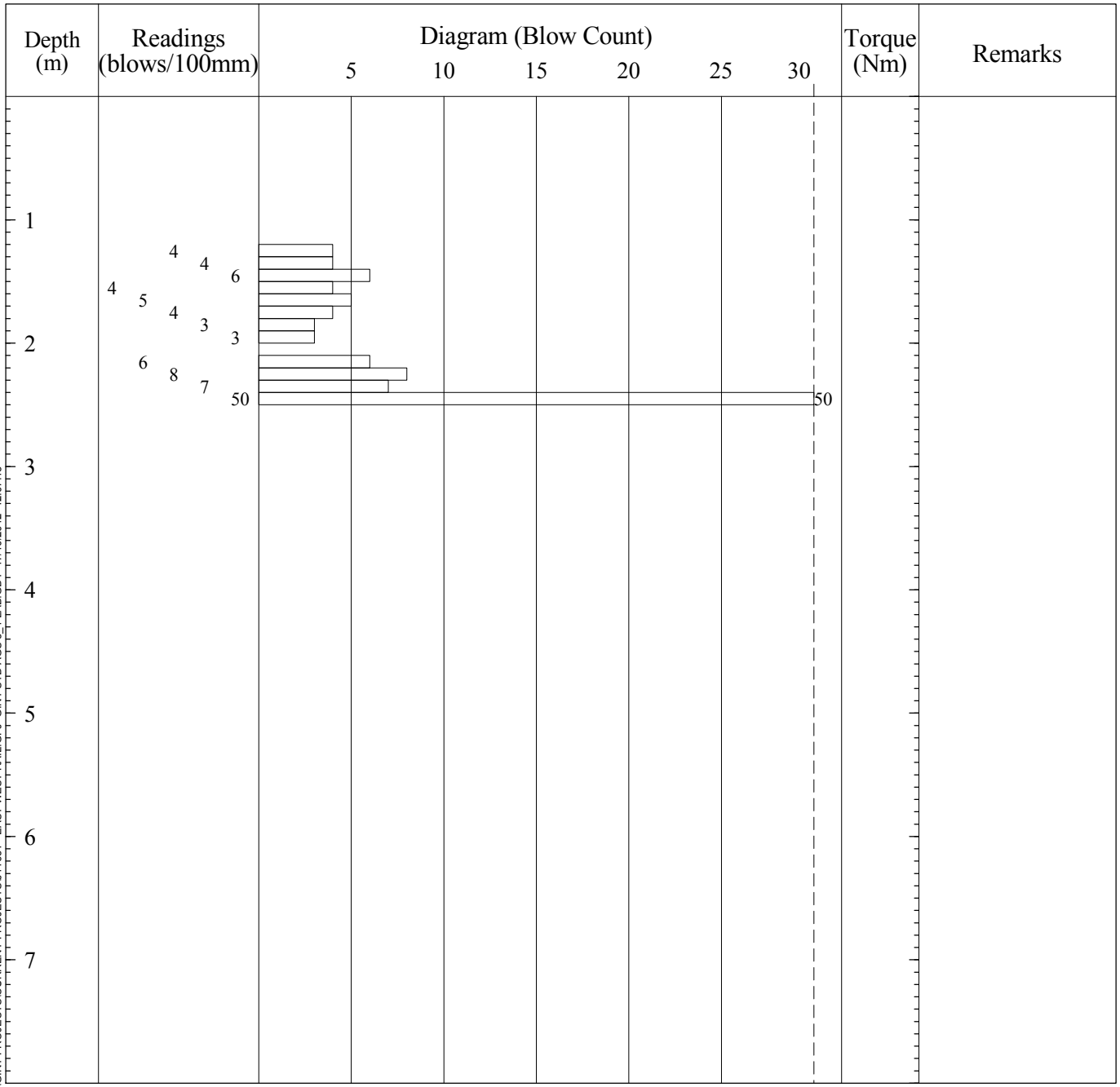
DYNAMIC PROBE LOG

Project	Site	Consultant	PROBE No
East West Rail		Atkins	**WS43B**
Job No: J11631	Date: 11-10-12 11-10-12	Ground Level (m)	Co-Ordinates ()
Contractor: Bridgeway Consulting			Sheet: 1 of 1



Hammer Wt (kg)	10
Hammer Drop (mm)	760
Cone Dia (mm)	35
Cone Type	Sacrificial
Damper	

GENERAL REMARKS

1. Position scanned with CAT & genny prior to excavation.
2. Inspection pit excavated to 1.20mbgl prior to drilling.

All dimensions in metres Scale 1:50	Client Atkins	Method/ Plant Used HHWS	Logged By NY

GINT STD AGS 3_1 LAB.GLB DCLP K:\SITE INVESTIGATION\GINT PROJECTS\CURRENT PROJECTS\J11631 - EAST WEST RAIL.GPJ GINT STD AGS 3_1 LAB.GDT 17/10/2012 12:07:15

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WINDOWLESS SAMPLER LOG

Project	Site	Consultant	EXPLORATORY HOLE No
East West Rail		Atkins	**WS43B**
Job No: J11631	Date: 11-10-12 11-10-12	Ground Level (m)	Co-Ordinates ()
Contractor: Bridgeway Consulting			Sheet: 1 of 1

SAMPLES & TESTS			STRATA						
Depth	Type No	Test Result	Water	Reduced Level	Legend	Depth (Thickness)	DESCRIPTION	Field Test kPa HSV PP	Instrument/ Backfill
0.10	D					0.20	TOPSOIL: Brown and dark grey slightly gravelly sandy silt with some rootlets. Gravel is angular to subangular fine to coarse chalk and flint.		
0.50	D		1 ▼ 2 ▼			(1.00)	Soft green grey low strength mottled orange brown CLAY.		
1.00	D					1.20			
1.20-1.40	B						Soft brown low to very low strength slightly sandy CLAY with rare subrounded fine mudstone gravel.	25	
1.40-1.90	B					(0.70)		17	
1.55-1.85	U					1.90		19	

Progress and Water Observations

Date	Depth	Water Dpt	Dia. mm	% Rec
11-10-12	0.60	0.6	N/A	N/A

GENERAL REMARKS

1. Position scanned with CAT & genny prior to excavation.
2. Inspection pit excavated to 1.20mbgl prior to drilling.

All dimensions in metres Scale 1:50	Client Atkins	Method/ Plant Used HHWS	Logged By NY

GINT STD AGS 3_1 LAB.GLB BCL WS FIELD TEST K:\SITE INVESTIGATION\GINT PROJECTS\CURRENT PROJECTS\J11631 - EAST WEST RAIL.GPJ GINT STD AGS 3_1 LAB.GDT 02/11/2012 17:15:02

Annex A2

Islip

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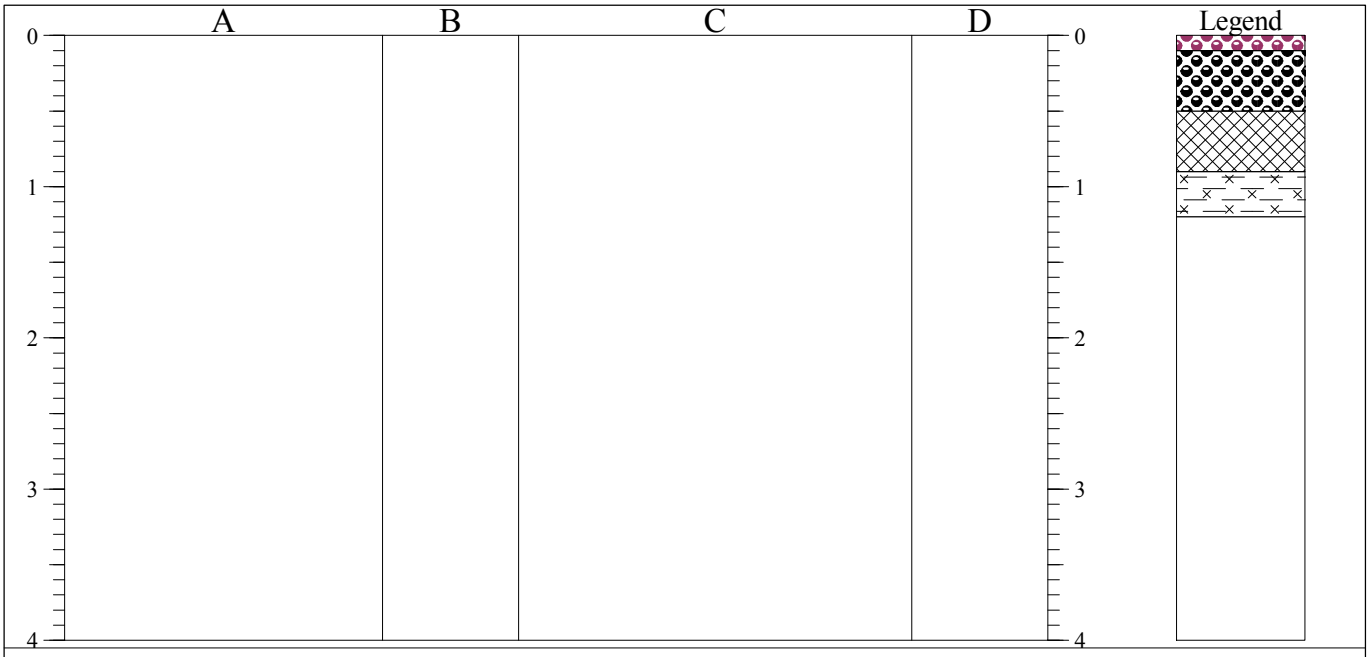
TRIAL PIT LOG

Project	Site	Consultant	TRIAL PIT No
East West Rail		Atkins	CPT17C
Job No: J11631	Date: 27-08-12 27-08-12	Ground Level (m)	Co-Ordinates ()
Contractor: Bridgeway Consulting			Sheet: 1 of 1

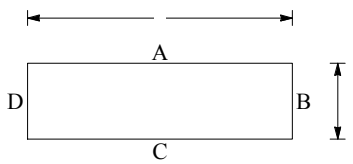


STRATA

SAMPLES & TESTS

Depth	No	DESCRIPTION	Depth	No	Remarks/Tests
0.00-0.10		Pink grey clean BALLAST of igneous rock			
0.10-0.50		Very dirty brown BALLAST with roots and rootlets. Fines are silty of ash sand and angular fine to coarse gravel of igneous rock.			
0.50-0.90		MADE GROUND: Light brown silty very sandy angular fine to medium gravel of limestone. Sand is fine to coarse. Angular cobbles below 0.80m. Diesel Odour.	0.50-0.70	B	
0.90-1.20		Soft grey mottled brown silty CLAY.	1.00	D	

Shoring/Support:
Stability:



GENERAL REMARKS

1. Position scanned with CAT & genny prior to excavation.
2. Inspection pit excavated to 1.20mbgl prior to drilling.
3. Hole Drilled at 25m 35ch Down.

All dimensions in metres Scale 1:50	Client Atkins	Method/ Plant Used Hand Tools	Logged By NY

GINT STD AGS 3_1 LAB.GLB AGS3 UK TP K:\SITE INVESTIGATION\GINT PROJECTS\CURRENT PROJECTS\J11631 - EAST WEST RAIL.GPJ GINT STD AGS 3_1 LAB.GDT 28/09/2012 16:38:43

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BOREHOLE LOG

Project	Site	Consultant	BOREHOLE No
East West Rail		Atkins	**BH 198 - Wk5**
Job No: J11631 / Date: 29-04-13, 30-04-13	Ground Level (m)	Co-Ordinates ()	
Contractor: Bridgeway Consulting			Sheet: 1 of 3

SAMPLES & TESTS			Water	STRATA				Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION	
						0.10	MADE GROUND: Black bituminous material.	
0.20	D					0.20	MADE GROUND: Greyish brown gravelly fine to coarse SAND. Gravel is angular to subangular fine to coarse brick and concrete.	
0.20	ES					(0.80)	MADE GROUND: Blackish brown gravelly slightly cobbly fine to coarse SAND of ash. Gravel is angular to subangular fine to coarse coal, slag and brick. Cobbles are limestone.	
						1.00		
1.00	D						MADE GROUND: Greyish brown mottled black sandy cobbly CLAY. Sand is fine to coarse. Cobbles are limestone. Rare rootlets and a strong organic odour.	
1.20	D							
1.40	S	N12				(0.90)		
						1.90		
1.90-2.40	B						Soft to firm brownish grey mottled orangey black CLAY with rootlets.	
2.40	D							
2.50-2.95	U100					(1.50)		
3.00	D							
						3.40		
3.40	D						Stiff to very stiff dark greyish green CLAY with fossil and shell fragments.	
3.50-3.95	S	N16						
4.00	D							
4.50-4.95	U100							
			▼1					
5.00	D							
5.50	S	N23						
6.00	D							
7.00-7.45	S	N24						

Boring Progress and Water Observations

Date	Time	Depth	Casing Depth	Casing Dia. mm	Water Dpt
29-04-13	00.00	1.20	N/A	N/A	N/A
29-04-13	00.01	3.50	3.50		DRY
29-04-13	00.02	5.50	5.50		5.0
29-04-13	00.03	7.00	7.00		2.6

Chiselling

From	To	Hours

Water Added

From	To

GENERAL REMARKS

1. Position scanned with CAT & genny prior to excavation.
2. Inspection pit excavated to 1.20mbgl prior to drilling.
3. Hole drilled at Islip Station.

All dimensions in metres Scale 1:50	Client: Chiltern Railways Ltd	Method/ Plant Used: Cable Percussion	Logged By: MR

GINT STD AGS 3_1 LAB.GLB BCL BH K:\SITE INVESTIGATION\GINT PROJECTS\CURRENT PROJECTS\J11631 - EAST WEST RAIL.GPJ GINT STD AGS 3_1 LAB.GDT 23/05/2013 09:45:07

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BOREHOLE LOG

Project	Site	Consultant	BOREHOLE No
East West Rail		Atkins	**BH 198 - Wk5**
Job No: J11631	Date: 29-04-13, 30-04-13	Ground Level (m)	Co-Ordinates ()
Contractor: Bridgeway Consulting			Sheet: 2 of 3

SAMPLES & TESTS			STRATA					
Depth	Type No	Test Result	Water	Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION	Instrument/ Backfill
8.00	D						Stiff to very stiff dark greyish green CLAY with fossil and shell fragments. *(continued)*	
8.50-8.95	U100							
9.00	D							
10.00-10.45	S	N25				(13.60)		
11.00	D							
11.50-11.95	U100							
12.00	D							
13.00-13.45	S	N40						
14.00	D							
14.50-14.95	U100							
15.00	D							

Boring Progress and Water Observations

Date	Time	Depth	Casing Depth	Casing Dia. mm	Water Dpt
30-04-13	00.00	10.00	7.00		2.6
30-04-13	00.01	13.00	7.00		DRY
30-04-13	00.02	16.00	7.00		DRY

Chiselling

From	To	Hours

Water Added

From	To

GENERAL REMARKS

1. Position scanned with CAT & genny prior to excavation.
2. Inspection pit excavated to 1.20mbgl prior to drilling.
3. Hole drilled at Islip Station.

All dimensions in metres Scale 1:50	Client: Chiltern Railways Ltd	Method/ Plant Used: Cable Percussion	Logged By: MR

GINT STD AGS 3_1 LAB.GLB BCL BH K:\SITE INVESTIGATION\GINT PROJECTS\CURRENT PROJECTS\J11631 - EAST WEST RAIL.GPJ GINT STD AGS 3_1 LAB.GDT 23/05/2013 09:45:08

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BOREHOLE LOG

Project	Site	Consultant	BOREHOLE No
East West Rail		Atkins	**BH 198 - Wk5**
Job No: J11631	Date: 29-04-13, 30-04-13	Ground Level (m)	Co-Ordinates ()
Contractor: Bridgeway Consulting			Sheet: 3 of 3

SAMPLES & TESTS			Water	STRATA				Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION	
16.00-16.45	S	N46				17.00	Stiff to very stiff dark greyish green CLAY with fossil and shell fragments. *(continued)*	
17.50-17.95	S	N47				(3.00)	Stiff to very stiff dark greyish green sandy CLAY with fossil and shell fragments. Sand is fine.	
19.50-19.95	S	N52				20.00		

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia. mm	Water Dpt	From	To	Hours	From	To	
30-04-13	00.03	17.50	7.00		DRY						1. Position scanned with CAT & genny prior to excavation. 2. Inspection pit excavated to 1.20mbgl prior to drilling. 3. Hole drilled at Islip Station.
30-04-13	00.04	20.00	7.00		DRY						

All dimensions in metres Scale 1:50	Client: Chiltern Railways Ltd	Method/ Plant Used: Cable Percussion	Logged By: MR

GINT STD AGS 3_1 LAB.GLB BCL BH K:\SITE INVESTIGATION\GINT PROJECTS\CURRENT PROJECTS\J11631 - EAST WEST RAIL.GPJ GINT STD AGS 3_1 LAB.GDT 23/05/2013 09:45:08

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BOREHOLE LOG

Project	Site	Consultant	BOREHOLE No
East West Rail		Atkins	**BH 199 - Wk5**
Job No: J11631	Date: 29-04-13, 19-04-13	Ground Level (m)	Co-Ordinates ()
Contractor: Bridgeway Consulting			Sheet: 1 of 1

SAMPLES & TESTS			Water	STRATA				Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION	
						(0.50) 0.50	MADE GROUND: Brown slightly sandy gravelly CLAY. Sand is fine to coarse. Gravel is angular to subangular fine to coarse flint and sandstone. some rootlets.	
0.50-1.00 0.50	B D					(2.02) 2.52	Orangey brown slightly sandy gravelly CLAY. Sand is fine to medium. Gravel is angular to subangular fine to coarse limestone. Some rootlets.	
1.00	D							
1.20-1.65	S	N10						
2.00-2.45	U100							
2.50-2.52	S	N50/ 5 mm						

Boring Progress and Water Observations

Date	Time	Depth	Casing Depth	Casing Dia. mm	Water Dpt
29-04-13	00.00	1.20	N/A	N/A	DRY
29-04-13	00.01	2.50	1.50		DRY

Chiselling

From	To	Hours

Water Added

From	To

GENERAL REMARKS

1. Position scanned with CAT & genny prior to excavation.
2. Inspection pit excavated to 1.20mbgl prior to drilling.
3. Hole drilled at Islip Station.

All dimensions in metres Scale 1:50	Client: Chiltern Railways Ltd	Method/ Plant Used: Cable Percussion	Logged By: MR

GINT STD AGS 3_1 LAB.GLB BCL BH K:\SITE INVESTIGATION\GINT PROJECTS\CURRENT PROJECTS\J11631 - EAST WEST RAIL.GPJ GINT STD AGS 3_1 LAB.GDT 23/05/2013 09:45:09

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BOREHOLE LOG

Project	Site	Consultant	BOREHOLE No
East West Rail		Atkins	BH 199A - Wk5
Job No: J11631	Date: 29-04-13 29-04-13	Ground Level (m)	Co-Ordinates ()
Contractor: Bridgeway Consulting			Sheet: 1 of 3

SAMPLES & TESTS			Water	STRATA				Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION	
						(0.50) 0.50	MADE GROUND: Brown slightly gravelly sandy CLAY. Sand is fine to coarse. Gravel is angular to subangualr fine to coarse brick. Some rootlets.	
0.50-1.00	B						Orangey brown sandy CLAY. Sand is fine to medium.	
0.60	D							
1.00	D							
1.20-1.70	B					(1.60)		
1.70-2.15	S	N7				2.10		
2.10-2.50	B						Soft to firm CLAY with rootlets.	
2.30	D							
3.00	D					(2.20)		
3.50-3.90	S	N50/ 245 mm				4.30		
							Borehole continued as a Cored Drillhole	

Boring Progress and Water Observations

Date	Time	Depth	Casing Depth	Casing Dia. mm	Water Dpt
29-04-13	00.00	1.20	N/A	N/A	DRY
29-04-13	00.01	2.50	2.50		
29-04-13	00.02	4.30	4.30		
29-04-13	00.03	7.50	4.30		

Chiselling

From	To	Hours

Water Added

From	To

GENERAL REMARKS

1. Position scanned with CAT & genny prior to excavation.
2. Inspection pit excavated to 1.20mbgl prior to drilling.
3. Dynamic sampling to 4.3m with rotary core follow on.
4. Hole drilled at Islip Station.

All dimensions in metres Scale 1:50	Client: Chiltern Railways Ltd	Method/ Plant Used: Commachio 205	Logged By: MR

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BOREHOLE LOG

Project	Site	Consultant	BOREHOLE No
East West Rail		Atkins	BH 199A - Wk5
Job No: J11631	Date: 29-04-13 29-04-13	Ground Level (m)	Co-Ordinates ()
Contractor: Bridgeway Consulting			Sheet: 2 of 3

RUN DETAILS			SAMPLES & TESTING			STRATA					Instrument/ Backfill
Depth	TCR (SCR) RQD	Fracture Spacing min(ave)max	Depth	Type	Result	Red'cd Level	Legend	Depth (Thick-ness)	DESCRIPTION: Discontinuities	DESCRIPTION: Main	
4.30	93 (93) 57	40 202 500	4.30-5.80 4.30-4.55	C S	N70/ 0 mm			4.30		Medium strong closely to medium bedded light grey fine to medium grained shelly LIMESTONE. Bedding fractures are: sub horizontal (10-20 degrees), closely to medium spaced, undulating, rough with dark grey clay infill. 4.53 - 5.03 Occasional medium gravel size pockets of clay fill. 5.33 - 5.46 Band of firm dark grey clay.	
5.80			5.80-7.30	C				(3.20)			
7.30	87 (80) 56									6.77 - 6.80 Band of mudstone with orange staining.	
			7.30-8.80	C				7.50		7.30 - 7.37 Band of firm to stiff grey clay.	
	100 (93) 62	40 191 450								Firm to stiff closely bedded dark grey silty CLAY. Bedding fractures are: sub horizontal (10 degrees) closely spaced, planar, smooth. 8.30 - 8.60 Band of medium strong light grey fine to medium grained limestone.	
8.80		60 240 450	8.80-10.30	C				(2.00)	8.30 - 8.60 1 No. sub vertical fracture (40 degrees) undulating, rough, with black stained surface.		
	100 (47) 23							9.50	8.60 - 8.80 Zone of drilling disturbed fracture.	Medium strong medium bedded light grey medium to coarse grained LIMESTONE.	
10.30			10.30-11.80	C				(2.70)	9.50 - 10.10 1 No. sub vertical fracture (60 degrees) undulating, rough, with orange stained surface.	Bedding fractures are: sub horizontal (10-20 degrees) medium spaced, undulating, rough, with orange and black stained suface. 10.80 - 10.92 Band of firm to stiff grey shelly clay with organic odour and decomposed material.	
11.80	100 (80) 40	40 223 620							10.10 - 10.30 Zone of drilling disturbed fracture.		
			11.80-13.00	C				12.20	Recovered as grey clay with		
	80										

Drilling Progress and Water Observations

Date	Time	Depth	Casing	Core Dia mm	Water Strike	Water Standing
29-04-13	00.02	4.30	4.30			
29-04-13	00.03	7.50	4.30			
29-04-13	00.04	10.00	4.30			

Rotary Flush

From	To	Type	Returns
4.3	5.8		100
5.8	7.3		100
7.3	8.8		100
8.8	10.3		100
10.3	11.8		100
11.8	13.0		100

GENERAL REMARKS

1. Position scanned with CAT & genny prior to excavation.
2. Inspection pit excavated to 1.20mbgl prior to drilling.
3. Dynamic sampling to 4.3m with rotary core follow on.
4. Hole drilled at Islip Station.

All dimensions in metres Scale 1:50	Client: Chiltern Railways Ltd	Method/ Plant Used: Commachio 205	Logged By: MR

GINT STD AGS 3_1 LAB.GLB AGS3 UK DH MPS K:\SITE INVESTIGATION\GINT PROJECTS\CURRENT PROJECTS\J11631 - EAST WEST RAIL.GPJ GINT STD AGS 3_1 LAB.GDT 23/05/2013 09:44:24

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BOREHOLE LOG

Project	Site	Consultant	BOREHOLE No
East West Rail		Atkins	BH 199A - Wk5
Job No: J11631	Date: 29-04-13 29-04-13	Ground Level (m)	Co-Ordinates ()
Contractor: Bridgeway Consulting			Sheet: 3 of 3

RUN DETAILS			SAMPLES & TESTING			STRATA					
Depth	TCR (SCR) RQD	Fracture Spacing min(ave)max	Depth	Type	Result	Red'cd Level	Legend	Depth (Thick-ness)	DESCRIPTION: Discontinuities	DESCRIPTION: Main	Instrument/ Backfill
	(64) 60							(0.50) 12.70	coarse gravel of limestone. 11.30 - 11.63 1 No. sub vertical fracture (60 degrees) undulating, rough, with orange stained surface. 12.70 - 13.00 Zone of drilling disturbed fracture.	Medium strong light grey fine to medium grained shelly LIMESTONE. *(continued)*	
13.00		30 165 300	13.00-14.25	C				(0.90) 13.60		Stiff to very stiff closely bedded dark grey shelly CLAY. Bedding fractures are: sub horizontal (10-20 degrees) closely spaced, undulating, rough, open and clean. 13.20 - 13.41 Band of black shelly clay with organic odour and decomposing wood.	
	77 (77) 42	40 67 100						(0.65) 14.25		Medium strong closely bedded light grey fine to medium grained LIMESTONE. Bedding fractures are: sub horizontal (10-20 degrees) closely spaced, undulating, rough, open and clean with black stained surface.	
14.25											

Drilling Progress and Water Observations

Date	Time	Depth	Casing	Core Dia mm	Water Strike	Water Standing
29-04-13	00.05	14.25	4.30			

Rotary Flush

From	To	Type	Returns
13	14.25		100

GENERAL REMARKS

1. Position scanned with CAT & genny prior to excavation.
2. Inspection pit excavated to 1.20mbgl prior to drilling.
3. Dynamic sampling to 4.3m with rotary core follow on.
4. Hole drilled at Islip Station.

All dimensions in metres Scale 1:50	Client: Chiltern Railways Ltd	Method/ Plant Used: Commachio 205	Logged By: MR

GINT STD AGS 3_1 LAB.GLB AGS3 UK DH MPS K:\SITE INVESTIGATION\GINT PROJECTS\CURRENT PROJECTS\J11631 - EAST WEST RAIL.GPJ GINT STD AGS 3_1 LAB.GDT 23/05/2013 09:44:25

2531

CHEMTECH environmental

ANALYTICAL TEST REPORT

Contract no: 46740

Contract name: East-West Rail

Client reference: PSL12/4199

Clients name: Professional Soils Laboratory

Clients address: 5-7 Hexthorpe Road
Doncaster
DN4 0AR

Samples received: 30 November 2012

Analysis started: 30 November 2012

Analysis completed 06 December 2012

Report issued: 06 December 2012

Notes:
Opinions and interpretations expressed herein are outside the UKAS accreditation scope.
Unless otherwise stated, Chemtech Environmental Ltd were not responsible for sampling.
Methods, procedures and performance data are available on request.
Results reported herein relate only to the material supplied to the laboratory.
This report shall not be reproduced except in full, withour prior written approval.
Samples will be disposed of 6 weeks from initial receipt unless otherwise instructed.

Key:
U UKAS accredited test
M MCERTS & UKAS accredited test
$ Test carried out by an approved subcontractor
I/S Insufficient sample to carry out test
N/S Sample not suitable for testing

Approved by: K Campbell

Karan Campbell Director

John Campbell Director

Chemtech Environmental Limited

SOILS

Lab number			46740-1	46740-2	46740-3	46740-4	46740-5
Sample id			WS 71B	WS 72	WS 73A	WS 107A	WS 108A
Depth (m)			0.60-1.20	0.40	0.50	0.30-0.70	0.50
Date sampled			-	-	-	-	-
Test	**Method**	**Units**					
pH	CE004 M	units	8.2	8.9	8.8	8.4	8.7
Magnesium (2:1 water soluble)	CE120	g/l Mg	<0.01	<0.01	<0.01	<0.01	<0.01
Chloride (2:1 water soluble)	CE049 U	g/l Cl	0.01	<0.01	<0.01	<0.01	<0.01
Nitrate (2:1 water soluble)	CE049 U	g/l NO_3	<0.01	<0.01	<0.01	<0.01	<0.01
Sulphate (2:1 water soluble)	CE061 M	g/l SO_4	0.04	<0.01	0.02	0.07	<0.01
Sulphate (total)	CE062 M	% w/w SO_4	0.04	0.04	0.04	0.03	0.02
Sulphur (total)	CE119	% w/w S	0.03	0.02	0.03	0.06	0.03

Chemtech Environmental Limited

METHOD DETAILS

METHOD	SOILS	METHOD SUMMARY	SAMPLE	STATUS	LOD	UNITS
CE004	pH	Based on BS 1377, pH Meter	Wet	M	-	units
CE120	Magnesium (2:1 water soluble)	Aqueous extraction, ICP-OES	Dry		0.01	g/l Mg
CE049	Chloride (2:1 water soluble)	Aqueous extraction, IC-COND	Dry	U	0.01	g/l Cl
CE049	Nitrate (2:1 water soluble)	Aqueous extraction, IC-COND	Dry	U	0.01	g/l NO_3
CE061	Sulphate (2:1 water soluble)	Aqueous extraction, ICP-OES	Dry	M	0.01	g/l SO_4
CE062	Sulphate (total)	Acid extraction, ICP-OES	Dry	M	0.01	% w/w SO_4
CE119	Sulphur (total)	Acid extraction, ICP-OES	Dry		0.01	% w/w S

2531

ANALYTICAL TEST REPORT

Contract no: 46741

Contract name: East-West Rail

Client reference: PSL12/4199

Clients name: Professional Soils Laboratory

Clients address: 5-7 Hexthorpe Road
Doncaster
DN4 0AR

Samples received: 30 November 2012

Analysis started: 30 November 2012

Analysis completed 10 December 2012

Report issued: 10 December 2012

Notes:

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Methods, procedures and performance data are available on request.

Results reported herein relate only to the material supplied to the laboratory.

BTEX compounds are identified by retention time only and may include interference from co-eluting compounds.

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Samples will be disposed of 6 weeks from initial receipt unless otherwise instructed.

Key:

U UKAS accredited test

M MCERTS & UKAS accredited test

$ Test carried out by an approved subcontractor

I/S Insufficient sample to carry out test

N/S Sample not suitable for testing

NAD No Asbestos Detected

Approved by:

K Campbell

Karan Campbell
Director

John Campbell
Director

Chemtech Environmental Limited

SAMPLE INFORMATION

MCERTS (Soils):

Soil descriptions are only intended to provide a log of sample matrices with respect to MCERTS validation. They are not intended as full geological descriptions. MCERTS accreditation applies for sand, clay and loam/topsoil, or combinations of these whether these are derived from naturally occurring soils or from made ground, as long as these materials constitute the major part of the sample. Other materials such as concrete, gravel and brick are not accredited if they comprise the major part of the sample.

All results are reported on a dry basis. Samples dried at no more than 30°C in a drying cabinet.
Analytical results are exclusive of stones.

Lab ref	Sample id	Depth (m)	Soil description passing 2mm sieve	Description of material retained on 2mm sieve	% Retained on 2mm sieve	Moisture (%)
46741-1	WS 45a	1.80-2.00	Sandy Clay	Gravel	38.3	17.1
46741-2	WS 52a	0.80	Sand	Stones	66.8	5.9
46741-3	WS 54	0.70	Silty Clay	Gravel	24.4	21.7
46741-4	WS 55	0.50	Sand	Stones	49.3	7.4
46741-5	WS 55	1.00	Silty Clay	Gravel	27.4	19.6
46741-6	Ws 59a	0.70	Clayey Sand	Gravel	46.5	10.1
46741-7	WS 68a	0.50	Sandy Clay	Gravel and Stones	70.2	8.1
46741-8	WS 68a	1.00	Clay	Gravel	19.4	17.4
46741-9	WS 68a	2.00-3.00	Clay	Gravel	35.8	19.5
46741-10	WS 72	1.00	Clay	Gravel	26.6	21.6
46741-11	WS 73a	0.50	Clayey Sand	Gravel and Stones	56.4	7.4
46741-12	WS 73a	1.00	Clay	Gravel and Stones	48.5	16.6
46741-13	WS 73a	3.00-4.00	Clay	Gravel	44.0	18.7
46741-14	WS 73b	1.00	Clay	Gravel	46.8	24.3
46741-15	WS 74a	0.50	Clayey Sand	Stones	61.4	8.7
46741-16	WS 74b	1.00	Clay	Gravel	40.5	20.4
46741-17	WS 81	0.70	Clay	Gravel and Stones	55.3	14.5
46741-18	WS 87	0.00-0.30	Loamy Sand	Gravel and Stones	46.5	12.6
46741-19	WS 98	0.70	Clayey Sand	Gravel and Stones	47.0	10.1
46741-20	WS 102a	1.20-2.00	Clay	Gravel	31.5	18.3
46741-21	WS 107a	0.50	Sand	Gravel and Stones	42.2	6.7
46741-22	WS 108a	0.50	Sand	Gravel and Stones	43.9	9.5

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SOILS

Lab number			46741-1	46741-2	46741-3	46741-4	46741-5	46741-6
Sample id			WS 45a	WS 52a	WS 54	WS 55	WS 55	Ws 59a
Depth (m)			1.80-2.00	0.80	0.70	0.50	1.00	0.70
Date sampled			-	-	-	-	-	-
Test	**Method**	**Units**						
Arsenic (total)	CE054 M	mg/kg As	8.8	5.8	6.0	4.0	9.1	6.4
Boron (water soluble)	CE063 M	mg/kg B	0.8	<0.3	1.6	<0.3	0.7	0.6
Cadmium (total)	CE054 M	mg/kg Cd	<0.2	0.3	<0.2	<0.2	<0.2	<0.2
Chromium (total)	CE054 M	mg/kg Cr	26	10	31	8.6	25	14
Chromium (VI)	CE050 U	mg/kg CrVI	<1	<1	<1	<1	<1	<1
Copper (total)	CE054 M	mg/kg Cu	12	13	15	8.6	8.1	5.7
Lead (total)	CE054 M	mg/kg Pb	14	7.5	11	4.7	8.9	6.0
Mercury (total)	CE054	mg/kg Hg	<0.5	0.6	0.6	0.5	0.5	<0.5
Nickel (total)	CE054 M	mg/kg Ni	16	8.5	17	7.8	19	13
Selenium (total)	CE054 M	mg/kg Se	1.1	<0.3	1.8	<0.3	1.5	<0.3
Zinc (total)	CE054 M	mg/kg Zn	57	38	44	21	35	20
pH	CE004 M	units	7.6	8.9	8.4	8.9	8.2	8.7
Chloride (2:1 water soluble)	CE049 U	mg/l Cl	3.5	<1	1.2	<1	1.2	7.9
Sulphate (total)	CE062 M	mg/kg SO_4	317	300	828	248	4910	244
Sulphide	CE079	mg/kg S^{2-}	<10	<10	<10	<10	<10	<10
Cyanide (free)	CE077	mg/kg CN	<2	<2	<2	<2	<2	<2
Phenols (total)	CE078	mg/kg PhOH	-	<0.5	<0.5	<0.5	<0.5	<0.5
Organic matter content (OMC)	CE005 M	% w/w	0.75	0.64	2.88	0.18	2.68	0.21
PAH								
Naphthalene	CE087	mg/kg	-	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	CE087	mg/kg	-	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthene	CE087	mg/kg	-	<0.1	<0.1	<0.1	<0.1	<0.1
Fluorene	CE087	mg/kg	-	<0.1	<0.1	<0.1	<0.1	<0.1
Phenanthrene	CE087	mg/kg	-	0.4	<0.1	<0.1	<0.1	<0.1
Anthracene	CE087	mg/kg	-	<0.1	<0.1	<0.1	<0.1	<0.1
Fluoranthene	CE087	mg/kg	-	2.0	0.2	0.3	<0.1	<0.1
Pyrene	CE087	mg/kg	-	1.8	0.2	0.4	<0.1	<0.1
Benzo(a)anthracene	CE087	mg/kg	-	0.2	<0.1	<0.1	<0.1	<0.1
Chrysene	CE087	mg/kg	-	0.5	<0.1	<0.1	<0.1	<0.1
Benzo(b)fluoranthene	CE087	mg/kg	-	0.5	<0.1	<0.1	<0.1	<0.1
Benzo(k)fluoranthene	CE087	mg/kg	-	0.2	<0.1	<0.1	<0.1	<0.1
Benzo(a)pyrene	CE087	mg/kg	-	0.1	<0.1	<0.1	<0.1	<0.1
Indeno(123cd)pyrene	CE087	mg/kg	-	<0.1	<0.1	<0.1	<0.1	<0.1
Dibenz(ah)anthracene	CE087	mg/kg	-	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(ghi)perylene	CE087	mg/kg	-	0.1	<0.1	<0.1	<0.1	<0.1
PAH (total)	CE087	mg/kg	-	5.8	<5	<5	<5	<5
BTEX & TPH								
MTBE	CE057 U	mg/kg	-	<0.01	<0.01	<0.01	<0.01	<0.01
Benzene	CE057 U	mg/kg	-	<0.01	<0.01	<0.01	<0.01	<0.01
Toluene	CE057 U	mg/kg	-	<0.01	<0.01	<0.01	<0.01	<0.01
Ethylbenzene	CE057 U	mg/kg	-	<0.01	<0.01	<0.01	<0.01	<0.01

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SOILS

Lab number			46741-1	46741-2	46741-3	46741-4	46741-5	46741-6
Sample id			WS 45a	WS 52a	WS 54	WS 55	WS 55	Ws 59a
Depth (m)			1.80-2.00	0.80	0.70	0.50	1.00	0.70
Date sampled			-	-	-	-	-	-
Test	**Method**	**Units**						
m & p-Xylene	CE057 U	mg/kg	-	<0.01	<0.01	<0.01	<0.01	<0.01
o-Xylene	CE057 U	mg/kg	-	<0.01	<0.01	<0.01	<0.01	<0.01
TPH Aromatic EC5-EC7	CE068	mg/kg	-	<0.01	<0.01	<0.01	<0.01	<0.01
TPH Aromatic EC7-EC8	CE068	mg/kg	-	<0.01	<0.01	<0.01	<0.01	<0.01
TPH Aromatic EC8-EC10	CE068	mg/kg	-	<0.01	<0.01	<0.01	<0.01	<0.01
TPH Aromatic EC10-EC12	CE068	mg/kg	-	<1	<1	<1	<1	<1
TPH Aromatic EC12-EC16	CE068	mg/kg	-	<1	<1	<1	<1	<1
TPH Aromatic EC16-EC21	CE068	mg/kg	-	4	<1	<1	<1	<1
TPH Aromatic EC21-EC35	CE068	mg/kg	-	2	<1	<1	<1	<1
TPH Aromatic EC35-EC44	CE068	mg/kg	-	<1	<1	<1	<1	<1
TPH Aliphatic EC5-EC6	CE068	mg/kg	-	<0.1	<0.1	<0.1	<0.1	<0.1
TPH Aliphatic EC6-EC8	CE068	mg/kg	-	<0.1	<0.1	<0.1	<0.1	<0.1
TPH Aliphatic EC8-EC10	CE068	mg/kg	-	<0.1	0.1	0.1	0.1	<0.1
TPH Aliphatic EC10-EC12	CE068	mg/kg	-	<1	<1	<1	<1	<1
TPH Aliphatic EC12-EC16	CE068	mg/kg	-	2	<1	2	2	1
TPH Aliphatic EC16-EC35	CE068	mg/kg	-	59	8	15	7	4
TPH Aliphatic EC35-EC44	CE068	mg/kg	-	<1	<1	<1	<1	<1
Subcontracted analysis								
Asbestos	$	-	NAD	NAD	NAD	NAD	NAD	NAD

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SOILS

Lab number			46741-7	46741-8	46741-9	46741-10	46741-11	46741-12
Sample id			WS 68a	WS 68a	WS 68a	WS 72	WS 73a	WS 73a
Depth (m)			0.50	1.00	2.00-3.00	1.00	0.50	1.00
Date sampled			-	-	-	-	-	-
Test	**Method**	**Units**						
Arsenic (total)	CE054 M	mg/kg As	12	9.6	7.5	12	16	13
Boron (water soluble)	CE063 M	mg/kg B	0.5	2.7	5.3	2.2	<0.3	1.4
Cadmium (total)	CE054 M	mg/kg Cd	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Chromium (total)	CE054 M	mg/kg Cr	14	41	51	33	12	30
Chromium (VI)	CE050 U	mg/kg CrVI	<1	<1	<1	<1	<1	<1
Copper (total)	CE054 M	mg/kg Cu	19	13	13	14	17	14
Lead (total)	CE054 M	mg/kg Pb	9.9	8.2	9.5	13	8.8	9.5
Mercury (total)	CE054	mg/kg Hg	0.6	0.5	0.7	<0.5	<0.5	<0.5
Nickel (total)	CE054 M	mg/kg Ni	18	28	36	23	18	25
Selenium (total)	CE054 M	mg/kg Se	<0.3	1.1	1.5	0.5	<0.3	<0.3
Zinc (total)	CE054 M	mg/kg Zn	12	16	13	53	45	42
pH	CE004 M	units	8.8	8.4	8.1	7.7	8.6	8.2
Chloride (2:1 water soluble)	CE049 U	mg/l Cl	1.1	2.1	36	1.9	1.8	1.4
Sulphate (total)	CE062 M	mg/kg SO_4	533	910	52410	6795	495	612
Sulphide	CE079	mg/kg S^{2-}	<10	<10	<10	<10	<10	<10
Cyanide (free)	CE077	mg/kg CN	<2	<2	<2	<2	<2	<2
Phenols (total)	CE078	mg/kg PhOH	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Organic matter content (OMC)	CE005 M	% w/w	0.84	0.42	0.21	2.00	0.37	0.43
PAH								
Naphthalene	CE087	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	CE087	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthene	CE087	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	0.3
Fluorene	CE087	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Phenanthrene	CE087	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Anthracene	CE087	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Fluoranthene	CE087	mg/kg	0.3	<0.1	<0.1	<0.1	0.5	0.5
Pyrene	CE087	mg/kg	0.2	<0.1	<0.1	<0.1	0.4	0.3
Benzo(a)anthracene	CE087	mg/kg	<0.1	<0.1	<0.1	<0.1	0.1	<0.1
Chrysene	CE087	mg/kg	<0.1	<0.1	<0.1	<0.1	0.2	<0.1
Benzo(b)fluoranthene	CE087	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(k)fluoranthene	CE087	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(a)pyrene	CE087	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Indeno(123cd)pyrene	CE087	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Dibenz(ah)anthracene	CE087	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(ghi)perylene	CE087	mg/kg	<0.1	<0.1	<0.1	<0.1	0.1	<0.1
PAH (total)	CE087	mg/kg	<5	<5	<5	<5	<5	<5
BTEX & TPH								
MTBE	CE057 U	mg/kg	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Benzene	CE057 U	mg/kg	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Toluene	CE057 U	mg/kg	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Ethylbenzene	CE057 U	mg/kg	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01

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SOILS

Lab number			46741-7	46741-8	46741-9	46741-10	46741-11	46741-12
Sample id			WS 68a	WS 68a	WS 68a	WS 72	WS 73a	WS 73a
Depth (m)			0.50	1.00	2.00-3.00	1.00	0.50	1.00
Date sampled			-	-	-	-	-	-
Test	**Method**	**Units**						
m & p-Xylene	CE057 U	mg/kg	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
o-Xylene	CE057 U	mg/kg	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
TPH Aromatic EC5-EC7	CE068	mg/kg	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
TPH Aromatic EC7-EC8	CE068	mg/kg	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
TPH Aromatic EC8-EC10	CE068	mg/kg	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
TPH Aromatic EC10-EC12	CE068	mg/kg	<1	<1	<1	<1	<1	<1
TPH Aromatic EC12-EC16	CE068	mg/kg	<1	<1	<1	<1	<1	<1
TPH Aromatic EC16-EC21	CE068	mg/kg	<1	<1	<1	<1	1	<1
TPH Aromatic EC21-EC35	CE068	mg/kg	<1	<1	<1	<1	<1	<1
TPH Aromatic EC35-EC44	CE068	mg/kg	<1	<1	<1	<1	<1	<1
TPH Aliphatic EC5-EC6	CE068	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
TPH Aliphatic EC6-EC8	CE068	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
TPH Aliphatic EC8-EC10	CE068	mg/kg	<0.1	<0.1	0.1	0.2	<0.1	0.1
TPH Aliphatic EC10-EC12	CE068	mg/kg	1	2	1	1	1	1
TPH Aliphatic EC12-EC16	CE068	mg/kg	3	5	2	4	3	2
TPH Aliphatic EC16-EC35	CE068	mg/kg	16	14	9	18	17	10
TPH Aliphatic EC35-EC44	CE068	mg/kg	<1	<1	<1	<1	<1	<1
Subcontracted analysis								
Asbestos	$	-	NAD	NAD	NAD	NAD	NAD	NAD

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SOILS

Lab number			46741-13	46741-14	46741-15	46741-16	46741-17	46741-18
Sample id			WS 73a	WS 73b	WS 74a	WS 74b	WS 81	WS 87
Depth (m)			3.00-4.00	1.00	0.50	1.00	0.70	0.00-0.30
Date sampled			-	-	-	-	-	-
Test	**Method**	**Units**						
Arsenic (total)	CE054 M	mg/kg As	9.7	10	14	7.5	9.0	21
Boron (water soluble)	CE063 M	mg/kg B	4.3	2.2	<0.3	2.2	0.7	1.0
Cadmium (total)	CE054 M	mg/kg Cd	<0.2	<0.2	<0.2	<0.2	<0.2	0.3
Chromium (total)	CE054 M	mg/kg Cr	31	49	15	53	19	14
Chromium (VI)	CE050 U	mg/kg CrVI	<1	<1	<1	<1	<1	<1
Copper (total)	CE054 M	mg/kg Cu	12	21	9.8	19	12	73
Lead (total)	CE054 M	mg/kg Pb	6.4	13	7.5	9.9	8.7	44
Mercury (total)	CE054	mg/kg Hg	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Nickel (total)	CE054 M	mg/kg Ni	23	23	17	32	16	22
Selenium (total)	CE054 M	mg/kg Se	<0.3	<0.3	<0.3	3.5	<0.3	<0.3
Zinc (total)	CE054 M	mg/kg Zn	35	58	32	63	32	199
pH	CE004 M	units	7.9	8.3	8.8	8.3	8.4	8.2
Chloride (2:1 water soluble)	CE049 U	mg/l Cl	18	11	<1	20	2.6	4.4
Sulphate (total)	CE062 M	mg/kg SO_4	134600	2614	455	455	880	1750
Sulphide	CE079	mg/kg S^{2-}	<10	<10	<10	<10	<10	<10
Cyanide (free)	CE077	mg/kg CN	<2	<2	<2	<2	<2	<2
Phenols (total)	CE078	mg/kg PhOH	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Organic matter content (OMC)	CE005 M	% w/w	0.44	1.77	0.76	0.21	2.84	0.22
PAH								
Naphthalene	CE087	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	CE087	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthene	CE087	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Fluorene	CE087	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Phenanthrene	CE087	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	0.3
Anthracene	CE087	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Fluoranthene	CE087	mg/kg	0.2	<0.1	0.2	<0.1	<0.1	0.8
Pyrene	CE087	mg/kg	0.1	<0.1	0.2	<0.1	<0.1	1.0
Benzo(a)anthracene	CE087	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	0.5
Chrysene	CE087	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	0.3
Benzo(b)fluoranthene	CE087	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	0.9
Benzo(k)fluoranthene	CE087	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	0.2
Benzo(a)pyrene	CE087	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	0.5
Indeno(123cd)pyrene	CE087	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	0.3
Dibenz(ah)anthracene	CE087	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(ghi)perylene	CE087	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	0.5
PAH (total)	CE087	mg/kg	<5	<5	<5	<5	<5	<5
BTEX & TPH								
MTBE	CE057 U	mg/kg	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Benzene	CE057 U	mg/kg	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Toluene	CE057 U	mg/kg	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Ethylbenzene	CE057 U	mg/kg	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01

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SOILS

Lab number			46741-13	46741-14	46741-15	46741-16	46741-17	46741-18
Sample id			WS 73a	WS 73b	WS 74a	WS 74b	WS 81	WS 87
Depth (m)			3.00-4.00	1.00	0.50	1.00	0.70	0.00-0.30
Date sampled			-	-	-	-	-	-
Test	**Method**	**Units**						
m & p-Xylene	CE057 U	mg/kg	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
o-Xylene	CE057 U	mg/kg	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
TPH Aromatic EC5-EC7	CE068	mg/kg	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
TPH Aromatic EC7-EC8	CE068	mg/kg	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
TPH Aromatic EC8-EC10	CE068	mg/kg	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
TPH Aromatic EC10-EC12	CE068	mg/kg	<1	<1	<1	<1	<1	<1
TPH Aromatic EC12-EC16	CE068	mg/kg	<1	<1	<1	<1	<1	<1
TPH Aromatic EC16-EC21	CE068	mg/kg	<1	<1	<1	<1	<1	2
TPH Aromatic EC21-EC35	CE068	mg/kg	<1	<1	<1	<1	<1	3
TPH Aromatic EC35-EC44	CE068	mg/kg	<1	<1	<1	<1	<1	<1
TPH Aliphatic EC5-EC6	CE068	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
TPH Aliphatic EC6-EC8	CE068	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
TPH Aliphatic EC8-EC10	CE068	mg/kg	0.1	0.2	<0.1	0.2	0.1	0.1
TPH Aliphatic EC10-EC12	CE068	mg/kg	1	1	1	1	1	2
TPH Aliphatic EC12-EC16	CE068	mg/kg	2	2	2	4	5	8
TPH Aliphatic EC16-EC35	CE068	mg/kg	5	4	8	9	9	94
TPH Aliphatic EC35-EC44	CE068	mg/kg	<1	<1	<1	<1	<1	3
Subcontracted analysis								
Asbestos	$	-	NAD	NAD	NAD	NAD	NAD	NAD

Chemtech Environmental Limited

SOILS

Lab number			46741-19	46741-20	46741-21	46741-22
Sample id			WS 98	WS 102a	WS 107a	WS 108a
Depth (m)			0.70	1.20-2.00	0.50	0.50
Date sampled			-	-	-	-
Test	**Method**	**Units**				
Arsenic (total)	CE054 M	mg/kg As	24	10	16	49
Boron (water soluble)	CE063 M	mg/kg B	0.5	1.7	0.3	<0.3
Cadmium (total)	CE054 M	mg/kg Cd	<0.2	<0.2	<0.2	<0.2
Chromium (total)	CE054 M	mg/kg Cr	23	40	15	16
Chromium (VI)	CE050 U	mg/kg CrVI	<1	<1	<1	<1
Copper (total)	CE054 M	mg/kg Cu	32	9.3	9.9	57
Lead (total)	CE054 M	mg/kg Pb	20	10	7.7	19
Mercury (total)	CE054	mg/kg Hg	<0.5	<0.5	<0.5	<0.5
Nickel (total)	CE054 M	mg/kg Ni	19	17	12	18
Selenium (total)	CE054 M	mg/kg Se	<0.3	0.4	<0.3	<0.3
Zinc (total)	CE054 M	mg/kg Zn	53	54	34	76
pH	CE004 M	units	8.2	8.0	8.4	8.5
Chloride (2:1 water soluble)	CE049 U	mg/l Cl	2.0	1.2	1.5	<1
Sulphate (total)	CE062 M	mg/kg SO_4	1165	1392	116	255
Sulphide	CE079	mg/kg S^{2-}	<10	<10	<10	<10
Cyanide (free)	CE077	mg/kg CN	<2	<2	<2	<2
Phenols (total)	CE078	mg/kg PhOH	<0.5	<0.5	-	-
Organic matter content (OMC)	CE005 M	% w/w	1.46	0.70	0.60	0.21
PAH						
Naphthalene	CE087	mg/kg	<0.1	<0.1	-	-
Acenaphthylene	CE087	mg/kg	<0.1	<0.1	-	-
Acenaphthene	CE087	mg/kg	<0.1	<0.1	-	-
Fluorene	CE087	mg/kg	<0.1	<0.1	-	-
Phenanthrene	CE087	mg/kg	<0.1	<0.1	-	-
Anthracene	CE087	mg/kg	<0.1	<0.1	-	-
Fluoranthene	CE087	mg/kg	0.5	<0.1	-	-
Pyrene	CE087	mg/kg	0.5	<0.1	-	-
Benzo(a)anthracene	CE087	mg/kg	<0.1	<0.1	-	-
Chrysene	CE087	mg/kg	<0.1	<0.1	-	-
Benzo(b)fluoranthene	CE087	mg/kg	<0.1	<0.1	-	-
Benzo(k)fluoranthene	CE087	mg/kg	<0.1	<0.1	-	-
Benzo(a)pyrene	CE087	mg/kg	<0.1	<0.1	-	-
Indeno(123cd)pyrene	CE087	mg/kg	<0.1	<0.1	-	-
Dibenz(ah)anthracene	CE087	mg/kg	<0.1	<0.1	-	-
Benzo(ghi)perylene	CE087	mg/kg	<0.1	<0.1	-	-
PAH (total)	CE087	mg/kg	<5	<5	-	-
BTEX & TPH						
MTBE	CE057 U	mg/kg	<0.01	<0.01	-	-
Benzene	CE057 U	mg/kg	<0.01	<0.01	-	-
Toluene	CE057 U	mg/kg	<0.01	<0.01	-	-
Ethylbenzene	CE057 U	mg/kg	<0.01	<0.01	-	-

Chemtech Environmental Limited

SOILS

Lab number			46741-19	46741-20	46741-21	46741-22
Sample id			WS 98	WS 102a	WS 107a	WS 108a
Depth (m)			0.70	1.20-2.00	0.50	0.50
Date sampled			-	-	-	-
Test	**Method**	**Units**				
m & p-Xylene	CE057 U	mg/kg	<0.01	<0.01	-	-
o-Xylene	CE057 U	mg/kg	<0.01	<0.01	-	-
TPH Aromatic EC5-EC7	CE068	mg/kg	<0.01	<0.01	-	-
TPH Aromatic EC7-EC8	CE068	mg/kg	<0.01	<0.01	-	-
TPH Aromatic EC8-EC10	CE068	mg/kg	<0.01	<0.01	-	-
TPH Aromatic EC10-EC12	CE068	mg/kg	<1	<1	-	-
TPH Aromatic EC12-EC16	CE068	mg/kg	<1	<1	-	-
TPH Aromatic EC16-EC21	CE068	mg/kg	1	<1	-	-
TPH Aromatic EC21-EC35	CE068	mg/kg	<1	<1	-	-
TPH Aromatic EC35-EC44	CE068	mg/kg	<1	<1	-	-
TPH Aliphatic EC5-EC6	CE068	mg/kg	<0.1	<0.1	-	-
TPH Aliphatic EC6-EC8	CE068	mg/kg	<0.1	<0.1	-	-
TPH Aliphatic EC8-EC10	CE068	mg/kg	0.1	0.2	-	-
TPH Aliphatic EC10-EC12	CE068	mg/kg	1	1	-	-
TPH Aliphatic EC12-EC16	CE068	mg/kg	2	4	-	-
TPH Aliphatic EC16-EC35	CE068	mg/kg	12	6	-	-
TPH Aliphatic EC35-EC44	CE068	mg/kg	<1	<1	-	-
Subcontracted analysis						
Asbestos	$	-	NAD	NAD	NAD	NAD

Chemtech Environmental Limited

LEACHATES

Lab number			46741-1L	46741-2L	46741-4L	46741-5L	46741-6L	46741-7L
Sample id			WS 45a	WS 52a	WS 55	WS 55	Ws 59a	WS 68a
Depth (m)			1.80-2.00	0.80	0.50	1.00	0.70	0.50
Test	**Method**	**Units**						
Arsenic (dissolved)	CE055	mg/l As	0.004	0.002	0.003	<0.001	0.001	0.002
Boron (dissolved)	CE063	mg/l B	0.04	<0.03	<0.03	<0.03	<0.03	<0.03
Cadmium (dissolved)	CE055 U	mg/l Cd	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Chromium (dissolved)	CE055 U	mg/l Cr	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003
Chromium (VI) (dissolved)	CE050 U	mg/l CrVI	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Copper (dissolved)	CE055 U	mg/l Cu	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004
Lead (dissolved)	CE055 U	mg/l Pb	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009
Mercury (dissolved)	CE055	mg/l Hg	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Nickel (dissolved)	CE055 U	mg/l Ni	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003
Selenium (dissolved)	CE055	mg/l Se	0.005	0.003	0.002	0.002	0.003	0.002
Zinc (dissolved)	CE055 U	mg/l Zn	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020
pH	CE004	units	7.7	8.3	8.4	7.7	8.3	7.8
Ammonia	CE012 U	mg/l N	0.55	0.09	0.06	0.09	0.07	0.08
Chloride	CE049 U	mg/l Cl	<1	<1	1.1	<1	2.0	<1
Nitrate	CE049 U	mg/l NO_3	12	<1	<1	<1	<1	<1
Sulphate	CE049 U	mg/l SO_4	<10	<10	<10	2250	<10	<10
Cyanide (free)	CE077	mg/l CN	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Total Organic Carbon	CE071	mg/l C	10.8	2.5	2.2	2.3	2.8	2.3

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LEACHATES

Lab number			46741-8L	46741-9L	46741-10L	46741-11L	46741-12L	46741-13L
Sample id			WS 68a	WS 68a	WS 72	WS 73a	WS 73a	WS 73a
Depth (m)			1.00	2.00-3.00	1.00	0.50	1.00	3.00-4.00
Test	**Method**	**Units**						
Arsenic (dissolved)	CE055	mg/l As	0.001	0.002	0.004	0.003	0.004	0.003
Boron (dissolved)	CE063	mg/l B	0.06	0.21	0.05	<0.03	0.04	0.12
Cadmium (dissolved)	CE055 U	mg/l Cd	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Chromium (dissolved)	CE055 U	mg/l Cr	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003
Chromium (VI) (dissolved)	CE050 U	mg/l CrVI	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Copper (dissolved)	CE055 U	mg/l Cu	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004
Lead (dissolved)	CE055 U	mg/l Pb	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009
Mercury (dissolved)	CE055	mg/l Hg	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Nickel (dissolved)	CE055 U	mg/l Ni	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003
Selenium (dissolved)	CE055	mg/l Se	<0.001	<0.001	<0.001	0.001	0.003	0.002
Zinc (dissolved)	CE055 U	mg/l Zn	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020
pH	CE004	units	7.8	7.3	7.6	8.6	8.1	7.6
Ammonia	CE012 U	mg/l N	0.19	0.15	3.35	0.05	1.95	0.25
Chloride	CE049 U	mg/l Cl	<1	7.5	<1	<1	<1	4.5
Nitrate	CE049 U	mg/l NO_3	<1	<1	<1	<1	2.0	<1
Sulphate	CE049 U	mg/l SO_4	30	1852	2074	<10	<10	2925
Cyanide (free)	CE077	mg/l CN	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Total Organic Carbon	CE071	mg/l C	3.1	2.2	5.7	1.9	3.3	2.0

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LEACHATES

Lab number			46741-14L	46741-17L	46741-18L	46741-19L	46741-20L	46741-21L
Sample id			WS 73b	WS 81	WS 87	WS 98	WS 102a	WS 107a
Depth (m)			1.00	0.70	0.00-0.30	0.70	1.20-2.00	0.50
Test	**Method**	**Units**						
Arsenic (dissolved)	CE055	mg/l As	0.003	0.002	0.002	<0.001	0.001	0.002
Boron (dissolved)	CE063	mg/l B	0.03	<0.03	0.05	0.06	0.07	<0.03
Cadmium (dissolved)	CE055 U	mg/l Cd	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Chromium (dissolved)	CE055 U	mg/l Cr	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003
Chromium (VI) (dissolved)	CE050 U	mg/l CrVI	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Copper (dissolved)	CE055 U	mg/l Cu	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004
Lead (dissolved)	CE055 U	mg/l Pb	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009
Mercury (dissolved)	CE055	mg/l Hg	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Nickel (dissolved)	CE055 U	mg/l Ni	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003
Selenium (dissolved)	CE055	mg/l Se	<0.001	0.003	0.001	<0.001	<0.001	0.004
Zinc (dissolved)	CE055 U	mg/l Zn	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020
pH	CE004	units	7.7	8.1	7.7	8.1	7.8	8.3
Ammonia	CE012 U	mg/l N	0.02	0.07	0.06	0.07	0.04	0.06
Chloride	CE049 U	mg/l Cl	1.5	<1	<1	<1	<1	<1
Nitrate	CE049 U	mg/l NO_3	2.2	<1	<1	<1	<1	<1
Sulphate	CE049 U	mg/l SO_4	25	<10	365	15	110	<10
Cyanide (free)	CE077	mg/l CN	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Total Organic Carbon	CE071	mg/l C	5.2	2.7	1.8	2.8	3.0	4.0

Chemtech Environmental Limited

LEACHATES

Lab number			46741-22L
Sample id			WS 108a
Depth (m)			0.50
Test	**Method**	**Units**	
Arsenic (dissolved)	CE055	mg/l As	<0.001
Boron (dissolved)	CE063	mg/l B	<0.03
Cadmium (dissolved)	CE055 U	mg/l Cd	<0.001
Chromium (dissolved)	CE055 U	mg/l Cr	<0.003
Chromium (VI) (dissolved)	CE050 U	mg/l CrVI	<0.01
Copper (dissolved)	CE055 U	mg/l Cu	<0.004
Lead (dissolved)	CE055 U	mg/l Pb	<0.009
Mercury (dissolved)	CE055	mg/l Hg	<0.001
Nickel (dissolved)	CE055 U	mg/l Ni	<0.003
Selenium (dissolved)	CE055	mg/l Se	0.003
Zinc (dissolved)	CE055 U	mg/l Zn	<0.020
pH	CE004	units	8.5
Ammonia	CE012 U	mg/l N	0.07
Chloride	CE049 U	mg/l Cl	<1
Nitrate	CE049 U	mg/l NO_3	<1
Sulphate	CE049 U	mg/l SO_4	<10
Cyanide (free)	CE077	mg/l CN	<0.02
Total Organic Carbon	CE071	mg/l C	2.8

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METHOD DETAILS

METHOD	SOILS	METHOD SUMMARY	SAMPLE	STATUS	LOD	UNITS
CE054	Arsenic (total)	Aqua regia digest, ICP-OES	Dry	M	1	mg/kg As
CE063	Boron (water soluble)	Hot water extract, ICP-OES	Dry	M	0.3	mg/kg B
CE054	Cadmium (total)	Aqua regia digest, ICP-OES	Dry	M	0.2	mg/kg Cd
CE054	Chromium (total)	Aqua regia digest, ICP-OES	Dry	M	1	mg/kg Cr
CE050	Chromium (VI)	Acid extraction, Colorimetry	Dry	U	1	mg/kg CrVI
CE054	Copper (total)	Aqua regia digest, ICP-OES	Dry	M	1	mg/kg Cu
CE054	Lead (total)	Aqua regia digest, ICP-OES	Dry	M	1	mg/kg Pb
CE054	Mercury (total)	Aqua regia digest, ICP-OES	Dry		0.5	mg/kg Hg
CE054	Nickel (total)	Aqua regia digest, ICP-OES	Dry	M	1	mg/kg Ni
CE054	Selenium (total)	Aqua regia digest, ICP-OES	Dry	M	0.3	mg/kg Se
CE054	Zinc (total)	Aqua regia digest, ICP-OES	Dry	M	3	mg/kg Zn
CE004	pH	Based on BS 1377, pH Meter	Wet	M	-	units
CE049	Chloride (2:1 water soluble)	Aqueous extraction, IC-COND	Dry	U	1	mg/l Cl
CE062	Sulphate (total)	Acid extraction, ICP-OES	Dry	M	100	mg/kg SO_4
CE079	Sulphide	Extraction, Continuous Flow Colorimetry	Wet		10	mg/kg S^{2-}
CE077	Cyanide (free)	Extraction, Continuous Flow Colorimetry	Wet		2	mg/kg CN
CE078	Phenols (total)	Extraction, Continuous Flow Colorimetry	Wet		0.5	mg/kg PhOH
CE005	Organic matter content (OMC)	Based on BS 1377, Colorimetry	Dry	M	0.01	% w/w
CE087	PAH (speciated)	Solvent extraction, GC-MS	Wet		0.1	mg/kg
CE087	PAH (total)	Solvent extraction, GC-MS	Wet		5	mg/kg
CE057	BTEX & MTBE	Headspace GC-FID	Wet	U	0.01	mg/kg
CE068	TPH Aliphatic/Aromatic fractions (C5-C10)	Headspace GC-FID	Wet		0.01-0.1	mg/kg
CE068	TPH Aliphatic/Aromatic fractions (C10-C44	Solvent extraction, GC-FID	Wet		1	mg/kg
$	Asbestos (qualitative)	HSG 248, Microscopy	Dry	U	-	-

Chemtech Environmental Limited

METHOD DETAILS

METHOD	LEACHATES	METHOD SUMMARY	STATUS	LOD	UNITS
CE055	Arsenic (dissolved)	ICP-OES		0.001	mg/l As
CE063	Boron (dissolved)	ICP-OES		0.03	mg/l B
CE055	Cadmium (dissolved)	ICP-OES	U	0.001	mg/l Cd
CE055	Chromium (dissolved)	ICP-OES	U	0.003	mg/l Cr
CE050	Chromium VI (dissolved)	Colorimetry	U	0.01	mg/l CrVI
CE055	Copper (dissolved)	ICP-OES	U	0.004	mg/l Cu
CE055	Lead (dissolved)	ICP-OES	U	0.009	mg/l Pb
CE055	Mercury (dissolved)	ICP-OES		0.001	mg/l Hg
CE055	Nickel (dissolved)	ICP-OES	U	0.003	mg/l Ni
CE055	Selenium (dissolved)	ICP-OES		0.001	mg/l Se
CE055	Zinc (dissolved)	ICP-OES	U	0.020	mg/l Zn
CE004	pH	Based on BS 1377, pH Meter		-	units
CE012	Ammonia	Colorimetry	U	0.01	mg/l N
CE049	Chloride	Ion Chromatography	U	1	mg/l Cl
CE049	Nitrate	Ion Chromatography	U	1	mg/l NO_3
CE049	Sulphate	Ion Chromatography	U	10	mg/l SO_4
CE077	Cyanide (free)	Distillation, Colorimetry		0.02	mg/l CN
CE071	Total Organic Carbon	TOC analyser		1	mg/l C

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WINDOWLESS SAMPLER LOG

Project	Site	Consultant	EXPLORATORY HOLE No
East West Rail		Atkins	**WS159 - Wk35**
Job No: J11631	Date: 25-11-12 25-11-12	Ground Level (m)	Co-Ordinates ()
Contractor: Bridgeway Consulting			Sheet: 1 of 1

SAMPLES & TESTS				STRATA					
Depth	Type No	Test Result	Water	Reduced Level	Legend	Depth (Thickness)	DESCRIPTION	Field Test kPa HSV PP	Instrument/ Backfill
0.00-0.70	B					0.25	Black DIRTY BALLAST of igneous rock. Fines are granular fine to coarse sand.		
0.40	D					(0.45) 0.70	MADE GROUND: Cream silty very sandy GRAVEL. Gravel is angular to subrounded fine to coarse flint and quartzite.		
0.70	B						Soft to firm extremely low strength blueish grey and yellow slightly sandy CLAY. Sand is fine.		
0.70	D								
1.20-1.65	S	N2				(0.90) 1.60			
1.60-1.70	D					(0.40) 2.00	Firm extremely low strength blackish blue grey mottled red slightly sandy CLAY. Sand is fine to medium. Some roots.		
2.00-2.10	D						Firm high strength yellowish blue CLAY.		
2.00	S	N20	1			(0.50) 2.50			
2.50-2.60	D					2.80	Medium dense yellowish orange slightly clayey gravelly SAND. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse sandstone and flint.		
3.00-3.45	S	N10	1				Firm medium to high strength yellowish blue slightly sandy CLAY. Sand is fine.		
						(1.65)			
4.00	S	N19				4.45			

Progress and Water Observations

Date	Depth	Water Dpt	Dia. mm	% Rec
25-11-12	1.20	DRY	N/A	N/A
25-11-12	2.00	DRY	87	95
25-11-12	3.00	2.5	77	100
25-11-12	4.00	2.5	67	0

GENERAL REMARKS

1. Position scanned with CAT & genny prior to excavation.
2. Inspection pit excavated to 1.20mbgl prior to drilling.
3. Hole drilled at 22m 50ch West.

All dimensions in metres Scale 1:50	Client: Chiltern Railways Ltd	Method/ Plant Used: Dart Competitor Rig	Logged By: MR

GINT STD AGS 3_1 LAB.GLB BCL WS FIELD TEST K:\SITE INVESTIGATION\GINT PROJECTS\CURRENT PROJECTS\J11631 - EAST WEST RAIL.GPJ GINT STD AGS 3_1 LAB.GDT 11/07/2013 07:53:59

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WINDOWLESS SAMPLER LOG

Project	Site	Consultant	EXPLORATORY HOLE No
East West Rail		Atkins	**WS160**
Job No: J11631	Date: 06-12-12 06-12-12	Ground Level (m)	Co-Ordinates ()
Contractor: Bridgeway Consulting			Sheet: 1 of 1

SAMPLES & TESTS				STRATA					
Depth	Type No	Test Result	Water	Reduced Level	Legend	Depth (Thickness)	DESCRIPTION	Field Test kPa HSV PP	Instrument/ Backfill
0.00-0.20	B					0.20	MADE GROUND: Firm brown slightly sandy slightly gravelly CLAY. Gravel is angular to subangular fine to coarse mudstone, sandstone and ballast of granite. Some roots.		
0.10	D								
0.20-0.60	B					(0.60)			
0.20	D						Brown and light brown slightly clayey SAND and GRAVEL. Sand is fine to coarse. Gravel is angular to subrounded fine to coarse sandstone, mudstone and quartzite.		
0.50	D					0.80			
						(0.40)			
1.00-1.20	B					1.20	Stiff blue mottled green and yellow gravelly CLAY. Gravel is angular to subrounded fine to medium sandstone, mudstone and quartzite.		
1.20-2.00	B								
1.20-1.65	S	N5	1			(0.80)	Firm greenish brown medium strength CLAY.	74	
						2.00			
2.00-3.60	B						Orange brown clayey very gravelly fine to coarse SAND. Gravel is subangular to subrounded fine to coarse sandstone, quartzite and flint.		
2.00-2.45	S	N13							
3.00-3.45	S	N17				(2.45)			
						4.45			

Progress and Water Observations

Date	Depth	Water Dpt	Dia. mm	% Rec
06-12-12	1.20	DRY	N/A	N/A
06-12-12	2.00	1.8	87	90
06-12-12	3.00	1.8	77	80
06-12-12	4.00	1.8	67	60

GENERAL REMARKS

1. Position scanned with CAT & genny prior to excavation.
2. Inspection pit excavated to 1.20mbgl prior to drilling.

All dimensions in metres Scale 1:50	Client Atkins	Method/ Plant Used Dart Competitor Rig	Logged By GD

GINT STD AGS 3_1 LAB.GLB BCL WS FIELD TEST K:\SITE INVESTIGATION\GINT PROJECTS\CURRENT PROJECTS\J11631 - EAST WEST RAIL.GPJ GINT STD AGS 3_1 LAB.GDT 10/01/2013 15:32:09

Bridgeway Consulting Ltd
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WINDOWLESS SAMPLER LOG

Project	Site	Consultant	EXPLORATORY HOLE No
East West Rail		Atkins	**WS161 - Wk35**
Job No: J11631	Date: 24-11-12, 25-11-12	Ground Level (m)	Co-Ordinates ()
Contractor: Bridgeway Consulting			Sheet: 1 of 1

SAMPLES & TESTS			STRATA						
Depth	Type No	Test Result	Water	Reduced Level	Legend	Depth (Thickness)	DESCRIPTION	Field Test kPa HSV PP	Instrument/ Backfill
						(0.40) 0.40	Black VERY DIRTY BALLAST of igneous rock. Fines are granular fine to coarse sand and ash and gravel of subangular to subrounded fine to coarse coal and granite. Some rootlets.		
0.40-1.00	B								
0.60	D					(0.60) 1.00	MADE GROUND: Light yellowish brown gravelly SAND. Sand is fine to coarse. Gravel is subangular to subrounded fine to medium flint and sandstone. Occasional shell fragments. Some roots.		
1.10	D					1.20			
1.20-1.30	B					1.30	Very soft greyish blue mottled yellow sandy CLAY. Sand is fine to medium. Some rootlets.		
1.20-1.65	S	N6							
1.30-2.50	B					(1.20)	Very soft low strength brownish blue and grey gravelly slightly sandy CLAY. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse flint and sandstone.		
2.00-2.10	D						Very soft low strength brownish blue and grey mottled red sandy CLAY. Sand is fine to coarse.		
2.00-2.45	S	N6				2.50			
2.50-5.50	B						Firm medium becoming high strength blueish grey slightly sandy CLAY with some selenite crystals. Sand is fine to medium.		
3.00-3.10	D								
3.00-3.45	S	N12							
4.00-4.10	D								
4.00-4.45	S	N13				(3.95)			
5.00-5.45	S	N20							
5.50-5.60	D								
6.00-6.45	S	N20				6.45			

Progress and Water Observations

Date	Depth	Water Dpt	Dia. mm	% Rec
25-11-12	1.20	DRY	N/A	N/A
25-11-12	2.00	DRY	87	100
25-11-12	3.00	DRY	77	100
25-11-12	4.00	DRY	67	100
25-11-12	5.00	DRY	57	100
25-11-12	6.00	DRY	45	100

GENERAL REMARKS

1. Position scanned with CAT & genny prior to excavation.
2. Inspection pit excavated to 1.20mbgl prior to drilling.
3. Hole drilled at 23m 18ch West.

All dimensions in metres Scale 1:50	Client: Chiltern Railways Ltd	Method/ Plant Used: Dart Competitor Rig	Logged By: MR

GINT STD AGS 3_1 LAB.GLB BCL WS FIELD TEST K:\SITE INVESTIGATION\GINT PROJECTS\CURRENT PROJECTS\J11631 - EAST WEST RAIL.GPJ GINT STD AGS 3_1 LAB.GDT 11/07/2013 07:54:01

Bridgeway Consulting Ltd
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WINDOWLESS SAMPLER LOG

Project	Site	Consultant	EXPLORATORY HOLE No
East West Rail		Atkins	**WS162 - Wk36**
Job No: J11631	Date: 01-12-12 01-12-12	Ground Level (m):	Co-Ordinates ():
Contractor: Bridgeway Consulting			Sheet: 1 of 1

SAMPLES & TESTS			STRATA						
Depth	Type No	Test Result	Water	Reduced Level	Legend	Depth (Thickness)	DESCRIPTION	Field Test kPa HSV PP	Instrument/ Backfill
						0.30	Black DIRTY BALLAST of granite. Fines are granular fine ash.		
0.30-0.70	B					(0.40)	POSSIBLE MADE GROUND: Yellow SAND and GRAVEL. Sand is fine to coarse. Gravel is angular to subrounded fine to medium sandstone, mudstone and flint.		
0.50	D					0.70			
						(0.50)	Blue gravelly CLAY. Gravel is angular to subrounded fine to medium sandstone, mudstone and flint.		
1.00	D					1.20			
1.20-2.00	B						Firm medium locally high strength brown and grey mottled orange slightly sandy CLAY. Sand is fine to coarse. Some gypsum crystals from 2.0m.		
1.20-1.65	S	N7						74	
2.00-3.00	B								
2.00-2.45	S	N13						88	
						(3.40)			
3.00-4.60	B								
3.00-3.45	S	N8							
4.00-4.45	S	N7						63	
						4.60			
4.60-6.00	B						Stiff medium becoming very high strength laminated dark grey CLAY with rare shells fragments.		
5.00-5.45	S	N30							
						(1.85)		>225	
6.00-6.45	S	N54							
						6.45			

Progress and Water Observations

Date	Depth	Water Dpt	Dia. mm	% Rec
01-01-12	4.00	DRY	77	100
01-12-12	1.20	DRY	N/A	N/A
01-12-12	2.00	DRY	87	100
01-12-12	3.00	DRY	87	100
01-12-12	5.00	DRY	67	90
01-12-12	6.00	DRY	57	90

GENERAL REMARKS

1. Position scanned with CAT & genny prior to excavation.
2. Inspection pit excavated to 1.20mbgl prior to drilling.
3. Hole drilled at 23m 70ch West.

All dimensions in metres Scale 1:50	Client: Chiltern Railways Ltd	Method/ Plant Used: Dart Competitor Rig	Logged By: GD

GINT STD AGS 3_1 LAB.GLB BCL WS FIELD TEST K:\SITE INVESTIGATION\GINT PROJECTS\CURRENT PROJECTS\J11631 - EAST WEST RAIL.GPJ GINT STD AGS 3_1 LAB.GDT 11/07/2013 07:54:02

Bridgeway Consulting Ltd
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WINDOWLESS SAMPLER LOG

Project	Site	Consultant	EXPLORATORY HOLE No
East West Rail		Atkins	**WS163 - Wk35**
Job No: J11631	Date: 26-11-12, 27-11-12	Ground Level (m)	Co-Ordinates ()
Contractor: Bridgeway Consulting			Sheet: 1 of 1

SAMPLES & TESTS			STRATA						
Depth	Type No	Test Result	Water	Reduced Level	Legend	Depth (Thickness)	DESCRIPTION	Field Test kPa HSV PP	Instrument/ Backfill
						0.25	Black SLIGHTLY DIRTY BALLAST of granite. Fines are granular fine to coarse sand and ash.		
0.25-0.40	B					0.40			
0.30	D					(0.40)	MADE GROUND: Brownish yellow SAND and GRAVEL. Sand is fine to coarse. Gravel is angular to rounded fine to medium quartzite, sandstone and mudstone.		
0.40	D					0.80			
0.80-1.20	B					(0.40)	Yellowish brown BOULDERS of sandstone.		
1.00	D					1.20	Firm blue mottled brown slightly gravelly CLAY. Gravel is angular to subrounded fine to coarse sandstone and some shell fragments.		
1.20-1.65	S	N7				(0.40)			
			1.1			1.60	Grey low strength very gravelly sandy CLAY. Sand is fine to coarse. Gravel is subangular fine to coarse sandstone.		
						(0.40)			
						2.00	Firm low strength dark orangey brown sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is subangular fine to coarse flint. Rare rootlets.		
2.00	S	N0				(0.40)		25	
						2.40	Very loose orangey brown very sandy GRAVEL. Sand is fine to medium. Gravel is subangular to subrounded fine to coarse sandstone and quartzite.		
							Stiff high locally low strength dark grey CLAY with some shell fragments.	63	
3.00-3.45	S	N9						125	
4.00-4.45	S	N30				(4.05)		113	
5.00-5.45	S	N27						113	
6.00-6.45	S	N7				6.45			

Progress and Water Observations

Date	Depth	Water Dpt	Dia. mm	% Rec
26-11-12	1.20	DRY	N/A	N/A
26-11-12	2.00	1.7	101	100
26-11-12	3.00	1.67	101	70
26-11-12	4.00	1.67	101	100
26-11-12	5.00	1.67	86	90
26-11-12	6.00	1.67	76	100

GENERAL REMARKS

1. Position scanned with CAT & genny prior to excavation.
2. Inspection pit excavated to 1.20mbgl prior to drilling.
3. Hole drilled at 24m 50ch East.

All dimensions in metres Scale 1:50	Client: Chiltern Railways Ltd	Method/ Plant Used: Dart Competitor Rig	Logged By: GD

GINT STD AGS 3_1 LAB.GLB BCL WS FIELD TEST K:\SITE INVESTIGATION\GINT PROJECTS\CURRENT PROJECTS\J11631 - EAST WEST RAIL.GPJ GINT STD AGS 3_1 LAB.GDT 11/07/2013 07:54:03

Bridgeway Consulting Ltd
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WINDOWLESS SAMPLER LOG

Project	Site	Consultant	EXPLORATORY HOLE No
East West Rail		Atkins	**WS164 - Wk35**
Job No: J11631	Date: 27-11-12, 28-12-12	Ground Level (m)	Co-Ordinates ()
Contractor: Bridgeway Consulting			Sheet: 1 of 1

SAMPLES & TESTS			STRATA						
Depth	Type No	Test Result	Water	Reduced Level	Legend	Depth (Thickness)	DESCRIPTION	Field Test kPa HSV PP	Instrument/ Backfill
						0.30	Black SLIGHTLY DIRTY BALLAST of igneous rock. Fines are granular fine to coarse sand and ash.		
0.30-0.50	B					(0.50)	MADE GROUND: Yellow SAND and GRAVEL. Sand is fine to coarse. Gravel is subangulalr to subrounded fine to coarse sandstone. Occasional sandstone cobbles.		
0.50	ES					0.80			
0.80-1.20	B					(0.40)	Blue gravelly CLAY. Gravel is angular to subangular fine to medum sandstone.		
1.00	D					1.20			
1.00	ES						Loose dark brown clayey SAND with rare rootlets. Sand is fine to medium.		
1.20-1.60	D								
1.20-1.65	S	N9				(0.80)			
1.60-2.00	D								
						2.00			
2.00-3.80	B						Medium dense locally dense orangey brown slightly clayey very sandy GRAVEL. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse sandstone and flint.		
2.00-2.45	S	N26							
						(1.80)			
3.00-3.45	S	N28							
						3.80			
3.80-6.00	B						Stiff to very stiff high to very high strength laminated CLAY with some shell fragments.		
4.00-4.45	S	N19							
5.00-5.45	S	N31				(2.65)		188	
6.00-6.45	S	N32							
						6.45			

Progress and Water Observations

Date	Depth	Water Dpt	Dia. mm	% Rec
27-11-12	1.20	N/A	N/A	N/A
27-11-12	2.00	DRY	101	80
28-11-12	3.00	2.73	101	100
28-11-12	4.00	2.73	101	100
28-11-12	5.00	2.73	86	100
28-11-12	6.00	2.73	76	100

GENERAL REMARKS

1. Position scanned with CAT & genny prior to excavation.
2. Inspection pit excavated to 1.20mbgl prior to drilling.
3. Hole drilled at 24m 60ch East.

All dimensions in metres Scale 1:50	Client: Chiltern Railways Ltd	Method/ Plant Used: Dart Competitor Rig	Logged By: GD

GINT STD AGS 3_1 LAB.GLB BCL WS FIELD TEST K:\SITE INVESTIGATION\GINT PROJECTS\CURRENT PROJECTS\J11631 - EAST WEST RAIL.GPJ GINT STD AGS 3_1 LAB.GDT 11/07/2013 07:54:04

Annex A3

Water Eaton

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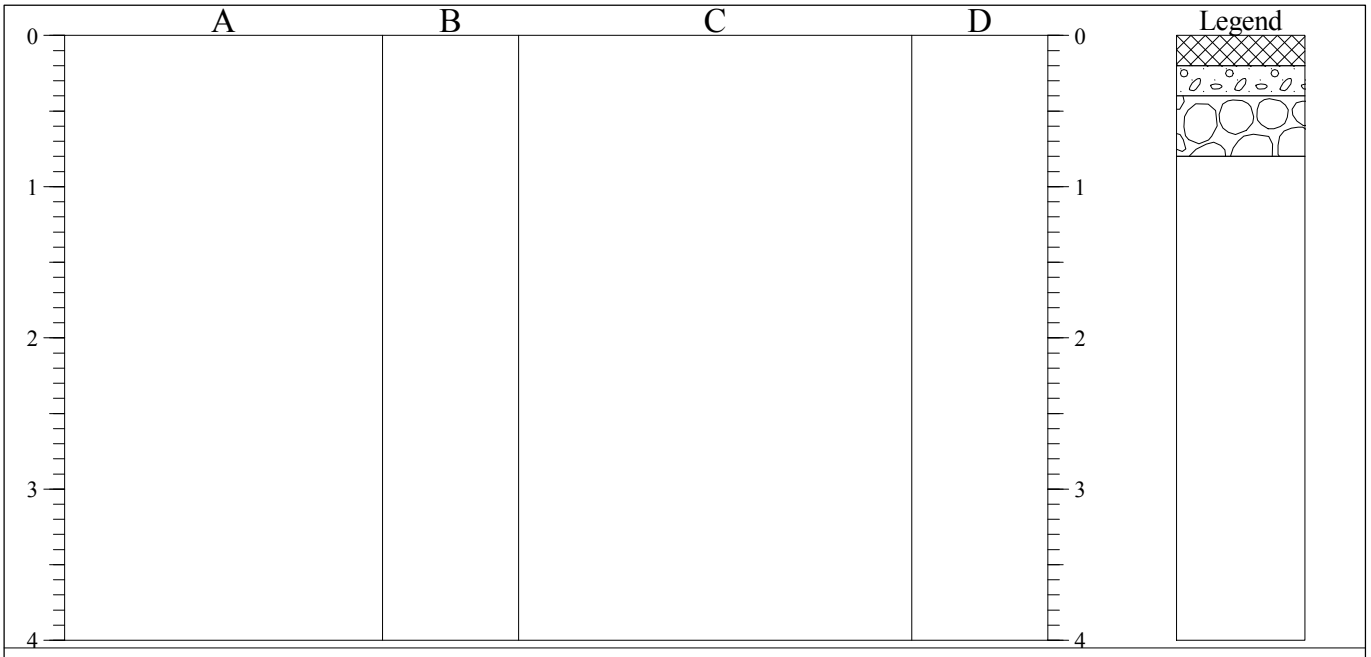
TRIAL PIT LOG

Project	Site	Consultant	TRIAL PIT No
East West Rail		Atkins	**41-TP2**
Job No: J11631 / Date: 13-12-12 13-12-12	Ground Level (m)	Co-Ordinates ()	
Contractor: Bridgeway Consulting			Sheet: 1 of 1

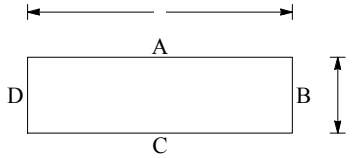


STRATA

SAMPLES & TESTS

Depth	No	DESCRIPTION	Depth	No	Remarks/Tests
0.00-0.20		MADE GROUND: Black SAND and GRAVEL. Sand is fine to coarse ash. Gravel is angular to subangular fine to coarse flint, sandstone and mudstone.			
0.20-0.40					
0.40-0.80		Yellow SAND and GRAVEL. Sand is fine to coarse. Gravel is angular to subrounded fine to medium sandstone and mudstone.			
		BOULDERS of sandstone.			

Shoring/Support:
Stability:



GENERAL REMARKS

1. Position scanned with CAT & genny prior to excavation.
2. Trial pit terminated at 0.8m due to sandstone boulders.

All dimensions in metres Scale 1:50	Client Atkins	Method/ Plant Used	Logged By EK

GINT STD AGS 3_1 LAB.GLB AGS3 UK TP K:\SITE INVESTIGATION\GINT PROJECTS\CURRENT PROJECTS\J11631 - EAST WEST RAIL.GPJ GINT STD AGS 3_1 LAB.GDT 10/01/2013 15:51:48

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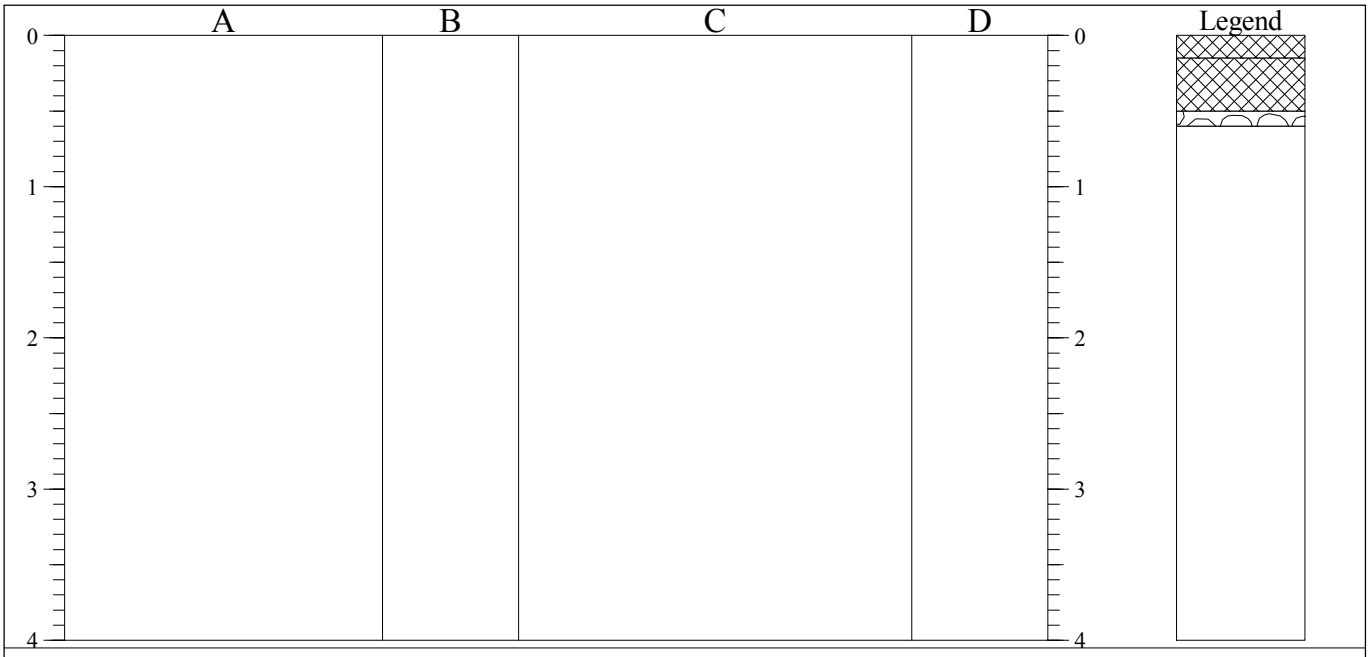
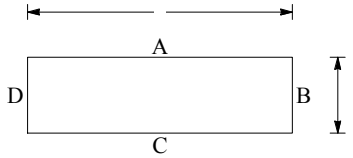
TRIAL PIT LOG

Project	Site	Consultant	TRIAL PIT No
East West Rail		Atkins	**41-TP3**
Job No: J11631 / Date: 13-12-12 13-12-12	Ground Level (m)	Co-Ordinates ()	
Contractor: Bridgeway Consulting			Sheet: 1 of 1



STRATA			SAMPLES & TESTS		
Depth	No	DESCRIPTION	Depth	No	Remarks/Tests
0.00-0.15 0.15-0.50		MADE GROUND: Black SAND and GRAVEL. Sand is ash. Gravel is angular to subangular fine to coarse flint, sandstone and mudstone.			
0.50-0.60		MADE GROUND: Yellow SAND and GRAVEL. Sand is fine to coarse. Gravel is angular to subrounded fine to coarse sandstone and mudstone. BOULDERS of sandstone.			

Shoring/Support:
Stability:



GENERAL REMARKS

1. Position scanned with CAT & genny prior to excavation.
2. Trial pit terminated at 0.6m due to sandstone boulders.

All dimensions in metres Scale 1:50	Client Atkins	Method/ Plant Used	Logged By EK

GINT STD AGS 3_1 LAB.GLB AGS3 UK TP K:\SITE INVESTIGATION\GINT PROJECTS\CURRENT PROJECTS\J11631 - EAST WEST RAIL.GPJ GINT STD AGS 3_1 LAB.GDT 10/01/2013 15:51:48

NICHOLLS COLTON GEOTECHNICAL

BOREHOLE RECORD - BH39

(Window Sampler)

Site
East West Rail Phase 1 - Off Track Investigation

Client
Atkins Limited

Boring diameter:	Casing diameter:	Project No.:
100 mm to 3.00m	100 mm to 2.00m	G13066

Logged by: NB	Ground Level:	Date: 28/03/2013	Location: -	Scale: 1:50

Samples & In situ Tests			Water	Level (mAOD)	Depth (m)	Strata Description	Legend	Backfill
Ref:	Depth (m)	SPT N						
E1	0.30-0.40					Vegetation over very soft red brown sandy CLAY with rare coarse angular limestone gravel and many roots.		
B2	0.50-0.60		▼		0.50			
E3	0.60-0.70					Soft orange brown and pale grey mottled sandy CLAY with occasional roots.		
E4	1.00-1.10							
D5	1.10-1.20					... with small pockets of silty fine to medium sand from 1.20m.		
S	1.20	N=3						
SD6	1.20-1.65				1.50			
D7	1.50-2.00					Firm orange brown and grey CLAY.		
S	2.00	N=2						
SD8	2.00-2.45							
D9	2.60-2.90				2.60	Stiff fissured grey CLAY.		
D10	2.90-3.00				2.90			
S	3.00	50/10mm			3.00	Stiff dark grey CLAY with many shells.		
						End of Borehole at 3.00 m		

Remarks and Water Observations

1. Hand dug starter pit to 1.20m to check for services.
2. Groundwater seepages were encountered at 0.70m during excavation of the hand dug starter pit.
3. The borehole was backfilled with the spoil arisings.

NICHOLLS COLTON GEOTECHNICAL

BOREHOLE RECORD - BH40

(Window Sampler)

Site
East West Rail Phase 1 - Off Track Investigation

Client
Atkins Limited

Boring diameter:	Casing diameter:	Project No.:
100 mm to 3.10m	100 mm to 2.00m	G13066

Logged by: NB	Ground Level:	Date: 28/03/2013	Location: -	Scale: 1:50

Samples & In situ Tests			Water	Level (mAOD)	Depth (m)	Strata Description	Legend	Backfill
Ref:	Depth (m)	SPT N						
						Turf over very soft red brown sandy CLAY.		
E1	0.30							
D2	0.30-0.45				0.45			
E3	0.60					Soft orange sandy slightly gravelly CLAY (gravel is coarse angular flint).		
B4	0.60-0.80				0.80			
E5	1.00		▼			Soft orange and grey brown locally sandy CLAY.		
D6	1.10-1.20							
S	1.20	N=6				... becoming firm from 1.30m.		
SD7	1.20-1.65				1.40			
D8	1.40-1.60				1.60	Firm orange brown and white mottled locally sandy CLAY.		
D9	1.60-2.00							
S	2.00	N=7				Firm orange grey and yellow mottled CLAY with occasional selenite crystals.		
SD10	2.00-2.45							
D11	2.00-2.60							
D12	2.60-3.00				2.60	Stiff fissured grey CLAY.		
S	3.00	50/5mm			3.05			
SD13	3.00-3.10				3.10	Weak grey LIMESTONE.		
						End of Borehole at 3.10 m		

Remarks and Water Observations

1. Hand dug starter pit to 1.20m to check for services.
2. Slight groundwater seepages were encountered at 1.00m during excavation of the hand dug starter pit.
3. The borehole was backfilled with the spoil arisings.

NICHOLLS COLTON GEOTECHNICAL

BOREHOLE RECORD - BH41

(Window Sampler)

Site
East West Rail Phase 1 - Off Track Investigation

Client
Atkins Limited

Boring diameter:
100 mm to 3.40m

Casing diameter:
100 mm to 2.00m

Project No.:
G13066

Logged by: NB

Ground Level:

Date: 28/03/2013

Location: -

Scale: 1:50

Samples & In situ Tests			Water	Level (mAOD)	Depth (m)	Strata Description	Legend	Backfill
Ref:	Depth (m)	SPT N						
			▼			MADE GROUND - turf over brown sandy topsoil.		
E1	0.30				0.30			
					0.50	MADE GROUND - very soft orange brown and pale grey sandy clay.		
E2	0.60							
E3	0.80-1.00				0.80	MADE GROUND - firm orange sandy clay.		
					1.10			
S	1.20	N=5				MADE GROUND - orange and black ashy clayey fine to coarse sand and fine to coarse angular rock and occasional slag gravel with a sulphurous odour.		
SD4	1.20-1.65							
D5	1.20-1.50							
D6	1.70-2.00				1.70			
S	2.00	N=10				Firm orange brown and grey mottled CLAY.		
SD7	2.00-2.45							
D8	2.00-2.50					Firm orange grey and yellow mottled CLAY.		
D9	2.50-3.00				2.40			
						Stiff fisssured grey CLAY.		
S	3.00	50/245mm						
SD10	3.00-3.40							
					3.35			
					3.40	Weak grey LIMESTONE.		
						End of Borehole at 3.40 m		

Sheet 1 of 1

Remarks and Water Observations

1. Hand dug starter pit to 1.20m to check for services.
2. Groundwater seepages were encountered at 0.20m during excavation of the hand dug starter pit.
3. The soils excavated within the starter pit were softened by the inflow of groundwater and turned to slurry.
4. Gas/groundwater monitoring pipe (slotted from 1.00m installed to 3.00m).

NICHOLLS COLTON GEOTECHNICAL

BOREHOLE RECORD - BH70

(Window Sampler)

Site
East West Rail Phase 1 - Off Track Investigation

Client
Atkins Limited

Boring diameter:
148 mm to 6.45m

Casing diameter:

Project No.:
G13066

Logged by: PP

Ground Level:

Date: 08/04/2010

Location: -

Scale: 1:50

Samples & In situ Tests			Water	Level (mAOD)	Depth (m)	Strata Description	Legend	Backfill
Ref:	Depth (m)	SPT N						
E1	0.00-0.20					TOPSOIL.		
D2	0.40-0.60				0.40	Firm light brown slightly sandy slightly organic CLAY.		
D3	0.80-1.10				0.70			
S	1.20	N=10				Firm yellow brown slightly sandy slightly gravelly CLAY. Gravel is sub angular to sub rounded fine to medium flint.		
B4	1.20-1.60							
B5	1.60-2.00				1.60	Stiff locally firm yellow grey and brown CLAY.		
S	2.00	N=13						
D6	2.00-2.45							
B7	2.00-3.00							
S	3.00	N=15						
D8	3.00-3.45							
B9	3.00-3.60							
B10	3.60-4.00				3.60	Stiff dark grey CLAY.		
S	4.00	N=20						
D11	4.00-4.45							
B12	4.00-5.00							
S	5.00	N=24						
D13	5.00-5.45							
B14	5.00-6.00							
S	6.00	N=24			6.00	*End of Borehole at 6.45 m*		
D15	6.00-6.45							

Remarks and Water Observations

1. Waiting for access problems to be resolved; 2 hours.
2. Hand dug starter pit to 1.20m to check for services.
3. No groundwater entries were recorded during boring operations.
4. The borehole was completed at 6.45m and backfilled with arisings.

BOREHOLE RECORD - BH99

(Window Sampler)

NICHOLLS COLTON GEOTECHNICAL

Site
East West Rail Phase 1 - Off Track Investigation

Client
Atkins Limited

Boring diameter:
148 mm to 6.45m

Casing diameter:

Project No.:
G13066

Logged by: PP

Ground Level:

Date: 09/04/2013

Location: -

Scale: 1:50

Samples & In situ Tests			Water	Level (mAOD)	Depth (m)	Strata Description	Legend	Backfill
Ref:	Depth (m)	SPT N						
D1	0.10-0.30					TOPSOIL.		
D2	0.50-0.90				0.40	Medium dense brown and orange brown slightly gravelly SAND. Gravel is angular to sub angular fine to coarse flint and quartz.		
S	1.20	N=29						
D3	1.20-1.65							
B4	1.20-2.00							
S	2.00	N=3			2.00			
D5	2.00-2.45					Firm yellow grey CLAY.		
B6	2.50-3.00				2.40	Stiff grey CLAY.		
S	3.00	N=11						
D7	3.00-3.45							
B8	3.00-4.00							
S	4.00	N=12						
B10	4.00-5.00							
D9	4.00-4.45							
S	5.00	N=21						
D11	5.00-5.45							
D12	5.00-6.00							
S	6.00	N=28						
D13	6.00-6.45							
					6.45	*End of Borehole at 6.45 m*		

Sheet 1 of 1

Remarks and Water Observations

1. Waiting for access problems to be resolved; 1.5 hours.
2. Hand dug starter pit to 1.20m to check for services.
3. Slight groundwater entry at 0.90m, water level did not rise.
4. Borehole was completed at 6.45m and backfilled with arisings.

NICHOLLS COLTON GEOTECHNICAL

BOREHOLE RECORD - BH100

(Window Sampler)

Site
East West Rail Phase 1 - Off Track Investigation

Client
Atkins Limited

Boring diameter:
100 mm to 6.45m

Casing diameter:

Project No.:
G13066

Logged by: PP

Ground Level:

Date: 12/04/2013

Location: -

Scale: 1:50

Samples & In situ Tests Ref:	Depth (m)	SPT N	Water	Level (mAOD)	Depth (m)	Strata Description	Legend	Backfill
E1	0.00-0.20					TOPSOIL.		
					0.40			
B2	0.50-1.00					Orange brown slightly clayey gravelly fine to coarse SAND. Gravel is angular to sub angular fine to medium quartz, flint and limestone.		
E2	0.50-1.00							
S	1.20	N=20						
D3	1.20-1.65							
B4	1.20-1.90							
D5	1.90-2.00				1.90			
S	2.00	N=4				Loose brown silty fine to medium SAND.		
D6	2.00-2.30							
D7	2.60-2.80				2.60			
D8	2.80-3.00				2.80	Firm brown CLAY		
S	3.00	N=13				Stiff grey CLAY.		
D10	3.00-3.50							
D9	3.00-3.45							
D11	3.50-4.00							
S	4.00	N=23						
D12	4.00-4.45							
D13	4.00-4.50							
D14	4.50-5.00							
S	5.00	N=35						
D15	5.00-5.45							
D16	5.00-5.50							
D17	5.50-6.00							
S	6.00	N=34						
D18	6.00-6.45							
					6.45	*End of Borehole at 6.45 m*		

Sheet 1 of 1

Remarks and Water Observations

1. Track rig to position; 1 Hour.
2. Hand dug starter pit to 1.20m to check for services.
3. No groundwater entries were recorded during boring operations.
4. Borehole completed at 6.45m and backfilled with arisings.

NICHOLLS COLTON GEOTECHNICAL

BOREHOLE RECORD - BH190

(Cable Percussion)

Site
East West Rail Phase 1 - Off Track Investigation

Client
Atkins Limited

Boring diameter:
150 mm to 10.00m

Casing diameter:

Project No.:
G13066

Logged by: PP

Ground Level:

Date: 10/04/2013

Location: -

Scale: 1:50

Samples & In situ Tests			Water	Level (mAOD)	Depth (m)	Strata Description	Legend	Backfill
Ref:	Depth (m)	SPT N						
B1	0.00-0.30					TOPSOIL.		
B2	0.30-0.70				0.30	Brown and grey slightly clayey slightly gravelly fine to coarse SAND. Gravel is angular to sub rounded fine to medium quartz.		
B3	0.70-1.20				0.70			
S	1.20	N=6				Loose yellow brown gravelly fine to coarse SAND. Gravel is angular to sub rounded fine to coarse limestone and quartz and flint.		
D5	1.70-2.00				1.70	... no soil sample recovered from SPT at 1.20m.		
S	2.00	N=6				Soft grey CLAY.		
D7	2.00-2.45				2.20			
B8	2.20-3.00					Stiff locally very stiff grey CLAY.		
U9	3.00-3.45	(19)						
D10	3.50							
B11	3.50-4.00							
S	4.00	N=18			4.00			
D13	4.00-4.45					Stiff locally very stiff grey CLAY with bands of grey silt.		
B14	4.50-5.00							
S	5.00	N=50						
D16	5.00-5.45							
B17	5.50-6.50		▼		5.50	Stiff locally very stiff grey silty CLAY.		
S	6.50	N=34						
D19	6.50-6.95							
D20	7.00-8.00		▽					
S	8.00	N=35						
D22	8.00-8.45							
D23	8.50-9.50							
						(continued next sheet)		Sheet 1 of 2

Remarks and Water Observations

1. Hand dug starter pit to 1.20m to check for services.
2. Groundwater seepages were encountered at 6.95m (casing at 2.50m) rising to stand at 5.50m after 5 minutes during boring operations.
3. On completion the borehole was backfilled with spoil arisings.

NICHOLLS COLTON GEOTECHNICAL

BOREHOLE RECORD - BH190

(Cable Percussion)

Site
East West Rail Phase 1 - Off Track Investigation

Client
Atkins Limited

Boring diameter:
150 mm to 10.00m

Casing diameter:

Project No.:
G13066

Logged by: PP

Ground Level:

Date: 10/04/2013

Location: -

Scale: 1:50

Samples & In situ Tests			Water	Level (mAOD)	Depth (m)	Strata Description	Legend	Backfill
Ref:	Depth (m)	SPT N						
S D25 D26	9.50 9.50-9.95 9.50-10.00	N=31				Stiff locally very stiff grey silty CLAY.		
					10.00	*End of Borehole at 10.00 m*		

Remarks and Water Observations

1. Hand dug starter pit to 1.20m to check for services.
2. Groundwater seepages were encountered at 6.95m (casing at 2.50m) rising to stand at 5.50m after 5 minutes during boring operations.
3. On completion the borehole was backfilled with spoil arisings.

NICHOLLS COLTON GEOTECHNICAL

BOREHOLE RECORD - BH191

(Window Sampler)

Site
East West Rail Phase 1 - Off Track Investigation

Client
Atkins Limited

Boring diameter:
148 mm to 4.00m

Casing diameter:

Project No.:
G13066

Logged by: PP

Ground Level:

Date: 10/04/2013

Location: -

Scale: 1:50

Samples & In situ Tests			Water	Level (mAOD)	Depth (m)	Strata Description	Legend	Backfill
Ref:	Depth (m)	SPT N						
B1	0.00-0.30					TOPSOIL.		
B2	0.30-0.50				0.30			
B3	0.50-1.00				0.50	Brown clayey gravelly fine to coarse SAND. Gravel is angular to sub angular fine to coarse limestone and quartz.		
S	1.20	N=7				Yellow brown gravelly fine to coarse SAND. Gravel is angular to sub angular fine to medium quartz and flint.		
B4	1.20-1.60							
B5	1.60-2.00				1.60			
S	2.00	N=17				Stiff locally very stiff dark grey CLAY.		
D6	2.00-2.45							
B7	2.00-3.00							
S	3.00	N=25						
D8	3.00-3.45							
B9	3.00-3.80							
D10	3.80-4.00				3.80			
S	4.00	50/85mm				Hard grey CLAY with many shell fragments and selenite crystals.		
S	5.00	50/230mm						
S	6.00	N=19						
					6.45	*End of Borehole at 6.45 m*		

Remarks and Water Observations

1. Hand dug starter pit to 1.20m to check for services.
2. Slight groundwater seepage at 0.80m, the water level did not rise.
3. Borehole completed at 6.45m and a groundwater monitoring standpipe installed to the base of the hole.

NICHOLLS COLTON GEOTECHNICAL

BOREHOLE RECORD - BH193

(Cable Percussion)

Site
East West Rail Phase 1 - Off Track Investigation

Client
Atkins Limited

Boring diameter:
150 mm to 20.00m

Casing diameter:

Project No.:
G13066

Logged by: PP

Ground Level:

Date: 08/04/2013-09/04/2013

Location: -

Scale: 1:50

Samples & In situ Tests			Water	Level (mAOD)	Depth (m)	Strata Description	Legend	Backfill
Ref:	Depth (m)	SPT N						
D1	0.00-0.30					MADE GROUND - Topsoil.		
B2	0.30-1.15				0.30	Firm locally stiff yellow brown and grey CLAY.		
UT3	1.20-1.65							
D4	1.70							
D5	1.70-2.00							
S	2.00	N=14						
D7	2.00-2.45							
B8	2.50-3.00							
UT9	3.00-3.45							
D10	3.50							
B11	3.50-4.00							
S	4.00	N=13						
D13	4.00-4.45							
B14	4.50-5.00				4.50	Stiff locally very stiff dark grey CLAY.		
UT15	5.00-5.40							
D16	5.45							
B17	5.50-6.50							
S	6.50	N=25						
D19	6.50-6.95							
B20	7.00-8.00							
U21	8.00-8.30	(39)						
D22	8.35							
B23	8.40-9.50							
						(continued next sheet)		

Remarks and Water Observations

1. Waiting for access problems to be resoved; 2 hours.
2. Hand dug starter pit to 1.20m to check for services.
3. Slight groundwater seepages were encountered at 15.85m (casing at 2.50m) during boring operations.
4. On completion the borehole was backfilled with spoil arisings.
5. Winch rig out of field due to soft ground; 1 hour.

NICHOLLS COLTON GEOTECHNICAL

BOREHOLE RECORD - BH193

(Cable Percussion)

Site
East West Rail Phase 1 - Off Track Investigation

Client
Atkins Limited

Boring diameter:
150 mm to 20.00m

Casing diameter:

Project No.:
G13066

Logged by: PP

Ground Level:

Date: 08/04/2013-09/04/2013

Location: -

Scale: 1:50

Samples & In situ Tests			Water	Level (mAOD)	Depth (m)	Strata Description	Legend	Backfill
Ref:	Depth (m)	SPT N						
						Stiff locally very stiff dark grey CLAY.		
S	9.50	N=29						
D25	9.50-9.95							
B26	10.00-11.00							
U27	11.00-11.45	(40)						
D28	11.50							
B29	11.50-12.50							
S	12.50	N=45						
D31	12.50-12.95							
B32	13.00-14.00							
U33	14.00-14.45	(45)						
D34	14.50							
B35	14.50-15.50							
S	15.50	50/225mm						
D37	15.50-15.85		▼					
B38	15.85-17.00							
S	17.00	50/210mm						
D40	17.00-17.35							
D41	17.35-18.50							
						(continued next sheet)		

Remarks and Water Observations

1. Waiting for access problems to be resoved; 2 hours.
2. Hand dug starter pit to 1.20m to check for services.
3. Slight groundwater seepages were encountered at 15.85m (casing at 2.50m) during boring operations.
4. On completion the borehole was backfilled with spoil arisings.
5. Winch rig out of field due to soft ground; 1 hour.

NICHOLLS COLTON GEOTECHNICAL

BOREHOLE RECORD - BH193

(Cable Percussion)

Site
East West Rail Phase 1 - Off Track Investigation

Client
Atkins Limited

Boring diameter:
150 mm to 20.00m

Casing diameter:

Project No.:
G13066

Logged by: PP

Ground Level:

Date: 08/04/2013-09/04/2013

Location: -

Scale: 1:50

Samples & In situ Tests			Water	Level (mAOD)	Depth (m)	Strata Description	Legend	Backfill
Ref:	Depth (m)	SPT N						
S D43 D44	18.50 18.50-18.80 18.80-20.00	50/195mm				Stiff locally very stiff dark grey CLAY.		
S D46	20.00 20.00-20.35	50/205mm			20.00	*End of Borehole at 20.00 m*		

Sheet 3 of 3

Remarks and Water Observations

1. Waiting for access problems to be resoved; 2 hours.
2. Hand dug starter pit to 1.20m to check for services.
3. Slight groundwater seepages were encountered at 15.85m (casing at 2.50m) during boring operations.
4. On completion the borehole was backfilled with spoil arisings.
5. Winch rig out of field due to soft ground; 1 hour.

NICHOLLS COLTON GEOTECHNICAL

BOREHOLE RECORD - BH194

(Cable Percussion)

Site
East West Rail Phase 1 - Off Track Investigation

Client
Atkins Limited

Boring diameter:
150 mm to 17.40m

Casing diameter:

Project No.:
G13066

Logged by: PP

Ground Level:

Date: 03/04/2013

Location: -

Scale: 1:50

Samples & In situ Tests			Water	Level (mAOD)	Depth (m)	Strata Description	Legend	Backfill
Ref:	Depth (m)	SPT N						
B1	0.00-0.30					TOPSOIL.		
B2	0.30-1.15				0.30	Firm orange brown and grey slightly sandy slightly gravelly CLAY. Gravel is angular to sub angular fine to medium limestone.		
UT3	1.20-1.55							
D4	1.60							
B5	1.60-2.00							
S	2.00	N=6						
B8	2.50-3.00				2.50	Stiff orange brown and grey slightly sandy slightly gravelly CLAY. Gravel is angular to sub angular fine to medium limestone.		
UT9	3.00-3.45							
D10	3.50				3.50	Stiff grey clay with many shell fragments.		
B11	3.55-4.00							
S	4.00	N=30						
D13	4.00-4.45							
B14	4.50-5.00							
U15	5.00-5.80	(40)						
D7	5.00							
D16	5.85				5.85	Hard grey SILT.		
B17	5.90-6.50							
S	6.50	50/275mm			6.50	Very stiff grey CLAY with many shell fragments.		
D19	6.50-6.95							
B20	7.00-8.00							
S	8.00	46/190mm						
D22	8.00-8.45							
B23	8.50-9.50							
						(continued next sheet)		

Remarks and Water Observations

1. Hand dug starter pit to 1.20m to check for services.
2. No groundwater seepages were encountered during boring operations.
3. On completion the borehole was backfilled with spoil arisings.

NICHOLLS COLTON GEOTECHNICAL

BOREHOLE RECORD - BH194

(Cable Percussion)

Site
East West Rail Phase 1 - Off Track Investigation

Client
Atkins Limited

Boring diameter:
150 mm to 17.40m

Casing diameter:

Project No.:
G13066

Logged by: PP

Ground Level:

Date: 03/04/2013

Location: -

Scale: 1:50

Samples & In situ Tests			Water	Level (mAOD)	Depth (m)	Strata Description	Legend	Backfill
Ref:	Depth (m)	SPT N						
						Very stiff grey CLAY with many shell fragments.		
S	9.50	50/220mm						
D25	9.50-9.95							
B26	10.00-11.00							
S	11.00	50/175mm						
D28	11.00-11.45							
B29	11.50-12.50							
S	12.50	50/220mm						
D31	12.50-12.95							
B32	13.00-14.00							
S	14.00	50/210mm						
D34	14.00-14.45							
B35	14.50-15.50							
S	15.50	50/285mm						
D37	15.50-15.90							
B38	15.90-17.00							
S	17.00	50/270mm						
D40	17.00-17.40							
					17.40	*End of Borehole at 17.40 m*		

Remarks and Water Observations

1. Hand dug starter pit to 1.20m to check for services.
2. No groundwater seepages were encountered during boring operations.
3. On completion the borehole was backfilled with spoil arisings.

NICHOLLS COLTON GEOTECHNICAL

BOREHOLE RECORD - BH195

(Window Sampler)

Site: East West Rail Phase 1 - Off Track Investigation

Client: Atkins Limited

Boring diameter: 148 mm to 7.45m

Casing diameter:

Project No.: G13066

Logged by: PP

Ground Level:

Date: 05/04/2013

Location: -

Scale: 1:50

Samples & In situ Tests			Water	Level (mAOD)	Depth (m)	Strata Description	Legend	Backfill
Ref:	Depth (m)	SPT N						
E1	0.10-0.50					Firm brown and yellow brown slightly sandy CLAY.		
D2	0.60-1.10				0.50	Firm locally stiff yellow brown and grey CLAY.		
S	1.20	N=11						
D3	1.20-1.65							
B4	1.20-1.60							
B5	1.60-2.00				1.60	Stiff grey locally brown CLAY with many selenite crystals and shell fragments.		
S	2.00	N=12						
D6	2.00-2.45							
B7	2.00-3.00							
S	3.00	N=10						
D8	3.00-3.45							
B9	3.00-3.85							
D10	3.85-4.00				3.85	Stiff locally very stiff dark grey CLAY with many shell fragments and selenite crystals.		
S	4.00	N=18						
D11	4.00-4.45							
B12	4.00-5.00							
S	5.00	N=46						
D13	5.00-5.45							
S	6.00	N=42						
D14	6.00-6.45							
S	7.00	50/285mm						
D15	7.00-7.45							
					7.45	*End of Borehole at 7.45 m*		

Remarks and Water Observations

1. Hand dug starter pit to 1.20m to check for services.
2. No groundwater entries were recorded during boring operations.
3. Borehole completed at 7.45m and backfilled with arisings.

NICHOLLS COLTON GEOTECHNICAL

BOREHOLE RECORD - BH196

(Window Sampler)

Site
East West Rail Phase 1 - Off Track Investigation

Client
Atkins Limited

Boring diameter:
148 mm to 7.45m

Casing diameter:

Project No.:
G13066

Logged by: PP

Ground Level:

Date: 04/04/2013

Location: -

Scale: 1:50

Samples & In situ Tests			Water	Level (mAOD)	Depth (m)	Strata Description	Legend	Backfill
Ref:	Depth (m)	SPT N						
E1	0.00-0.20					TOPSOIL.		
D2	0.30-0.60				0.30			
B3	0.60-1.00				0.60	Firm orange brownand grey slightly sandy slightly gravelly CLAY. Gravel is angular to sub angular fine to medium limestone.		
S	1.20	N=15				Firm orange brown and grey CLAY with rare partings of fine to medium sand sized selenite crystals.		
D10	1.20-1.65							
B4	1.20-1.80							
B5	1.80-2.00				1.80			
S	2.00	N=16				Firm locally stiff yellow brown and grey CLAY with many selenite crystals.		
D10	2.00-2.45							
B6	2.00-2.60							
B7	2.60-2.90				2.60			
B8	2.90-3.50					Stiff dark grey CLAY with many shell fragments and occasional selenite crystals.		
S	3.00	N=9						
D10	3.00-3.45							
B9	3.50-4.00				3.50	Very stiff dark grey CLAY with many shell fragments.		
S	4.00	N=32						
B10	4.00-5.00							
D10	4.00-4.45							
S	5.00	50/280mm						
D10	5.00-5.45							
S	6.00	50/200mm						
D10	6.00-6.45							
S	7.00	50/240mm			7.00			
D10	7.00-7.45					*End of Borehole at 7.45 m*		

Remarks and Water Observations

1. Hand dug starter pit to 1.20m to check for services.
2. No groundwater entries were recorded during boring operations.
3. Borehole completed at 7.45m and backfilled with arisings.

NICHOLLS COLTON GEOTECHNICAL

BOREHOLE RECORD - BH197

(Cable Percussion)

Site
East West Rail Phase 1 - Off Track Investigation

Client
Atkins Limited

Boring diameter:
150 mm to 20.00m

Casing diameter:

Project No.:
G13066

Logged by: PP

Ground Level:

Date: 02/01/1900-03/04/2013

Location: -

Scale: 1:50

Samples & In situ Tests			Water	Level (mAOD)	Depth (m)	Strata Description	Legend	Backfill
Ref:	Depth (m)	SPT N						
B1	0.05-1.15					Firm orange brown and grey slightly sandy slightly gravelly CLAY. Gravel is angular to sub angular fine to medium limestone.		
UT2	1.20-1.65							
D3	1.70							
D4	1.70-2.00							
S	2.00	N=7						
D6	2.00-2.45							
B7	2.50-3.00				2.50	Stiff orange brown and grey slightly sandy CLAY.		
UT8	3.00-3.45							
D9	3.50		▼		3.50	Firm grey slightly sandy SILT.		
D10	3.70-4.00							
S	4.00	N=24			4.00	Stiff locally very stiff grey CLAY.		
D12	4.00-4.45							
B13	4.50-5.00							
UT14	5.00-5.25							
D15	5.30							
B16	5.35-6.50							
S	6.50	N=32						
D17	6.50-6.95							
B19	7.00-8.00							
U20	8.00-8.25	(40)						
D21	8.30				8.30			
B22	8.35-9.50					Stiff locally very stiff dark grey clay with many shell fragments.		
						(continued next sheet)		

Remarks and Water Observations

1. Hand dug starter pit to 1.20m to check for services.
2. Slight groundwater seepages were encountered at 3.50m during boring operations.
3. On completion the borehole was backfilled with spoil arisings.

NICHOLLS COLTON GEOTECHNICAL

BOREHOLE RECORD - BH197

(Cable Percussion)

Site
East West Rail Phase 1 - Off Track Investigation

Client
Atkins Limited

Boring diameter:
150 mm to 20.00m

Casing diameter:

Project No.:
G13066

Logged by: PP

Ground Level:

Date: 02/01/1900-03/04/2013

Location: -

Scale: 1:50

Samples & In situ Tests			Water	Level (mAOD)	Depth (m)	Strata Description	Legend	Backfill
Ref:	Depth (m)	SPT N						
S	9.50	50/255mm				Stiff locally very stiff dark grey clay with many shell fragments.		
D24	9.50-9.90							
B25	9.90-11.00							
S	11.00	50/220mm						
D27	11.00-11.35							
B28	11.40-12.50							
S	12.50	50/115mm						
D30	12.50-12.75							
B31	12.75-14.00							
S	14.00	49/220mm						
D33	14.00-14.35							
D34	14.40-15.50							
S	15.50	50/195mm						
D36	15.50-15.85							
B37	15.90-17.00							
S	17.00	50/255mm						
D39	17.00-17.40							
B40	17.45-18.50							
						(continued next sheet)		

Remarks and Water Observations

1. Hand dug starter pit to 1.20m to check for services.
2. Slight groundwater seepages were encountered at 3.50m during boring operations.
3. On completion the borehole was backfilled with spoil arisings.

BOREHOLE RECORD - BH197

(Cable Percussion)

NICHOLLS COLTON GEOTECHNICAL

Site
East West Rail Phase 1 - Off Track Investigation

Client
Atkins Limited

Boring diameter:
150 mm to 20.00m

Casing diameter:

Project No.:
G13066

Logged by: PP

Ground Level:

Date: 02/01/1900-03/04/2013

Location: -

Scale: 1:50

Samples & In situ Tests			Water	Level (mAOD)	Depth (m)	Strata Description	Legend	Backfill
Ref:	Depth (m)	SPT N						
S D42 B43	18.50 18.50-18.85 18.95-20.00	50/255mm				Stiff locally very stiff dark grey clay with many shell fragments.		
S D45	20.00 20.00-20.45	50/260mm			20.00	*End of Borehole at 20.00 m*		

Remarks and Water Observations

1. Hand dug starter pit to 1.20m to check for services.
2. Slight groundwater seepages were encountered at 3.50m during boring operations.
3. On completion the borehole was backfilled with spoil arisings.

NICHOLLS COLTON GEOTECHNICAL

BOREHOLE RECORD - BH216

(Cable Percussion)

Site
East West Rail Phase 1 - Off Track Investigation

Client
Atkins Limited

Boring diameter:
150 mm to 14.00m

Casing diameter:

Project No.:
G13066

Logged by: PP

Ground Level:

Date: 09/04/2013

Location: -

Scale: 1:50

Samples & In situ Tests			Water	Level (mAOD)	Depth (m)	Strata Description	Legend	Backfill
Ref:	Depth (m)	SPT N						
B1	0.00-0.30					Topsoil.		
B2	0.30-1.15				0.30	Orange brown fine to medium SAND.		
S	1.20	N=9			1.20			
D4	1.20-1.65					Loose orange brown slightly gravelly fine to coarse SAND. Gravel is angular to sub angular fine to medium quartz.		
B5	1.70-2.00							
S	2.00	N=6						
B7	2.35-3.00				2.35	Firm yellow grey slightly silty CLAY.		
S	3.00	N=9						
D9	3.00-3.45				3.25			
B10	3.50-4.00					Stiff grey CLAY with occasional shell fragments.		
U11	4.00-4.45	(25)						
D12	4.50							
B13	4.50-5.00							
S	5.00	N=19						
D15	5.00-5.45							
B16	5.50-6.50							
U17	6.50-6.95	(30)						
D18	7.00							
B19	7.00-8.00							
S	8.00	N=25						
D21	8.00-8.45							
B22	8.50-9.50							
						(continued next sheet)		

Remarks and Water Observations

1. Waiting for access problems to be resolved; 1.5 hours.
2. Hand dug starter pit to 1.20m to check for services.
3. Water added to assist drilling from 1.70m to 2.35m.
4. No groundwater seepages were encountered during boring operations.
5. On completion the borehole was backfilled with spoil arisings.

BOREHOLE RECORD - BH216

(Cable Percussion)

NICHOLLS COLTON GEOTECHNICAL

Site
East West Rail Phase 1 - Off Track Investigation

Client
Atkins Limited

Boring diameter:
150 mm to 14.00m

Casing diameter:

Project No.:
G13066

Logged by: PP

Ground Level:

Date: 09/04/2013

Location: -

Scale: 1:50

Samples & In situ Tests			Water	Level (mAOD)	Depth (m)	Strata Description	Legend	Backfill
Ref:	Depth (m)	SPT N						
						Stiff grey CLAY with occasional shell fragments.		
U23	9.50-9.80	(36)						
D24	9.85							
B25	9.85-11.00							
S	11.00	N=49						
D27	11.00-11.45							
B28	11.50-12.50							
U29	12.50-12.80	(50)						
D30	12.85							
B31	12.85-14.00							
					14.00	*End of Borehole at 14.00 m*		

Remarks and Water Observations

1. Waiting for access problems to be resolved; 1.5 hours.
2. Hand dug starter pit to 1.20m to check for services.
3. Water added to assist drilling from 1.70m to 2.35m.
4. No groundwater seepages were encountered during boring operations.
5. On completion the borehole was backfilled with spoil arisings.

Bridgeway Consulting Ltd
Bridgeway House, Technology Drive
NG9 1LA
Telephone: 01159191111

WINDOWLESS SAMPLER LOG

Project	Site	Consultant	EXPLORATORY HOLE No
East West Rail		Atkins	ONP WS01 - Wk10
Job No: J11631	Date: 06-06-13 06-06-13	Ground Level (m)	Co-Ordinates ()
Contractor: Bridgeway Consulting			Sheet: 1 of 1

SAMPLES & TESTS				STRATA					
Depth	Type No	Test Result	Water	Reduced Level	Legend	Depth (Thickness)	DESCRIPTION	Field Test kPa HSV PP	Instrument/ Backfill
0.00-0.40	B					(0.40) 0.40	Grey DIRTY BALLAST of limestone. Fines are granular fine to coarse sand.		
0.40	D					(0.40) 0.80	MADE GROUND: Brown very gravelly SAND. Sand is fine to coarse. Gravel is angular to rounded fine to coarse granite and quartzite.		
0.40	ES								
0.50-0.80	B								
0.50-0.80	D					(0.40) 1.20	Very soft grey mottled light brown CLAY.		
0.90-1.20	B								
1.20-1.65	S	N7					Firm medium locally high strength yellowish brown slightly sandy gravelly CLAY. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse limestone and quartzite.	104	
1.30	D							63	
1.35-2.00	B					(0.80) 2.00		50	
2.00-2.45	S	N5					Firm medium strength yellowish brown sandy CLAY. Sand is fine to coarse.		
2.05-2.60	B					(0.60) 2.60			
2.05	D							75	
2.65-3.00	B					(0.40) 3.00	Firm medium strength light grey slightly sandy CLAY. Sand is fine to coarse.	75	
2.65	D							75	
3.00-3.45	S	N7					Stiff medium becoming high and very high strength dark brown CLAY.	67	
3.05	D							54	
							From 3.5m occasional shell fragments.	92	
								117	
4.00-4.45	S	N24							
4.05-5.00	B					(2.95)		133	
								225	
5.00-5.45	S	N35							
5.50-5.95	S	N93							
5.55-5.95	B							>225	
5.55	D					5.95			

Progress and Water Observations

Date	Depth	Water Dpt	Dia. mm	% Rec
06-06-13	1.20	DRY	N/A	N/A
06-06-13	2.00	DRY	87	70
06-06-13	3.00	DRY	87	100
06-06-13	4.00	DRY	77	100
06-06-13	5.00	DRY	67	100
06-06-13	5.50	DRY	67	40

GENERAL REMARKS

1. Position scanned with CAT & genny prior to excavation.
2. Inspection pit excavated to 1.20mbgl prior to drilling.

All dimensions in metres Scale 1:50	Client: Chiltern Railways Ltd	Method/ Plant Used: Premier Rig	Logged By: AH

GINT STD AGS 3_1 LAB.GLB BCL WS FIELD TEST K:\SITE INVESTIGATION\GINT PROJECTS\CURRENT PROJECTS\J11631 - EAST WEST RAIL.GPJ GINT STD AGS 3_1 LAB.GDT 22/07/2013 10:42:46

Bridgeway Consulting Ltd
Bridgeway House, Technology Drive
NG9 1LA
Telephone: 01159191111

WINDOWLESS SAMPLER LOG

Project	Site	Consultant	EXPLORATORY HOLE No
East West Rail		Atkins	ONP WS02 - Wk03
Job No: J11631	Date: 16-04-13 16-04-13	Ground Level (m)	Co-Ordinates ()
Contractor: Bridgeway Consulting			Sheet: 1 of 1

SAMPLES & TESTS				STRATA					
Depth	Type No	Test Result	Water	Reduced Level	Legend	Depth (Thickness)	DESCRIPTION	Field Test kPa HSV PP	Instrument/ Backfill
0.00-0.20	B					0.20	Grey and cream CLEAN BALLAST of limestone. Gravel is angular to subangular medium to coarse.		
0.20-0.50	B					(0.40) 0.60	MADE GROUND: Red angular to subangular COBBLES of brick.		
0.50	D						Stiff blue mottled yellow slightly gravelly CLAY. Gravel is subrounded to rounded fine to meidum quartzite. At 0.6m rare yellow angular to subangular boulders of sandstone.		
0.50	ES								
0.60-0.80	B					(1.00)			
1.10	D								
1.10	ES								
1.20-1.65	S	N8				1.60			
1.60-1.90	B					(0.40) 2.00	Stiff medium strength grey green with black specks slightly gravelly CLAY. Gravel is subrounded to rounded fine to medium quartzite.	40 60	
1.90-2.00	D								
2.00-2.45	S	N8					Firm very low strength blue mottled brown yellow CLAY with occasional pockets of fine to coarse sand. From 3.25m no mottling.		
2.20-2.90	B					(1.50)		18 14 12	
2.90-3.00	D								
3.00-3.30	B								
3.00-3.45	S	N8				3.50			
3.25-3.40	D						Firm low to medium strength dark brown blue sandy CLAY. Sand is fine to medium. Occasional fossils. Some white specks from 4.0m.	48 32 38	
3.90-4.00	D					(1.00)			
4.00		N10				4.50			
4.80-5.00	D						Extremely weak thinly laminated dark grey MUDSTONE. From 4.3-4.8m fine to medium shell fragments.	48	
5.00-5.45	S	N44							
5.30-5.80	D					(1.95)			
5.80-6.00	D								
6.00-6.45	S	N41				6.45			

Progress and Water Observations

Date	Depth	Water Dpt	Dia. mm	% Rec
16-04-13	1.20	0.3	N/A	N/A
16-04-13	2.00		87	80
16-04-13	3.00		87	100
16-04-13	4.00		77	100
16-04-13	5.00		67	100
16-04-13	6.00		57	70

GENERAL REMARKS

1. Position scanned with CAT & genny prior to excavation.
2. Inspection pit excavated to 1.20mbgl prior to drilling.

All dimensions in metres Scale 1:50	Client: Chiltern Railways Ltd	Method/ Plant Used: Dart Competitor Rig	Logged By: EK

GINT STD AGS 3_1 LAB.GLB BCL WS FIELD TEST K:\SITE INVESTIGATION\GINT PROJECTS\CURRENT PROJECTS\J11631 - EAST WEST RAIL.GPJ GINT STD AGS 3_1 LAB.GDT 22/07/2013 10:42:48

Bridgeway Consulting Ltd
Bridgeway House, Technology Drive
NG9 1LA
Telephone: 01159191111

WINDOWLESS SAMPLER LOG

Project	Site	Consultant	EXPLORATORY HOLE No
East West Rail		Atkins	ONP WS03 - Wk03
Job No: J11631	Date: 18-04-13, 19-04-13	Ground Level (m)	Co-Ordinates ()
Contractor: Bridgeway Consulting			Sheet: 1 of 1

SAMPLES & TESTS				STRATA					
Depth	Type No	Test Result	Water	Reduced Level	Legend	Depth (Thickness)	DESCRIPTION	Field Test kPa HSV PP	Instrument/ Backfill
0.20-0.50	B					0.20	Grass and shrubs over dark brown clayey SAND. Sand is fine to coarse. Frequent roots.		
0.60	D					(1.00)	Soft to firm yellow mottled blueish grey CLAY. Occasional pockets of yellow fine to coarse sand. Rare rootlets.		
0.60	ES					1.20			
1.20-1.65	S	N5					Very soft low locally medium strength yellowish brown mottled grey and black slightly sandy slightly gravelly CLAY. Sand is fine to medium. Gravel is angular to subangular fine to medium coal. Occasional rootlets.	29	
1.30-1.40	D					(0.80)		55	
1.40-2.00	B					2.00		26	
2.00-2.45	S	N5					Soft to firm low strength yellowish brown and grey slightly sandy CLAY. Sand is fine to medium.		
2.20-2.30	D					(0.50)		32	
2.30-2.50	B					2.50			
2.50-2.60	D						Soft to firm medium locally low strength yellowish brown and grey slightly gravelly CLAY. Gravel is subangular to subrounded fine sandstone. Some shell fragments. Occasional rootlets.	48	
2.60-3.80	B							44	
3.00-3.45	S	N8				(1.30)		32	
						3.80		47	
3.80-4.00	B						Firm greyish brown slightly sandy CLAY. Sand is fine to medium.	56	
4.00-4.15	S	N64/ 145 mm				4.15			

Progress and Water Observations

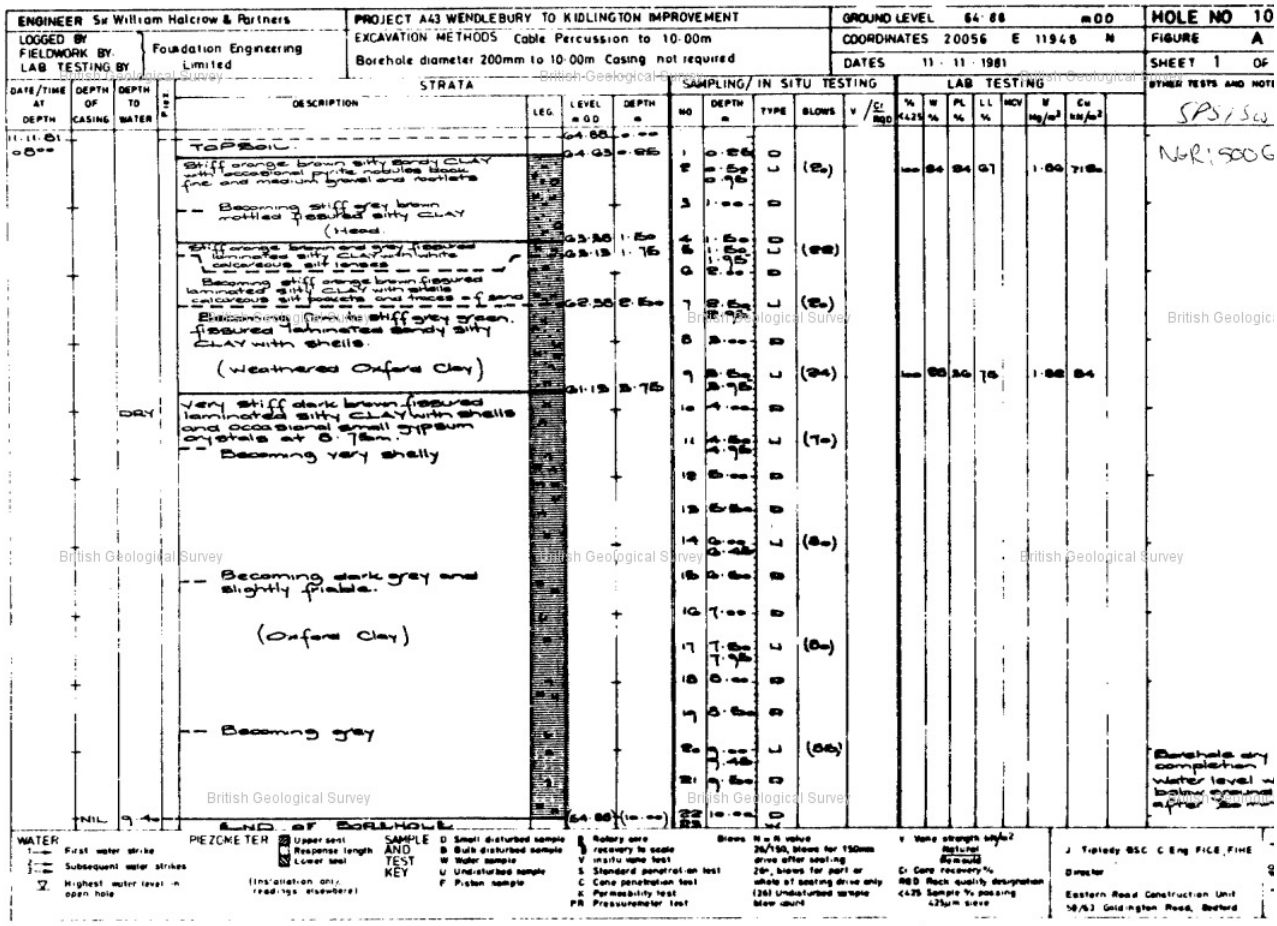
Date	Depth	Water Dpt	Dia. mm	% Rec
18-04-13	1.20	N/A	N/A	N/A
18-04-13	2.00	DRY	87	80
19-04-13	3.00	DRY	87	90
19-04-13	4.00	DRY	77	90

GENERAL REMARKS

1. Position scanned with CAT & genny prior to excavation.
2. Inspection pit excavated to 1.20mbgl prior to drilling.

All dimensions in metres Scale 1:50	Client: Chiltern Railways Ltd	Method/ Plant Used: Dart Competitor Rig	Logged By: EK

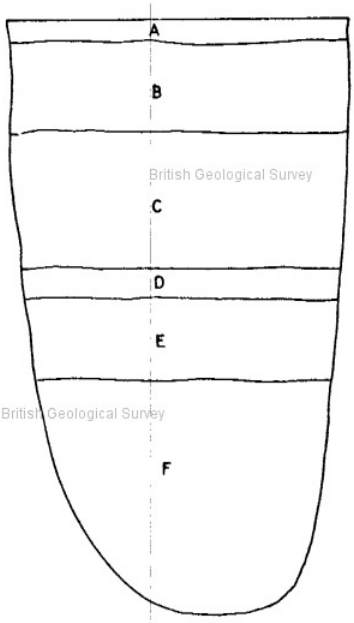
GINT STD AGS 3_1 LAB.GLB BCL WS FIELD TEST K:\SITE INVESTIGATION\GINT PROJECTS\CURRENT PROJECTS\J11631 - EAST WEST RAIL.GPJ GINT STD AGS 3_1 LAB.GDT 22/07/2013 10:42:50


ENGINEER Sir William Halcrow & Partners
LOGGED BY
FIELDWORK BY
LAB TESTING BY
Foundation Engineering Limited
PROJECT A43 WENDLEBURY TO KIDLINGTON IMPROVEMENT
EXCAVATION METHODS Cable Percussion to 10·00m
Borehole diameter 200mm to 10·00m Casing not required
GROUND LEVEL 64·88 mOD
COORDINATES 20056 E 11948 N
DATES 11 · 11 · 1981
HOLE NO 10
FIGURE A
SHEET 1 OF
STRATA
SAMPLING/ IN SITU TESTING
LAB TESTING
OTHER TESTS AND NOTES
DATE/TIME AT DEPTH
DEPTH OF CASING
DEPTH TO WATER
DESCRIPTION
LEG.
LEVEL mOD
DEPTH m
NO
DEPTH m
TYPE
BLOWS
TOPSOIL
Stiff orange brown silty sandy CLAY with occasional pyrite nodules black fine and medium gravel and rootlets
Becoming stiff grey brown mottled fissured silty CLAY
(Head)
Stiff orange brown and grey fissured laminated silty CLAY with white calcareous silt lenses
Becoming stiff orange brown fissured laminated silty CLAY with white calcareous silt pockets and traces of sand
Becoming from the stiff grey green fissured laminated sandy silty CLAY with shells
(Weathered Oxford Clay)
Very stiff dark brown fissured laminated silty CLAY with shells and occasional small gypsum crystals at 8·78m.
Becoming very shelly
Becoming dark grey and slightly fissile.
(Oxford Clay)
Becoming grey
END OF BOREHOLE
DRY
NIL
WATER
PIEZOMETER
SAMPLE AND TEST KEY
Borehole dry on completion
Eastern Road Construction Unit
50/63 Gold Hill Road, Bedford

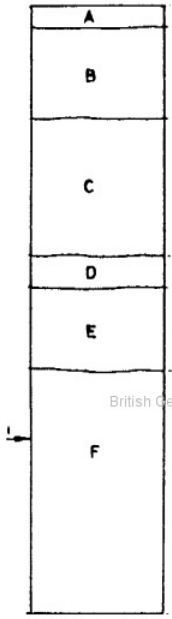
ENGINEER: Sir William Halcrow & Partners	PROJECT A 43 WENDLEBURY TO KIDLINGTON IMPROVEMENT	GROUND LEVEL 62·42 m O.D.	HOLE NO T
LOGGED BY: / FIELDWORK BY: Foundation Engineering Limited / LAB. TESTING BY:	EXCAVATION METHODS MECHANICAL EXCAVATION DIMENSIONS 2·5 X 1·0m shored NGR: 5019 1212	COORDINATES 20195 E 12127 N	FIGURE
		DATES 11 · 11 · 1981	SHEET 1

British Geological Survey

NORTH WEST FACE



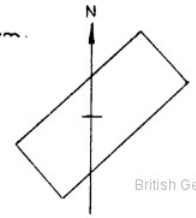
NORTH EAST FACE



Depth (m)	Sampling	
0.00		A. Brown slightly sandy silty CLAY w occasional gravel and roots (Top
0.15	D 0.20 B 0.20	B. Firm pale brown and grey brown s with occasional gravel and roots, w crumb structure (Head)
0.80	D 0.80 B 1.00	C. Soft to firm pale grey and pale brown mottled extremely closely silty CLAY. Fissures mostly sm polished occasionally of persiste greater than 0.30m.
	D 1.20	D. Firm pale grey and grey brown to extremley closely fissured silty frequent lenses of white calca silt (weathered Oxford clay)
1.70	D 1.90	E. Firm grey brown and brown par very thinly laminated extremel
2.00	B 2.00	fissured slightly carbonaceous CLAY with frequent bivalve sh
	D 2.20	F. Stiff and very stiff brittle dar
2.60	B 2.60	thickly laminated fissile sligh carbonaceous silty CLAY (Ox
	D 2.80	3.10m. Becoming very stiff fissured with frequent and ammonite shell fra
	B 3.00	
	D 3.20	
	D 3.80	
4.30	D 4.30	Trial Pit penetration.

NOTE

1. Seepage at 3.10m.



DISCONTINUITIES
Joint directions, 070/15 dip direction/dip in deg.
Fracture spacing, Rf 20/50/200, minimum/average/maximum in mms.
DEPTH
All depths, levels and thicknesses in metres.

WATER
First water strike
Subsequent water strikes

J. Tiplady BSC. C.Eng FI
FIHE.
Director
Eastern Road Construction
98/83 Goldington Road, Bed

SP51SW

Record of Borehole No.P

Sheet 1

Location OXFORD A40

Client DEPARTMENT OF TRANSPORT
N : 211 753
E : 450 173

Type of boring LIGHT CABLE PERCUSSION (PILCON 150)

Job No. 11311028 Ground level 62.63m O.D. Diameter / 150mm to 20.00m Casing / 150mm to 1.50m

Daily Progress	Ground water levels	Depth of casing	Samples: Depth	Samples: No.	Samples: Type	Scale	Strata: Depth	Strata: Reduced level	Description of strata
4.8.86			0.20	1	D		0.25	62.38	TOPSOIL.
			0.30	2	D				Stiff to very stiff friable orange brown mottled light grey and brown sandy silty CLAY with a little sub-angular fine flint gravel and occasional fine rootlets.
							(0.85)		
			1.00 - 1.45	3	U(21)		1.10	61.53	
			1.45	4	D				Firm horizontally poorly thinly laminated closely fissured brown with light grey staining on discontinuities silty CLAY with white calcareous silt on laminations traces of shell fragments and fine rootlets.
		1.50					(0.65)		
			1.80	5	D		1.75	60.88	
			2.00 - 2.45	6	U(30)				
			2.45	7	D				Firm to stiff horizontally poorly thinly laminated closely fissured variegated olive green and brown slightly to moderately calcareous silty CLAY(CV) with small inclusions and laminations of white calcareous silt, small pockets of fine to medium sand size gypsum crystals and traces of shell fragments.
			2.75	8	D		(1.50)		
			3.00 - 3.45	9	U(33)				
			3.45	10	D		3.25	59.38	
			3.75	11	D				
			4.00 - 4.45	12	U (60)				Stiff becoming very stiff horizontally thinly laminated closely fissured dark brownish olive grey with bands of brown calcareous silty CLAY with traces of shell fragments, inc. bivalves and ammonites.
			4.45	13	D		(1.45)		
			4.75	14	D		4.70	57.93	
			5.00 - 5.45	15	U(90)*				
			5.45	16	D				Very stiff horizontally thinly laminated closely fissured brownish olive grey slightly calcareous silty CLAY with occasional shells and shell fragments, inc. bivalves.
			5.50 - 5.95	17	U(90)				
			5.95	18	D				
			6.50	19	D				
			7.00 - 7.45	20	U(100)				
			7.45	21	D		(5.30)		
			7.70	22	D				
			8.50 - 8.95	23	U(90)				
			8.95	24	D				
			9.50	25	D				
							10.00	52.63	(borehole continues...)

Key
U.... undisturbed 102mm diameter sample
D.... disturbed jar sample
B.... disturbed bulk sample
W.... water sample
S( ). standard penetration test
C( ). cone penetration test
(33). number of blows ('N' value)
▼.. groundwater encountered

Remarks
Service pit excavated to 1.00m.
U4 No. 17 : 290mm Recovery.
Remainder > 380mm Recovery.
U4 No. 15 : stripped thread in borehole. Tube damaged in recovery.
U4 No. 3 : 320mm Recovery.
U4 No. 23 : 240mm Recovery.

GROUND ENGINEERING

GE 3035

GROUND ENGINEERING

Trial Pit No. T

LOCATION A40 NORTH OF OXFORD IMPROVEMENT

COORDINATES : 211 776 N
450 538 E

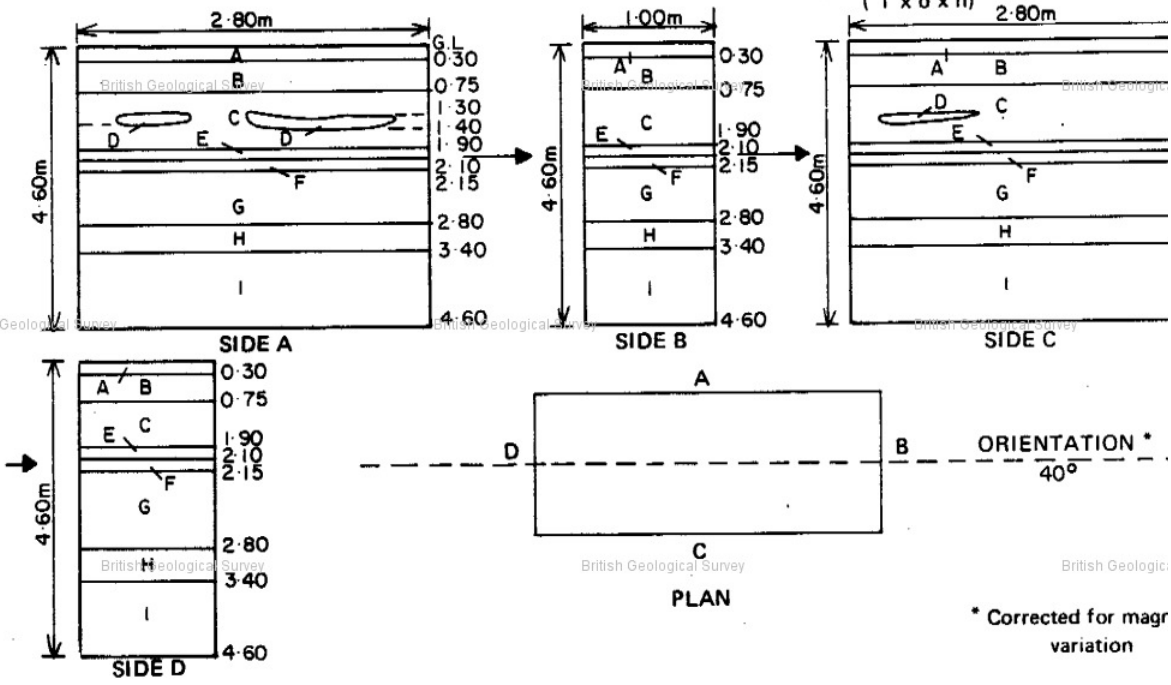
JOB No. 11311028

SP51SW

GROUND LEVEL 60.24m A.O.D

DATE 7.7.86

DIMENSIONS 2.80x1.00x4 (l x b x h)



* Corrected for magn variation

STRATA

A) G.L. - 0.30m TOPSOIL.

B) 0.30 - 0.75m Stiff friable yellowish brown slightly sandy silty CLAY of intermediate plasticity with occasional rounded medium to coarse gravel and cobble sized flints, occasional fine rootlets and traces of brick fragments at 0.6m (Head)

C) 0.75 - 1.90m Stiff very closely fissured grey mottled olive brown silty CLAY of high plasticity with occasional small pockets of white calcareous sand and traces of fine rootlets. -with occasional medium to coarse gravel and cobble sized flints to 1.0m (Weathered Oxford Clay).

SAMPLES

No	Type	Depth
See attached sheet		

REMARKS

/continued..

LAING

TRIAL PIT RECORD - S1

NICHOLLS COLTON GEOTECHNICAL

Site: East West Rail Phase 1 - Off Track Investigation

Client: Atkins Limited

Method of excavation: Mechanical Excavator

Dimensions: 0.60m x 2.10m

Project No: G13066

Logged by: PP

Ground Level:

Date: 12/07/2013

Location: -

Scale: 1:25

Samples & In situ Tests Ref:	Depth (m)	Result	Water	Level (mAOD)	Depth (m)	Strata Description	Legend	Backfill
					0.05	MADE GROUND - Bituminous macadam.		
					0.20	MADE GROUND - Concrete.		
E1	0.30							
D2	0.30					MADE GROUND - Topsoil.		
B4	0.50-0.70				0.45			
E3	0.60					Firm locally stiff yellow brown and grey slightly sandy slightly gravelly CLAY. Gravel is angular to sub angular fine to medium flint and quartz.		
D5	1.00-1.20							
					1.40			
D6	1.60-1.90					Firm locally stiff grey locally yellow brown slightly sandy CLAY with many shell fragments.		
D7	2.60-29.00				2.60	Firm locally stiff grey and dark grey slightly organic CLAY with partings of sand sized selenite crystals. Occasional sandstone boulders from 2.90 to 3.40m.		
D8	3.30-3.40							
					3.40	*End of Trial Pit 3.40 m*		

Remarks and Water Observations

1. Trial pit walls did not collapse during excavation.
2. No significant groundwater entries were recorded during excavation.
3. Trial pit completed at 3.40m and a soakaway test constructed.
4. No visual or olfactory evidence of contamination was recorded unless noted within the descriptions.

NICHOLLS COLTON GEOTECHNICAL

TRIAL PIT RECORD - S4

Site: East West Rail Phase 1 - Off Track Investigation

Client: Atkins Limited

Method of excavation: Mechanical Excavator

Dimensions: 0.60m x 1.70m

Project No: G13066

Logged by: PP

Ground Level:

Date: 12/07/2013

Location: -

Scale: 1:25

Samples & In situ Tests Ref:	Depth (m)	Result	Water	Level (mAOD)	Depth (m)	Strata Description	Legend	Backfill
					0.10	MADE GROUND - Bituminous macadam.		
					0.20	MADE GROUND - Sub-base.		
E1	0.30					MADE GROUND - Black ash.		
					0.50			
E2 D3	0.60 0.60-0.90					Firm grey slightly sandy slightly gravelly slightly organic CLAY. Gravel is angular to sub rounded fine to coarse quartz and flint.		
					1.10			
D4	1.20-1.40					Firm green grey slightly organic SILT.		
					1.60			
D5	1.70-1.90					Firm orange brown sandy CLAY with occasional sand lenses.		
D6	2.20-2.40							
					2.80			
D7	2.90-3.10					Stiff dark brown grey CLAY.		
					3.10	*End of Trial Pit 3.10 m*		

Sheet 1 of 1

Remarks and Water Observations

1. Trial pit walls did not collapse during excavation.
2. No significant groundwater entries were recorded during excavation however on completion seepages were noted below 2.30m.
3. Trial pit completed at 3.10m and a soakaway test constructed.
4. No visual or olfactory evidence of contamination was recorded unless noted within the descriptions.

NICHOLLS COLTON GEOTECHNICAL

TRIAL PIT RECORD - S5

Site: East West Rail Phase 1 - Off Track Investigation

Client: Atkins Limited

Method of excavation: Mechanical Excavator

Dimensions: 0.60m x 2.20m

Project No: G13066

Logged by: PP

Ground Level:

Date: 11/07/2013

Location: -

Scale: 1:25

Samples & In situ Tests			Water	Level (mAOD)	Depth (m)	Strata Description	Legend	Backfill
Ref:	Depth (m)	Result						
D1	0.00-0.20					MADE GROUND - Topsoil.		
D2	0.20-0.40				0.20	MADE GROUND - Stiff yellow brown and grey slightly sandy slightly gravelly clay. Gravel is anglar to sub rounded fine to coarse brick and quartz.		
D3	0.30							
D4	0.60				0.60	Stiff yellow brown and grey slightly sndy slightly gravelly CLAY. Gravel is angula rot sub rounded fine to coarse quartz.		
D5	1.40-1.60							
D6	2.60-2.80				2.60	Stiff dark grey CLAY with many sand sized selenite crystals.		
D7	3.20-3.40							
					3.40	*End of Trial Pit 3.40 m*		

Sheet 1 of 1

Remarks and Water Observations

1. Trial pit walls did not collapse during excavation.
2. No significant groundwater entries were recorded during excavation.
3. Trial pit completed at 3.40m anda soakaway test constructed.
4. PID reading on sample B2 at 0.20 to 0.40m = 0.7ppm.
5. No visual or olfactory evidence of contamination was recorded unless noted within the descriptions.

NICHOLLS COLTON GEOTECHNICAL

TRIAL PIT RECORD - S8

Site: East West Rail Phase 1 - Off Track Investigation

Client: Atkins Limited

Method of excavation: Mechanical Excavator

Dimensions: 0.60m x 1.70m

Project No: G13066

Logged by: PP

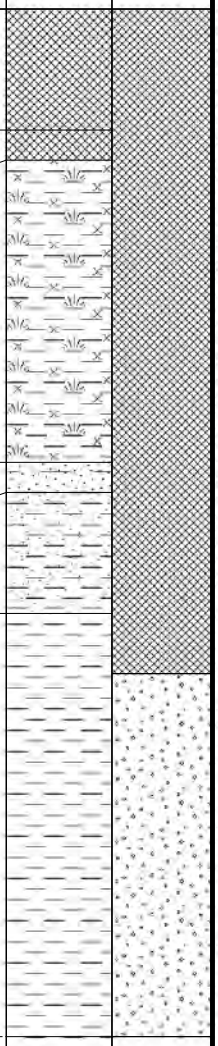
Ground Level:

Date: 12/07/2013

Location: -

Scale: 1:25

Samples & In situ Tests Ref:	Depth (m)	Result	Water	Level (mAOD)	Depth (m)	Strata Description	Legend	Backfill
B1	0.00-0.40					MADE GROUND - Mixed Ballast and sub-base.		
					0.40			
E2	0.50				0.50	MADE GROUND - Bituminous macadam.		
E3	0.70					Firm grey organic CLAY.		
B4	0.70-0.90							
D5	1.50-1.60				1.50	Yellow brown clayey fine to medium SAND.		
					1.60			
D6	1.70-1.90					Stiff grey slightly sandy CLAY.		
					2.00			
D7	2.10-2.40					Stiff brown grey highly fissile CLAY with many shell fragments.		
D8	2.80-3.10							
					3.40	*End of Trial Pit 3.40 m*		



Sheet 1 of 1

Remarks and Water Observations

1. Trial pit walls did not collapse during excavation.
2. No significant groundwater entries were recorded during excavation however on completion seepages were noted below 1.40m.
3. Trial pit completed at 3.40m and a soakaway test constructed.
4. No visual or olfactory evidence of contamination was recorded unless noted within the descriptions.

NICHOLLS COLTON GEOTECHNICAL

TRIAL PIT RECORD - T41

Site: East West Rail Phase 1 - Off Track Investigation

Client: Atkins Limited

Method of excavation: Mechanical Excavator

Dimensions: 0.60m x 2.50m

Project No: G13066

Logged by: PP

Ground Level:

Date: 11/07/2013

Location: -

Scale: 1:25

Samples & In situ Tests Ref:	Depth (m)	Result	Water	Level (mAOD)	Depth (m)	Strata Description	Legend	Backfill
					0.20	MADE GROUND - Crushed brick, concrete and bituminous materials.		
E1 D2	0.30 0.30					MADE GROUND - Stiff grey brown slightly sandy slightly gravelly clay with a number of railway sleepers with a strong odour of creosote. Gravel is angular to sub rounded fine to coarse brick, quartz and flint..		
E3	0.70-0.90				0.70	MADE GROUND - Black ash.		
					0.90			
B4	1.00-1.40					Stiff yellow brown and grey slightly sandy slightly organic CLAY.		
B5	1.90-2.30					Occasional sandstone boulders encountered from 2.40 to 3.50m.		
D6	2.70-2.90							
D7	3.50-3.70				3.50	Very stiff dark grey CLAY with many shell fragments.		
					3.70	*End of Trial Pit 3.70 m*		

Sheet 1 of 1

Remarks and Water Observations

1. Trial pit walls did not collapse during excavation.
2. No significant groundwater entries were recorded during excavation.
3. Trial pit completed at 3.70m and backfilled with arisings.
4. PID reading on sample D2 at 0.30m = 23.9ppm.
5. PID reading on sample B4 at 1.00 to 1.40m = 4.1ppm.
6. No visual or olfactory evidence of contamination was recorded unless noted within the descriptions.

NICHOLLS COLTON GEOTECHNICAL

TRIAL PIT RECORD - T42

Site: East West Rail Phase 1 - Off Track Investigation

Client: Atkins Limited

Method of excavation: Mechanical Excavator

Dimensions: 0.60m x 2.10m

Project No: G13066

Logged by: PP

Ground Level:

Date: 11/07/2013

Location: -

Scale: 1:25

Samples & In situ Tests Ref:	Depth (m)	Result	Water	Level (mAOD)	Depth (m)	Strata Description	Legend	Backfill
B1	0.00-0.20					MADE GROUND - Concrete.		
					0.20			
E1	0.30					MADE GROUND - Black ash with coal and brick fragments.		
D2	0.30				0.40			
E2	0.30					MADE GROUND - Stiff grey slightly sandy slightly gravelly clay. Gravel is angular to sub rounded fine to coarse brick, coal and ash.		
D3	0.30							
E3	0.60							
D4	0.60							
E4	0.60							
D5	0.60-0.80							
E5	1.00				1.00			
B6	1.00-1.30					Firm green grey slightly organic SILT.		
E6	1.20							
B7	1.20-1.50							
D7	1.70-2.00				1.70			
						Firm locally stiff yellow brown and grey slightly sandy slightly gravelly CLAY. Gravel is angular to sub angular fine to medium flint and quartz.		
B8	2.00-2.40							
D8	2.30-2.60							
D9	2.70-3.00							
D9	3.00-3.30							
					3.40	*End of Trial Pit 3.40 m*		

Sheet 1 of 1

Remarks and Water Observations

1. Trial pit walls did not collapse during excavation.
2. No significant groundwater entries were recorded during excavation.
3. Trial pit completed at 3.40m and a soakaway test constructed (S3).
4. PID reading on sample D2 at 0.30m = 1.4ppm.
5. PID reading on sample D4 at 0.60m = 1.3ppm.
6. No visual or olfactory evidence of contamination was recorded unless noted within the descriptions.

NICHOLLS COLTON GEOTECHNICAL

TRIAL PIT RECORD - T43

Site: East West Rail Phase 1 - Off Track Investigation

Client: Atkins Limited

Method of excavation: Mechanical Excavator

Dimensions: 0.60m x 2.10m

Project No: G13066

Logged by: PP

Ground Level:

Date: 11/07/2013

Location: -

Scale: 1:25

Samples & In situ Tests			Water	Level (mAOD)	Depth (m)	Strata Description	Legend	Backfill
Ref:	Depth (m)	Result						
						MADE GROUND - Sub-base.		
					0.20	MADE GROUND - Firm locally stiff green grey slightly sandy slightly gravelly slightly organic clay. Gravel is angular to sub rounded fine to coarse brick.		
					1.20	Firm locally stiff green grey slightly sandy slightly gravelly slightly organic CLAY with occasional black mottlingGravel is sub angular to sub rounded fine to coarse quartz and flint.		
					2.30	Stiff yellow brown and pale grey sandy CLAY with occasional quartz gravels.		
					3.00	Very stiff dark grey CLAY with occasional shell fragments.		
					3.50	*End of Trial Pit 3.50 m*		

Sheet 1 of 1

Remarks and Water Observations

1. Trial pit walls did not collapse during excavation.
2. No significant groundwater entries were recorded during excavation.
3. Trial pit completed at 3.40m and a soakaway test constructed.
4. PID reading on sample D3 at 0.30m = 3.6ppm.
5. PID reading on sample D5 at 0.60 to 0.80m = 2.9ppm.
6. No visual or olfactory evidence of contamination was recorded unless noted within the descriptions.

NICHOLLS COLTON GEOTECHNICAL

TRIAL PIT RECORD - T44

Site: East West Rail Phase 1 - Off Track Investigation

Client: Atkins Limited

Method of excavation: Mechanical Excavator

Dimensions: 0.60m x 2.50m

Project No: G13066

Logged by: PP

Ground Level:

Date: 11/07/2013

Location: -

Scale: 1:25

Samples & In situ Tests Ref:	Depth (m)	Result	Water	Level (mAOD)	Depth (m)	Strata Description	Legend	Backfill
E1 D2	0.30 0.30					MADE GROUND - Crushed brick, concrete and bituminous materials.		
E3 B4	0.60 0.60-0.90				0.60	MADE GROUND - Yellow brown and grey clayey gravelly fine to coarse sand. Gravel is angular to sub rounded fine to coarse concrete, mudstone and bituminous macadam.		
E5	1.00				0.90	Firm green grey slightly organic SILT.		
D6	1.20-1.60				1.20	Orange brown sandy slightly gravelly CLAY. Gravel is angular to sub angular fine to medium quartz and flint.		
B7	2.00-2.50				2.00	Stiff locally very stiff highly fissile dark grey brown CLAY with many shell fragments.		
D8	3.00-3.50							
D9	4.00-4.50					*Continued next sheet*		

Remarks and Water Observations

1. Trial pit walls noted to collapse from 1.20 to 2.00m.
2. Groundwater entry at 2.00m, water level did not rise.
3. Trial pit completed at 4.60m and backfilled with arisings.
4. PID reading on sample B4 at 0.60 to 0.90m = 1.5ppm.
5. PID reading on sample B7 at 2.00 to 2.50m = 1.2ppm.
6. No visual or olfactory evidence of contamination was recorded unless noted within the descriptions.

NICHOLLS COLTON GEOTECHNICAL

TRIAL PIT RECORD - T44

Site: East West Rail Phase 1 - Off Track Investigation

Client	Method of excavation	Dimensions	Project No:
	Mechanical Excavator	0.60m x 2.50m	G13066

Logged by: PP	Ground Level:	Date: 11/07/2013	Location: -	Scale: 1:25

Samples & In situ Tests			Water	Level (mAOD)	Depth (m)	Strata Description	Legend	Backfill
Ref:	Depth (m)	Result						
					4.60	*End of Trial Pit 4.60 m*		

Remarks and Water Observations

1. Trial pit walls noted to collapse from 1.20 to 2.00m.
2. Groundwater entry at 2.00m, water level did not rise.
3. Trial pit completed at 4.60m and backfilled with arisings.
4. PID reading on sample B4 at 0.60 to 0.90m = 1.5ppm.
5. PID reading on sample B7 at 2.00 to 2.50m = 1.2ppm.
6. No visual or olfactory evidence of contamination was recorded unless noted within the descriptions.

CC GROUND INVESTIGATIONS LTD

INSPECTION PIT LOG

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Pit No **TB032**

Sheet 1 of 1

Project Name: East - West Rail Phase 1	Project No: **C3723**	Co-ords: E 450078 N 211932 Level: mAD	Date 16/09/2013
Location: Bicester to Oxford		Dimensions: m Depth 1.20m m	Scale 1 : 9.375
Client: Atkins Rail Ltd			Logged By MA

(m)	Water Levels	Samples & In Situ Testing No/Type	Depth (m)	Result	Description	Depth (m)	Level (mAD)	Legend
		B ES	0.00 0.00 - 0.20		MADE GROUND: Grey and light grey GRAVEL. Gravel is angular and subangular coarse ballast (CLEAN BALLAST).	(0.20)		
					MADE GROUND: Reddish brown clayey very gravelly SAND. Gravel is angular and subangular medium to coarse ballast.	0.20		
		B ES	0.50			(0.40)		
					Soft to firm greenish brown locally greyish brown slightly sandy CLAY locally with a slight organic odour.	0.60		
		H	0.70	58				
						(0.60)		
1		B ES	1.00					1
	Dry				Inspection pit completed at 1.20m	1.20		

DRAFT

REMARKS:

EQUIPMENT: Hand digging tools.

METHOD: Hand dug inspection pit: 0.00-1.20m.

STABILITY: Trial pit sides unstable 0.00-0.20m.

GROUNDWATER: None encountered.

PID TESTING: PID testing carried out at regular intervals, 0.0ppm recorded.

BACKFILL: On completion trial pit backfilled with compact arisings.

LOCATION: OXD MP27.75 -137.50m four foot. 0.55m to nearest running rail.

REMARKS: All measurements from top of sleeper (concrete 160mm thickness). TRL DCP test carried out 1.20-2.20m.

Logged in accordance with NR/SP/TRK/9039.

CC GROUND INVESTIGATIONS LTD

INSPECTION PIT LOG

Telephone: 01452 739165 , Fax: 01452 739220 , Email: info@ccground.co.uk

Pit No **TB033**

Sheet 1 of 1

Project Name: East - West Rail Phase 1	Project No: **C3723**	Co-ords: E 450108 N 211973 Level: mAD	Date 17/09/2013
Location: Bicester to Oxford		Dimensions: m Depth 1.20m m	Scale 1 : 9.375
Client: Atkins Rail Ltd			Logged By MA

(m)	Water Levels	Samples & In Situ Testing No/Type	Depth (m)	Result	Description	Depth (m)	Level (mAD)	Legend
		B ES	0.00 0.00 - 0.20		MADE GROUND: Greyish brown and brown slightly ashy sandy GRAVEL. Gravel is angular and subangular fine to coarse ballast and clinker. Approximately 40% undersized with fines of ash and degraded ballast (DIRTY BALLAST).	(0.20)		
					MADE GROUND: Yellowish brown and brown slightly clayey very sandy GRAVEL. Gravel is subangular and subrounded fine to coarse limestone and siliceous material.	0.20		
		D	0.30			(0.35)		
		B ES	0.50			0.55		
		H	0.60		Firm greyish brown locally dark grey slightly sandy slightly gravelly CLAY locally with a slight organic odour. Gravel is angular to subrounded fine and medium limestone and siliceous material.			
1		D ES	1.00			(0.65)		1
	Dry			71	Inspection pit completed at 1.20m	1.20		

DRAFT

REMARKS:

EQUIPMENT: Hand digging tools.

METHOD: Hand dug inspection pit: 0.00-1.20m.

STABILITY: Trial pit sides unstable 0.00-0.20m.

GROUNDWATER: None encountered.

PID TESTING: PID testing carried out at regular intervals, 0.0ppm recorded.

BACKFILL: On completion trial pit backfilled with compact arisings.

LOCATION: OXD MP27.75 -187.50m MOD sidings four foot. 0.65m to nearest running rail.

REMARKS: All measurements from top of sleeper (wooden 120mm thickness).

Logged in accordance with NR/SP/TRK/9039.

CC GROUND INVESTIGATIONS LTD

INSPECTION PIT LOG

Telephone: 01452 739165 , Fax: 01452 739220 , Email: info@ccground.co.uk

Pit No **TB034**

Sheet 1 of 1

Project Name: East - West Rail Phase 1	Project No: **C3723**	Co-ords: E 450131 N 212017 Level: mAD	Date 17/09/2013
Location: Bicester to Oxford		Dimensions: m Depth 1.20m m	Scale 1 : 9.375
Client: Atkins Rail Ltd			Logged By MA

(m)	Water Levels	Samples & In Situ Testing No/Type	Depth (m)	Result	Description	Depth (m)	Level (mAD)	Legend
		B ES	0.00 0.00 - 0.50		MADE GROUND: Grey and light grey GRAVEL. Gravel is angular and subangular coarse ballast (CLEAN BALLAST).	(0.25)		
					MADE GROUND: Greyish brown sandy GRAVEL. Gravel is angular and subangular fine to coarse ballast. Approximately 20% undersized with fines of degraded ballast (SLIGHTLY DIRTY BALLAST).	0.25 (0.45)		
		D	0.75		MADE GROUND: Yellowish brown and brown slightly clayey gravelly SAND. Gravel is angular to subrounded fine to coarse ballast and limestone.	0.70 (0.10)		
1		B ES	1.00		Soft greenish brown locally dark greyish brown slightly sandy slightly gravelly CLAY. Gravel is subangular and subrounded fine and medium limestone and siliceous material.	0.80 (0.40)		1
	Dry				Inspection pit completed at 1.20m	1.20		

DRAFT

REMARKS:

EQUIPMENT: Hand digging tools.

METHOD: Hand dug inspection pit: 0.00-1.20m.

STABILITY: Trial pit sides unstable 0.00-0.70m.

GROUNDWATER: None encountered.

PID TESTING: PID testing carried out at regular intervals, 0.0ppm recorded.

BACKFILL: On completion trial pit backfilled with compact arisings.

LOCATION: OXD MP27.75 -235.50m four foot. 0.60m to nearest running rail.

REMARKS: All measurements from top of sleeper (concrete 160mm thickness). TRL DCP test carried out 1.20-2.20m.

Logged in accordance with NR/SP/TRK/9039.

CC GROUND INVESTIGATIONS LTD

INSPECTION PIT LOG

Telephone: 01452 739165 , Fax: 01452 739220 , Email: info@ccground.co.uk

Pit No **TB035**

Sheet 1 of 1

Project Name: East - West Rail Phase 1	Project No: **C3723**	Co-ords: E 450162 N 212056 Level: mAD	Date 17/09/2013
Location: Bicester to Oxford		Dimensions: m Depth 1.20m m	Scale 1 : 9.375
Client: Atkins Rail Ltd			Logged By MA

(m)	Water Levels	Samples & In Situ Testing No/Type	Depth (m)	Result	Description	Depth (m)	Level (mAD)	Legend
		B ES	0.00 0.00 - 0.25		MADE GROUND: Grey and light grey slightly sandy GRAVEL. Gravel is angular and subangular fine to coarse ballast (SLIGHTLY DIRTY BALLAST).	(0.10) 0.10		
					MADE GROUND: Greyish brown and brown slightly ashy slightly sandy GRAVEL. Gravel is angular and subangular fine to coarse ballast and clinker. Approximately 50% undersized with fines of ash and degraded ballast (DIRTY BALLAST).	(0.15) 0.25		
					MADE GROUND: Brown locally yellowish brown clayey very sandy GRAVEL. Gravel is angular to subrounded fine to coarse limestone and siliceous material.			
		B ES	0.50		0.45-0.70m: With low cobble content. Cobbles are limestone.	(0.45) 0.70		
					Soft greyish brown and brown slightly sandy gravelly CLAY with low cobble content. Gravel is angular to subrounded fine to coarse limestone and siliceous material. Cobbles are limestone.			
1		B ES	1.00			(0.50)		1
	Dry				Inspection pit completed at 1.20m	1.20		

DRAFT

REMARKS:

EQUIPMENT: Hand digging tools.

METHOD: Hand dug inspection pit: 0.00-1.20m.

STABILITY: Trial pit sides unstable 0.00-0.25m.

GROUNDWATER: None encountered.

PID TESTING: PID testing carried out at regular intervals, 0.0ppm recorded.

BACKFILL: On completion trial pit backfilled with compact arisings.

LOCATION: OXD MP27.75 -284.75m MOD sidings four foot. 0.50m to nearest running rail.

REMARKS: All measurements from top of sleeper (wooden 120mm thickness).

Logged in accordance with NR/SP/TRK/9039.

CC GROUND INVESTIGATIONS LTD

INSPECTION PIT LOG

Telephone: 01452 739165 , Fax: 01452 739220 , Email: info@ccground.co.uk

Pit No **TB036**

Sheet 1 of 1

Project Name: East - West Rail Phase 1	Project No: **C3723**	Co-ords: E 450186 N 212100 Level: mAD	Date 17/09/2013
Location: Bicester to Oxford		Dimensions: m Depth 1.20m m	Scale 1 : 9.375
Client: Atkins Rail Ltd			Logged By MA

(m)	Water Levels	Samples & In Situ Testing No/Type	Depth (m)	Result	Description	Depth (m)	Level (mAD)	Legend
		B ES	0.00 0.00 - 0.20		MADE GROUND: Grey and pinkish grey GRAVEL. Gravel is angular and subangular coarse ballast (CLEAN BALLAST).	(0.20)		
					MADE GROUND: Greyish brown slightly ashy slightly sandy GRAVEL. Gravel is angular and subangular fine to coarse ballast and clinker. Approximately 70% undersized with fines of ash and degraded ballast (DIRTY BALLAST).	0.20		
					0.40-0.55m: Ash non-apparent.	(0.35)		
		B ES	0.50		MADE GROUND: Yellowish brown and brown clayey sandy GRAVEL. Gravel is subangular and subrounded fine and medium limestone and siliceous material.	0.55		
					Soft greyish brown and brown sandy gravelly CLAY. Gravel is subangular and subrounded fine to coarse limestone and siliceous material (POSSIBLE MADE GROUND).	(0.15) 0.70		
1		B ES	1.00			(0.50)		1
	Dry				Inspection pit completed at 1.20m	1.20		

DRAFT

REMARKS:

EQUIPMENT: Hand digging tools.

METHOD: Hand dug inspection pit: 0.00-1.20m.

STABILITY: Trial pit sides unstable 0.00-0.55m.

GROUNDWATER: None encountered.

PID TESTING: PID testing carried out at regular intervals, 0.0ppm recorded.

BACKFILL: On completion trial pit backfilled with compact arisings.

LOCATION: OXD MP25.50 +65.00m four foot. 0.50m to nearest running rail.

REMARKS: All measurements from top of sleeper (concrete 140mm thickness). TRL DCP test carried out 1.20-2.20m.

Logged in accordance with NR/SP/TRK/9039.

Bridgeway Consulting Ltd
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Nottingham. NG9 1LA
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Fax: 0115 919 1112

WINDOWLESS SAMPLER LOG

Project	Site	Consultant	EXPLORATORY HOLE No
East West Rail		Atkins	**WS43AAA**
Job No: J11631	Date: 15-11-12 15-11-12	Ground Level (m)	Co-Ordinates ()
Contractor: Bridgeway Consulting			Sheet: 1 of 1

SAMPLES & TESTS			STRATA						
Depth	Type No	Test Result	Water	Reduced Level	Legend	Depth (Thickness)	DESCRIPTION	Field Test kPa HSV PP	Instrument/ Backfill
0.10-0.30	B					0.35	MADE GROUND: Silty gravelly sand with ash. (Driller's description)		
0.10	D								
0.10	ES					0.60	MADE GROUND: Orange sand. (Driller's description)		
0.40-0.60	B						Firm orangey brown mottled grey very low strength slightly sandy CLAY with some roots. Sand is fine to medium.		
0.45	D								
0.45	ES					(1.20)			
0.60-1.00	B								
0.90	D								
1.00	ES								
1.20-1.80	B					1.80		13	
2.00-3.00	B						Firm to stiff brown low strength mottled grey CLAY.		
						(1.20)		38	
						3.00			
3.00-4.70	B						Stiff dark grey and orangey brown high strength slightly gravelly CLAY. Gravel is subangular to subrounded fine to medium limestone with some shells.		
						(1.70)		113	
						4.70			

Progress and Water Observations

Date	Depth	Water Dpt	Dia. mm	% Rec
15-08-12	1.20	DRY	N/A	N/A
15-08-12	2.00	DRY	87	100
15-08-12	3.00	DRY	77	100
15-08-12	4.00	DRY	67	100

GENERAL REMARKS

1. Position scanned with CAT & genny prior to excavation.
2. Inspection pit excavated to 1.20mbgl prior to drilling.

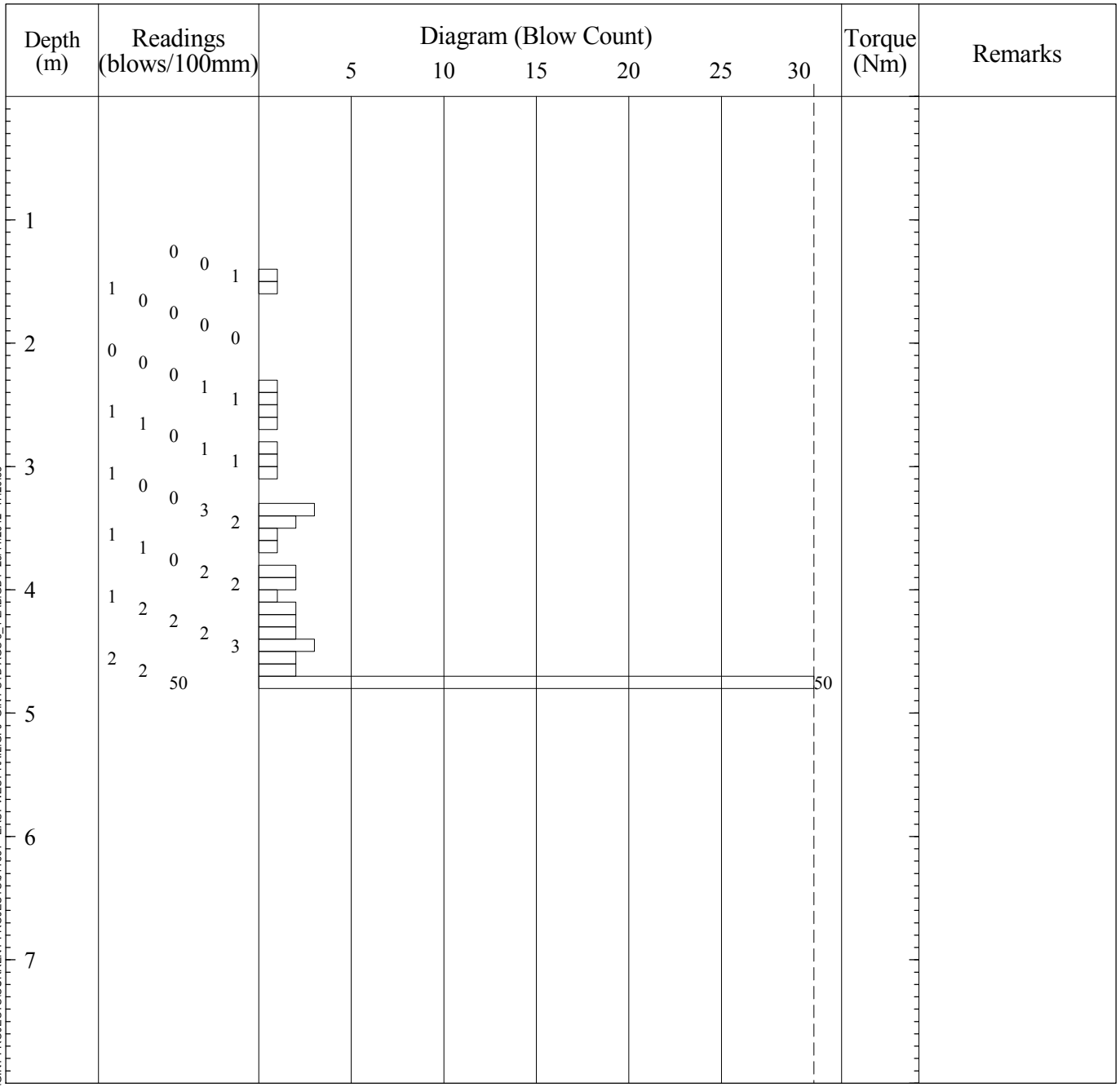
All dimensions in metres Scale 1:50	Client Atkins	Method/ Plant Used Dart Competitor Rig	Logged By GD

GINT STD AGS 3_1 LAB.GLB BCL WS FIELD TEST K:\SITE INVESTIGATION\GINT PROJECTS\CURRENT PROJECTS\J11631 - EAST WEST RAIL.GPJ GINT STD AGS 3_1 LAB.GDT 23/11/2012 17:54:21

Bridgeway Consulting Ltd
Beeston Business Park, Technology Drive,
Nottingham. NG9 1LA
Telephone: 0115 919 1111
Fax: 0115 919 1112

DYNAMIC PROBE LOG

Project	Site	Consultant	PROBE No
East West Rail		Atkins	**WS43AAA**
Job No: J11631 / Date: 15-11-12 15-11-12	Ground Level (m)	Co-Ordinates ()	
Contractor: Bridgeway Consulting			Sheet: 1 of 1



Hammer Wt (kg)	63
Hammer Drop (mm)	760
Cone Dia (mm)	50
Cone Type	Sacrificial
Damper	

GENERAL REMARKS

1. Position scanned with CAT & genny prior to excavation.
2. Inspection pit excavated to 1.20mbgl prior to drilling.

All dimensions in metres Scale 1:50	Client Atkins	Method/ Plant Used Dart Competitor Rig	Logged By GD

GINT STD AGS 3_1 LAB.GLB DCLP K:\SITE INVESTIGATION\GINT PROJECTS\CURRENT PROJECTS\J11631 - EAST WEST RAIL.GPJ GINT STD AGS 3_1 LAB.GDT 23/11/2012 17:20:53

Bridgeway Consulting Ltd
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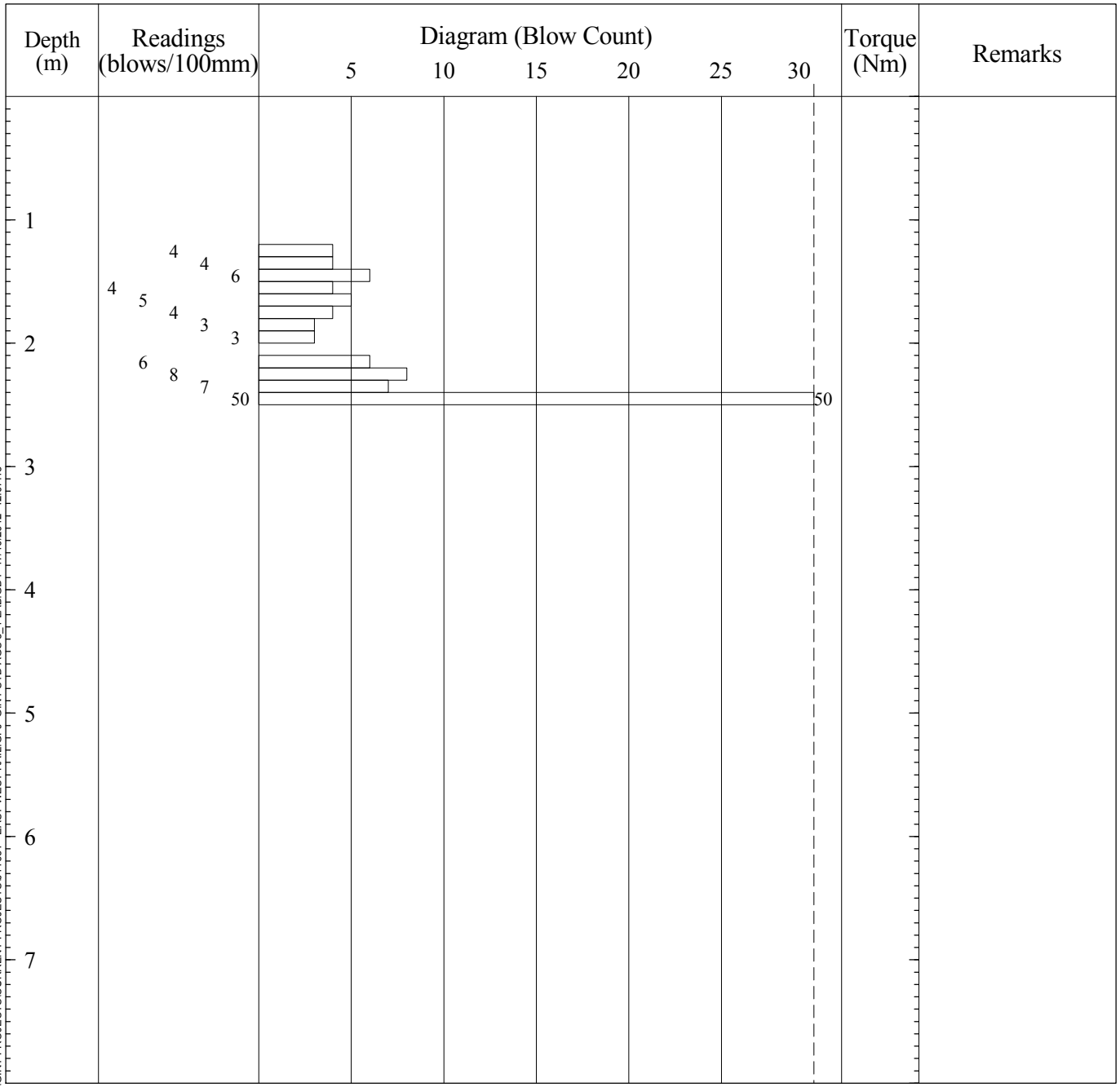
DYNAMIC PROBE LOG

Project	Site	Consultant	PROBE No
East West Rail		Atkins	**WS43B**
Job No: J11631	Date: 11-10-12 11-10-12	Ground Level (m)	Co-Ordinates ()
Contractor: Bridgeway Consulting			Sheet: 1 of 1



Hammer Wt (kg)	10
Hammer Drop (mm)	760
Cone Dia (mm)	35
Cone Type	Sacrificial
Damper	

GENERAL REMARKS

1. Position scanned with CAT & genny prior to excavation.
2. Inspection pit excavated to 1.20mbgl prior to drilling.

All dimensions in metres Scale 1:50	Client Atkins	Method/ Plant Used HHWS	Logged By NY

GINT STD AGS 3_1 LAB.GLB DCLP K:\SITE INVESTIGATION\GINT PROJECTS\CURRENT PROJECTS\J11631 - EAST WEST RAIL.GPJ GINT STD AGS 3_1 LAB.GDT 17/10/2012 12:07:15

Bridgeway Consulting Ltd
Beeston Business Park, Technology Drive
Nottingham. NG9 1LA
Telephone: 0115 919 1111
Fax: 0115 919 1112

WINDOWLESS SAMPLER LOG

Project	Site	Consultant	EXPLORATORY HOLE No
East West Rail		Atkins	**WS43B**
Job No: J11631	Date: 11-10-12 11-10-12	Ground Level (m)	Co-Ordinates ()
Contractor: Bridgeway Consulting			Sheet: 1 of 1

SAMPLES & TESTS			STRATA						
Depth	Type No	Test Result	Water	Reduced Level	Legend	Depth (Thickness)	DESCRIPTION	Field Test kPa HSV PP	Instrument/ Backfill
0.10	D					0.20	TOPSOIL: Brown and dark grey slightly gravelly sandy silt with some rootlets. Gravel is angular to subangular fine to coarse chalk and flint.		
0.50	D		1 ▼ 2 ▼			(1.00)	Soft green grey low strength mottled orange brown CLAY.		
1.00	D					1.20			
1.20-1.40	B						Soft brown low to very low strength slightly sandy CLAY with rare subrounded fine mudstone gravel.	25	
1.40-1.90	B					(0.70)		17	
1.55-1.85	U					1.90		19	

Progress and Water Observations

Date	Depth	Water Dpt	Dia. mm	% Rec
11-10-12	0.60	0.6	N/A	N/A

GENERAL REMARKS

1. Position scanned with CAT & genny prior to excavation.
2. Inspection pit excavated to 1.20mbgl prior to drilling.

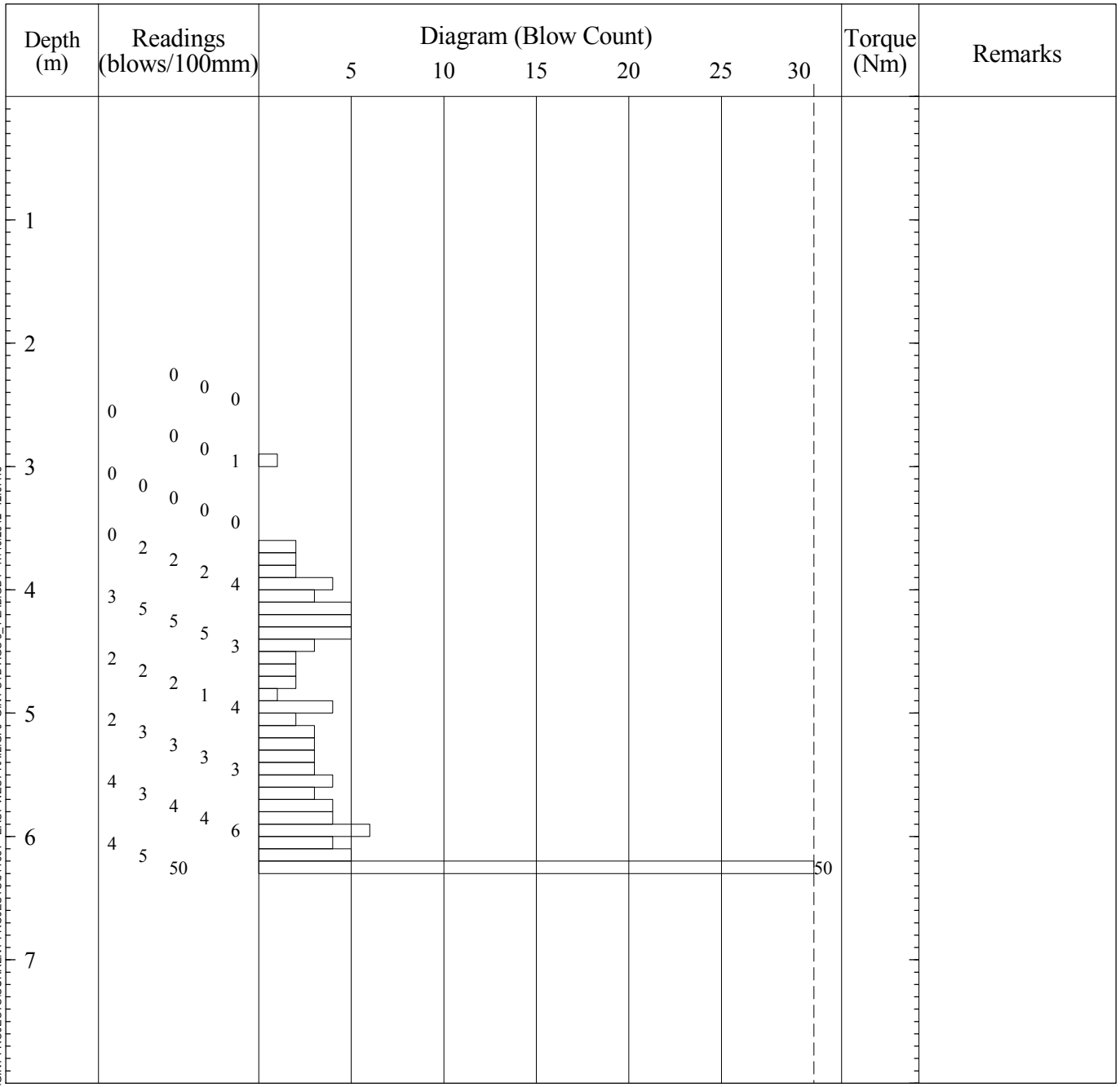
All dimensions in metres Scale 1:50	Client Atkins	Method/ Plant Used HHWS	Logged By NY

GINT STD AGS 3_1 LAB.GLB BCL WS FIELD TEST K:\SITE INVESTIGATION\GINT PROJECTS\CURRENT PROJECTS\J11631 - EAST WEST RAIL.GPJ GINT STD AGS 3_1 LAB.GDT 02/11/2012 17:15:02

Bridgeway Consulting Ltd
Beeston Business Park, Technology Drive,
Nottingham. NG9 1LA
Telephone: 0115 919 1111
Fax: 0115 919 1112

DYNAMIC PROBE LOG

Project	Site	Consultant	PROBE No
East West Rail		Atkins	**WS44**
Job No: J11631	Date: 09-09-12 09-09-12	Ground Level (m)	Co-Ordinates ()
Contractor: Bridgeway Consulting			Sheet: 1 of 1



Hammer Wt (kg)	63
Hammer Drop (mm)	760
Cone Dia (mm)	50
Cone Type	Sacrificial
Damper	

GENERAL REMARKS

1. Position scanned with CAT & genny prior to excavation.
2. Inspection pit excavated to 1.20mbgl prior to drilling.
3. Hole drilled at 19m 50ch down.

All dimensions in metres Scale 1:50	Client: Atkins	Method/ Plant Used: Dart Competitor Rig	Logged By: NY

GINT STD AGS 3_1 LAB.GLB DCLP K:\SITE INVESTIGATION\GINT PROJECTS\CURRENT PROJECTS\J11631 - EAST WEST RAIL.GPJ GINT STD AGS 3_1 LAB.GDT 17/10/2012 12:07:15

Bridgeway Consulting Ltd
Beeston Business Park, Technology Drive
Nottingham. NG9 1LA
Telephone: 0115 919 1111
Fax: 0115 919 1112

WINDOWLESS SAMPLER LOG

Project	Site	Consultant	EXPLORATORY HOLE No
East West Rail		Atkins	**WS44**
Job No: J11631	Date: 09-09-12 09-09-12	Ground Level (m)	Co-Ordinates ()
Contractor: Bridgeway Consulting			Sheet: 1 of 1

SAMPLES & TESTS				STRATA					
Depth	Type No	Test Result	Water	Reduced Level	Legend	Depth (Thickness)	DESCRIPTION	Field Test kPa HSV	Field Test kPa PP
0.20	D					0.30	MADE GROUND: Grass and vegetation over black and dark brown silty very sandy angular to subangular fine to coarse GRAVEL of clinker, coal, flint and granite. Sand is ash.		
0.20	ES								
0.30-0.50	B					(0.90)	Soft becoming firm orange mottled grey and brown slightly gravelly CLAY. Gravel is angular fine to medium flint.		
0.80	ES								
0.90-1.10	B					1.20			
1.00	D								
1.20-2.00	B					(0.80)	Firm dark greenish brown mottled orange medim strength slightly gravelly CLAY. Gravel is fine to coarse subangular sandstone.		69
						2.00			
2.00-3.00	B					(1.00)	Firm dark green medium strength slightly sandy gravelly CLAY with rare cobbles. Gravel is subangular to subrounded fine to coarse sandstone. Sand is fine to medium.		50
						3.00			
3.25	D					(0.40) 3.40	Soft slightly friable grey mottled green low strength slightly gravelly CLAY. Gravel is subangular fine flint.	28	
3.40-3.50	D					(0.60) 4.00	Soft brown mottled grey low strength slightly sandy slightly gravelly CLAY. Sand is fine to medium. Gravel is subangualr fine flint.	22	
4.20	D		1			(1.60)	Soft grey mottled orange low strength CLAY with traces of rootlets up to 5.0m. Mottled green from 5.0m.	37	21
4.40-4.80	U							38	
4.90	D		2					37	
5.10-5.20	D							38	
5.40-5.80	U							30	
						5.60		32	
5.80-6.00	D					(0.40) 6.00	Firm fissured dark grey medium strength CLAY with occasional pockets of pyrite crystals.	67	

Instrument/Backfill

Progress and Water Observations

Date	Depth	Water Dpt	Dia. mm	% Rec
09-09-12	1.20	DRY		
09-09-12	4.50	4.5		

GENERAL REMARKS

1. Position scanned with CAT & genny prior to excavation.
2. Inspection pit excavated to 1.20mbgl prior to drilling.
3. Hole drilled at 19m 50ch down.

All dimensions in metres Scale 1:50	Client Atkins	Method/ Plant Used Dart Competitor Rig	Logged By NY

GINT STD AGS 3_1 LAB.GLB BCL WS FIELD TEST K:\SITE INVESTIGATION\GINT PROJECTS\CURRENT PROJECTS\J11631 - EAST WEST RAIL.GPJ GINT STD AGS 3_1 LAB.GDT 02/11/2012 17:15:03

Annex B

Laboratory Results

Annex B1

Islip

Derwentside Environmental Testing Services

2139

Certificate of Analysis

Date: 06/06/2013

Certificate Number: 13-82108

Client:	Professional Soils Laboratory Ltd 5/7 Hexthorpe Road Hexthorpe DN4 0AR
Our Reference:	13-82108
Client Reference:	PSL13/1880
Contract Title:	EWR Testing
Description:	20 water samples
Date Received:	30 May 2013
Date Started:	31 May 2013
Date Completed:	06 June 2013
Test Procedures:	Identified by prefix DETSn, details available upon request.
Notes:	Observations and interpretations are outside the scope of UKAS accreditation
Approved By:	Rob Brown, Business Manager

This certificate is issued in accordance with the accreditation requirements of the United Kingdom Accreditation Service. The results reported herein relate only to the material supplied to the laboratory. This certificate shall not be reproduced except in full, without the prior written approval of the laboratory.

Information in Support of the Analytical Results

Analysis

Inorganic soil analysis was carried out on a dried sample, crushed to pass a 425um sieve, in accordance with BS1377.
Organic soil analysis was carried out on an 'as received' sample. Organics results are corrected for moisture and expressed on a dry weight basis.
The Loss on Drying, used to express organics analysis on an air dried basis, is carried out at a temperature of 28oC +/-2oC.

Key

*	Denotes test not included in laboratory scope of accreditation
#	Denotes test that holds MCERTS accreditation, however, MCERTS accreditation is only implied if the report carries the MCERTS logo
$	Denotes tests completed by an approved subcontractor
I/S	Denotes insufficient sample to carry out test
U/S	Denotes that the sample is not suitable for testing

Disposal

From the issue date of this test certificate, samples will be held for the following times prior to disposal :-
Soils - 1 month
Liquids - 2 weeks
Asbestos (test portion) - 6 months

Summary of Chemical Analysis
Water Samples

Our Ref: 13-82108
Client Ref: PSL13/1880
Contract Title: EWR Testing

			Lab No.	518665	518666	518667	518668	518669
			Sample ID	WS163	WS701	WS160	WS72	WS708
			Depth					
			Sample Ref					
			Sample Type					
			Sampling Date	29/05/2013	29/05/2013	29/05/2013	29/05/2013	29/05/2013
			Sampling Time					
Test	**Units**	**DETSxx**	**LOD**					
Arsenic, Dissolved	ug/l	DETSC 2306	0.16	0.33	1.1	1.6	0.71	0.35
Total Cadmium	ug/l	DETSC 2306*	0.03	1.0	0.22	8.8	0.49	1.1
Chromium, Dissolved	ug/l	DETSC 2306	0.25	< 0.25	< 0.25	< 0.25	0.40	< 0.25
Copper, Dissolved	ug/l	DETSC 2306	0.4	< 0.40	2.4	1.2	2.5	3.6
Lead, Dissolved	ug/l	DETSC 2306	0.09	< 0.090	< 0.090	0.41	0.39	0.34
Mercury, Dissolved	ug/l	DETSC 2306	0.01	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Nickel, Dissolved	ug/l	DETSC 2306	0.5	4.2	2.6	4.8	1.1	5.7
Selenium, Dissolved	ug/l	DETSC 2306	0.25	1.1	2.7	1.3	15	1.5
Vanadium, Dissolved	ug/l	DETSC 2306	0.6	< 0.60	1.3	< 0.60	< 0.60	< 0.60
Total Zinc	ug/l	DETSC 2306*	1.25	110	63	550	140	190
Alkalinity as CaCO3 (Automated)	mg/l	DETS 030	10	430	340	280	210	310
Chloride	mg/l	DETSC 2055	0.1	12	6.6	15	4.7	44
Boron Total	ug/l	DETSC 2306*	12	120	54	96	79	120
Cyanide total	ug/l	DETSC 2130	40	< 40	< 40	< 40	< 40	< 40
Cyanide free	ug/l	DETSC 2130	20	< 20.0	< 20.0	< 20.0	< 20.0	< 20.0
Cyanide complex	ug/l	DETSC 2130	40	< 40	< 40	< 40	< 40	< 40
Hardness	mg/l	DETSC 2303*	0.1	728	339	314	232	349
Hexavalent Chromium	ug/l	DETSC 2203	10	< 10	< 10	< 10	< 10	< 10
Ammoniacal Nitrogen as N	mg/l	DETSC 2207	0.015	0.029	< 0.015	0.037	0.031	0.067
Nitrate as N	mg/l	*	0.1	2.4	2.0	0.94	2.4	2.9
Sulphate as SO4	mg/l	DETSC 2076*	0.01	340	29	100	120	59
Total Organic Carbon	mg/l	DETSC 2033	2	39	18	180	14	26
pH		DETSC 2008		7.1	7.7	7.3	7.5	7.3
Aliphatic C5-C6	ug/l	DETSC 3322	0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Aliphatic C6-C8	ug/l	DETSC 3322	0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Aliphatic C8-C10	ug/l	DETSC 3322	0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Aliphatic C10-C12	ug/l	DETSC 3072*	1	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic C12-C16	ug/l	DETSC 3072*	1	< 1.0	< 1.0	9.5	9.3	< 1.0
Aliphatic C16-C21	ug/l	DETSC 3072*	1	< 1.0	< 1.0	32	< 1.0	< 1.0
Aliphatic C21-C35	ug/l	DETSC 3072*	1	< 1.0	< 1.0	52	< 1.0	< 1.0
Aromatic C5-C7	ug/l	DETSC 3322	0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Aromatic C7-C8	ug/l	DETSC 3322	0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Aromatic C8-C10	ug/l	DETSC 3322	0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Aromatic C10-C12	ug/l	DETSC 3072*	1	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic C12-C16	ug/l	DETSC 3072*	1	< 1.0	< 1.0	3.9	< 1.0	< 1.0
Aromatic C16-C21	ug/l	DETSC 3072*	1	< 1.0	< 1.0	23	6.1	3.2
Aromatic C21-C35	ug/l	DETSC 3072*	1	< 1.0	< 1.0	48	110	120
Aliphatic C5-C35	ug/l	DETSC 3072*	10	< 10	< 10	94	< 10	< 10
Aromatic C5-C35	ug/l	DETSC 3072*	10	< 10	< 10	75	120	120
TPH Ali/Aro	ug/l	DETSC 3072*	10	< 10	< 10	170	130	120
Acenaphthene	ug/l	DETS 074*	0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Acenaphthylene	ug/l	DETS 074*	0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Anthracene	ug/l	DETS 074*	0.01	0.05	< 0.01	< 0.01	< 0.01	0.01

Summary of Chemical Analysis
Water Samples

Our Ref: 13-82108
Client Ref: PSL13/1880
Contract Title: EWR Testing

			Lab No.	518665	518666	518667	518668	518669
			Sample ID	WS163	WS701	WS160	WS72	WS708
			Depth					
			Sample Ref					
			Sample Type					
			Sampling Date	29/05/2013	29/05/2013	29/05/2013	29/05/2013	29/05/2013
			Sampling Time					
Test	**Units**	**DETSxx**	**LOD**					
Benzo(a)anthracene	ug/l	DETS 074*	0.01	0.04	< 0.01	< 0.01	< 0.01	0.02
Benzo(a)pyrene	ug/l	DETS 074*	0.01	0.02	< 0.01	< 0.01	< 0.01	< 0.01
Benzo(b)fluoranthene	ug/l	DETS 074*	0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Benzo(k)fluoranthene	ug/l	DETS 074*	0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Benzo(g,h,i)perylene	ug/l	DETS 074*	0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Chrysene	ug/l	DETS 074*	0.01	0.09	< 0.01	< 0.01	< 0.01	0.08
Dibenzo(a,h)anthracene	ug/l	DETS 074*	0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Fluoranthene	ug/l	DETS 074*	0.01	0.19	< 0.01	< 0.01	< 0.01	0.14
Fluorene	ug/l	DETS 074*	0.01	0.04	< 0.01	< 0.01	< 0.01	< 0.01
Indeno(1,2,3-c,d)pyrene	ug/l	DETS 074*	0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Naphthalene	ug/l	DETS 074*	0.01	0.05	< 0.01	< 0.01	< 0.01	< 0.01
Phenanthrene	ug/l	DETS 074*	0.01	0.19	< 0.01	< 0.01	< 0.01	0.08
Pyrene	ug/l	DETS 074*	0.01	0.09	< 0.01	< 0.01	< 0.01	0.08
PAH	ug/l	DETS 074*	0.2	0.75	< 0.20	< 0.20	< 0.20	0.42
Benzene	ug/l	DETSC 3322	1	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Ethylbenzene	ug/l	DETSC 3322	1	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Toluene	ug/l	DETSC 3322	1	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Xylene	ug/l	DETSC 3322	1	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Phenol - Monohydric	ug/l	DESTC 2130	100	< 100.0	< 100.0	< 100.0	< 100.0	< 100.0

Summary of Chemical Analysis
Water Samples

Our Ref: 13-82108
Client Ref: PSL13/1880
Contract Title: EWR Testing

			Lab No.	518670	518671	518672	518673	518674
			Sample ID	WS98	WS180	WS162	WS800	WS73A
			Depth					
			Sample Ref					
			Sample Type					
			Sampling Date	29/05/2013	29/05/2013	29/05/2013	29/05/2013	29/05/2013
			Sampling Time					
Test	**Units**	**DETSxx**	**LOD**					
Arsenic, Dissolved	ug/l	DETSC 2306	0.16	1.6	0.43	0.38	1.9	1.7
Total Cadmium	ug/l	DETSC 2306*	0.03	3.2	1.6	1.4	2.5	0.26
Chromium, Dissolved	ug/l	DETSC 2306	0.25	< 0.25	< 0.25	< 0.25	< 0.25	< 0.25
Copper, Dissolved	ug/l	DETSC 2306	0.4	5.7	4.7	5.5	2.0	1.0
Lead, Dissolved	ug/l	DETSC 2306	0.09	1.0	1.4	0.70	1.1	0.21
Mercury, Dissolved	ug/l	DETSC 2306	0.01	< 0.010	< 0.010	< 0.010	0.015	< 0.010
Nickel, Dissolved	ug/l	DETSC 2306	0.5	20	13	18	2.7	4.5
Selenium, Dissolved	ug/l	DETSC 2306	0.25	0.36	1.8	2.0	0.51	1.4
Vanadium, Dissolved	ug/l	DETSC 2306	0.6	< 0.60	< 0.60	< 0.60	< 0.60	< 0.60
Total Zinc	ug/l	DETSC 2306*	1.25	200	120	230	1500	92
Alkalinity as CaCO3 (Automated)	mg/l	DETS 030	10	320	640	380	300	280
Chloride	mg/l	DETSC 2055	0.1	36	340	130	10	6.6
Boron Total	ug/l	DETSC 2306*	12	460	3700	950	100	75
Cyanide total	ug/l	DETSC 2130	40	< 40	< 40	< 40	< 40	< 40
Cyanide free	ug/l	DETSC 2130	20	< 20.0	< 20.0	< 20.0	< 20.0	< 20.0
Cyanide complex	ug/l	DETSC 2130	40	< 40	< 40	< 40	< 40	< 40
Hardness	mg/l	DETSC 2303*	0.1	689	1440	1700	358	233
Hexavalent Chromium	ug/l	DETSC 2203	10	< 10	< 10	< 10	< 10	< 10
Ammoniacal Nitrogen as N	mg/l	DETSC 2207	0.015	0.57	1.2	0.26	8.1	2.6
Nitrate as N	mg/l	*	0.1	1.6	0.39	0.27	1.1	< 0.10
Sulphate as SO4	mg/l	DETSC 2076*	0.01	680	2500	2100	24	27
Total Organic Carbon	mg/l	DETSC 2033	2	38	22	44	280	20
pH		DETSC 2008		7.0	7.2	7.2	7.3	7.2
Aliphatic C5-C6	ug/l	DETSC 3322	0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Aliphatic C6-C8	ug/l	DETSC 3322	0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Aliphatic C8-C10	ug/l	DETSC 3322	0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Aliphatic C10-C12	ug/l	DETSC 3072*	1	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic C12-C16	ug/l	DETSC 3072*	1	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic C16-C21	ug/l	DETSC 3072*	1	< 1.0	< 1.0	< 1.0	1.4	< 1.0
Aliphatic C21-C35	ug/l	DETSC 3072*	1	< 1.0	< 1.0	< 1.0	180	< 1.0
Aromatic C5-C7	ug/l	DETSC 3322	0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Aromatic C7-C8	ug/l	DETSC 3322	0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Aromatic C8-C10	ug/l	DETSC 3322	0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Aromatic C10-C12	ug/l	DETSC 3072*	1	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic C12-C16	ug/l	DETSC 3072*	1	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic C16-C21	ug/l	DETSC 3072*	1	5.5	2.2	1.9	24	10
Aromatic C21-C35	ug/l	DETSC 3072*	1	170	60	60	270	220
Aliphatic C5-C35	ug/l	DETSC 3072*	10	< 10	< 10	< 10	180	< 10
Aromatic C5-C35	ug/l	DETSC 3072*	10	170	62	62	290	230
TPH Ali/Aro	ug/l	DETSC 3072*	10	170	62	62	480	230
Acenaphthene	ug/l	DETS 074*	0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Acenaphthylene	ug/l	DETS 074*	0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Anthracene	ug/l	DETS 074*	0.01	< 0.01	< 0.01	0.02	0.01	< 0.01

Summary of Chemical Analysis
Water Samples

Our Ref: 13-82108
Client Ref: PSL13/1880
Contract Title: EWR Testing

			Lab No.	518670	518671	518672	518673	518674
			Sample ID	WS98	WS180	WS162	WS800	WS73A
			Depth					
			Sample Ref					
			Sample Type					
			Sampling Date	29/05/2013	29/05/2013	29/05/2013	29/05/2013	29/05/2013
			Sampling Time					
Test	**Units**	**DETSxx**	**LOD**					
Benzo(a)anthracene	ug/l	DETS 074*	0.01	< 0.01	< 0.01	0.02	0.03	< 0.01
Benzo(a)pyrene	ug/l	DETS 074*	0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Benzo(b)fluoranthene	ug/l	DETS 074*	0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Benzo(k)fluoranthene	ug/l	DETS 074*	0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Benzo(g,h,i)perylene	ug/l	DETS 074*	0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Chrysene	ug/l	DETS 074*	0.01	< 0.01	< 0.01	0.09	0.08	< 0.01
Dibenzo(a,h)anthracene	ug/l	DETS 074*	0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Fluoranthene	ug/l	DETS 074*	0.01	< 0.01	< 0.01	0.13	0.10	0.04
Fluorene	ug/l	DETS 074*	0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Indeno(1,2,3-c,d)pyrene	ug/l	DETS 074*	0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Naphthalene	ug/l	DETS 074*	0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Phenanthrene	ug/l	DETS 074*	0.01	< 0.01	< 0.01	< 0.01	0.11	< 0.01
Pyrene	ug/l	DETS 074*	0.01	< 0.01	< 0.01	0.04	0.03	0.01
PAH	ug/l	DETS 074*	0.2	< 0.20	< 0.20	0.29	0.36	< 0.20
Benzene	ug/l	DETSC 3322	1	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Ethylbenzene	ug/l	DETSC 3322	1	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Toluene	ug/l	DETSC 3322	1	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Xylene	ug/l	DETSC 3322	1	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Phenol - Monohydric	ug/l	DESTC 2130	100	< 100.0	< 100.0	< 100.0	< 100.0	< 100.0

Summary of Chemical Analysis
Water Samples

Our Ref: 13-82108
Client Ref: PSL13/1880
Contract Title: EWR Testing

			Lab No.	518675	518676	518677	518678	518679
			Sample ID	WS179	WS702	WS707	WS706	WS703
			Depth					
			Sample Ref					
			Sample Type					
			Sampling Date	29/05/2013	29/05/2013	28/05/2013	28/05/2013	28/05/2013
			Sampling Time					
Test	**Units**	**DETSxx**	**LOD**					
Arsenic, Dissolved	ug/l	DETSC 2306	0.16	1.3	0.71	0.33	0.32	0.80
Total Cadmium	ug/l	DETSC 2306*	0.03	0.40	4.1	0.18	0.59	1.5
Chromium, Dissolved	ug/l	DETSC 2306	0.25	0.59	< 0.25	< 0.25	< 0.25	< 0.25
Copper, Dissolved	ug/l	DETSC 2306	0.4	9.2	2.4	2.7	1.6	0.90
Lead, Dissolved	ug/l	DETSC 2306	0.09	0.56	0.75	0.71	0.33	0.41
Mercury, Dissolved	ug/l	DETSC 2306	0.01	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Nickel, Dissolved	ug/l	DETSC 2306	0.5	87	4.9	3.3	4.5	3.0
Selenium, Dissolved	ug/l	DETSC 2306	0.25	2.6	19	3.0	< 0.25	0.47
Vanadium, Dissolved	ug/l	DETSC 2306	0.6	< 0.60	1.4	< 0.60	< 0.60	< 0.60
Total Zinc	ug/l	DETSC 2306*	1.25	86	1700	41	95	150
Alkalinity as CaCO3 (Automated)	mg/l	DETS 030	10	500	350	350	360	360
Chloride	mg/l	DETSC 2055	0.1	110	14	34	36	67
Boron Total	ug/l	DETSC 2306*	12	1100	110	760	200	78
Cyanide total	ug/l	DETSC 2130	40	< 40	< 40	< 40	< 40	< 40
Cyanide free	ug/l	DETSC 2130	20	< 20.0	< 20.0	< 20.0	< 20.0	< 20.0
Cyanide complex	ug/l	DETSC 2130	40	< 40	< 40	< 40	< 40	< 40
Hardness	mg/l	DETSC 2303*	0.1	1370	286	756	805	354
Hexavalent Chromium	ug/l	DETSC 2203	10	< 10	< 10	< 10	< 10	< 10
Ammoniacal Nitrogen as N	mg/l	DETSC 2207	0.015	0.77	0.035	0.079	0.49	0.35
Nitrate as N	mg/l	*	0.1	0.29	2.6	0.75	0.54	< 0.10
Sulphate as SO4	mg/l	DETSC 2076*	0.01	1700	88	630	650	24
Total Organic Carbon	mg/l	DETSC 2033	2	52	71	11	25	49
pH		DETSC 2008		7.1	7.5	7.5	7.4	7.6
Aliphatic C5-C6	ug/l	DETSC 3322	0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Aliphatic C6-C8	ug/l	DETSC 3322	0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Aliphatic C8-C10	ug/l	DETSC 3322	0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Aliphatic C10-C12	ug/l	DETSC 3072*	1	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic C12-C16	ug/l	DETSC 3072*	1	< 1.0	< 1.0	< 1.0	17	< 1.0
Aliphatic C16-C21	ug/l	DETSC 3072*	1	< 1.0	< 1.0	< 1.0	18	< 1.0
Aliphatic C21-C35	ug/l	DETSC 3072*	1	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic C5-C7	ug/l	DETSC 3322	0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Aromatic C7-C8	ug/l	DETSC 3322	0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Aromatic C8-C10	ug/l	DETSC 3322	0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Aromatic C10-C12	ug/l	DETSC 3072*	1	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic C12-C16	ug/l	DETSC 3072*	1	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic C16-C21	ug/l	DETSC 3072*	1	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic C21-C35	ug/l	DETSC 3072*	1	4.4	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic C5-C35	ug/l	DETSC 3072*	10	< 10	< 10	< 10	35	< 10
Aromatic C5-C35	ug/l	DETSC 3072*	10	< 10	< 10	< 10	< 10	< 10
TPH Ali/Aro	ug/l	DETSC 3072*	10	< 10	< 10	< 10	35	< 10
Acenaphthene	ug/l	DETS 074*	0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Acenaphthylene	ug/l	DETS 074*	0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Anthracene	ug/l	DETS 074*	0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01

Summary of Chemical Analysis
Water Samples

Our Ref: 13-82108
Client Ref: PSL13/1880
Contract Title: EWR Testing

			Lab No.	518675	518676	518677	518678	518679
			Sample ID	WS179	WS702	WS707	WS706	WS703
			Depth					
			Sample Ref					
			Sample Type					
			Sampling Date	29/05/2013	29/05/2013	28/05/2013	28/05/2013	28/05/2013
			Sampling Time					
Test	**Units**	**DETSxx**	**LOD**					
Benzo(a)anthracene	ug/l	DETS 074*	0.01	< 0.01	0.02	< 0.01	< 0.01	< 0.01
Benzo(a)pyrene	ug/l	DETS 074*	0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Benzo(b)fluoranthene	ug/l	DETS 074*	0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Benzo(k)fluoranthene	ug/l	DETS 074*	0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Benzo(g,h,i)perylene	ug/l	DETS 074*	0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Chrysene	ug/l	DETS 074*	0.01	< 0.01	0.05	< 0.01	< 0.01	< 0.01
Dibenzo(a,h)anthracene	ug/l	DETS 074*	0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Fluoranthene	ug/l	DETS 074*	0.01	0.03	0.02	< 0.01	< 0.01	< 0.01
Fluorene	ug/l	DETS 074*	0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Indeno(1,2,3-c,d)pyrene	ug/l	DETS 074*	0.01	< 0.01	0.09	< 0.01	< 0.01	< 0.01
Naphthalene	ug/l	DETS 074*	0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Phenanthrene	ug/l	DETS 074*	0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Pyrene	ug/l	DETS 074*	0.01	0.02	0.04	< 0.01	< 0.01	< 0.01
PAH	ug/l	DETS 074*	0.2	< 0.20	0.23	< 0.20	< 0.20	< 0.20
Benzene	ug/l	DETSC 3322	1	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Ethylbenzene	ug/l	DETSC 3322	1	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Toluene	ug/l	DETSC 3322	1	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Xylene	ug/l	DETSC 3322	1	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Phenol - Monohydric	ug/l	DESTC 2130	100	< 100.0	< 100.0	< 100.0	< 100.0	< 100.0

Summary of Chemical Analysis
Water Samples

Our Ref: 13-82108
Client Ref: PSL13/1880
Contract Title: EWR Testing

			Lab No.	518680	518681	518682	518683	518684
			Sample ID	WS55	WS54	WS46	WS45a	WS44
			Depth					
			Sample Ref					
			Sample Type					
			Sampling Date	28/05/2013	28/05/2013	28/05/2013	28/05/2013	28/05/2013
			Sampling Time					
Test	**Units**	**DETSxx**	**LOD**					
Arsenic, Dissolved	ug/l	DETSC 2306	0.16	0.96	3.6	0.79	0.39	0.25
Total Cadmium	ug/l	DETSC 2306*	0.03	1.4	0.94	0.92	0.73	0.88
Chromium, Dissolved	ug/l	DETSC 2306	0.25	< 0.25	< 0.25	< 0.25	< 0.25	< 0.25
Copper, Dissolved	ug/l	DETSC 2306	0.4	1.4	0.93	4.2	1.8	56
Lead, Dissolved	ug/l	DETSC 2306	0.09	0.45	0.33	0.44	0.42	0.29
Mercury, Dissolved	ug/l	DETSC 2306	0.01	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Nickel, Dissolved	ug/l	DETSC 2306	0.5	2.8	7.2	16	3.6	2.0
Selenium, Dissolved	ug/l	DETSC 2306	0.25	0.77	0.46	1.2	0.43	0.33
Vanadium, Dissolved	ug/l	DETSC 2306	0.6	< 0.60	< 0.60	< 0.60	< 0.60	< 0.60
Total Zinc	ug/l	DETSC 2306*	1.25	180	120	130	280	200
Alkalinity as CaCO3 (Automated)	mg/l	DETS 030	10	270	390	240	300	300
Chloride	mg/l	DETSC 2055	0.1	29	34	25	19	17
Boron Total	ug/l	DETSC 2306*	12	88	97	200	120	110
Cyanide total	ug/l	DETSC 2130	40	< 40	< 40	< 40	< 40	< 40
Cyanide free	ug/l	DETSC 2130	20	< 20.0	< 20.0	< 20.0	< 20.0	< 20.0
Cyanide complex	ug/l	DETSC 2130	40	< 40	< 40	< 40	< 40	< 40
Hardness	mg/l	DETSC 2303*	0.1	274	434	1180	380	599
Hexavalent Chromium	ug/l	DETSC 2203	10	< 10	< 10	< 10	< 10	< 10
Ammoniacal Nitrogen as N	mg/l	DETSC 2207	0.015	0.45	1.1	0.10	< 0.015	< 0.015
Nitrate as N	mg/l	*	0.1	< 0.10	< 0.10	< 0.10	0.72	0.15
Sulphate as SO4	mg/l	DETSC 2076*	0.01	30	64	1200	120	370
Total Organic Carbon	mg/l	DETSC 2033	2	37	19	30	16	27
pH		DETSC 2008		7.7	7.4	7.2	7.5	7.6
Aliphatic C5-C6	ug/l	DETSC 3322	0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Aliphatic C6-C8	ug/l	DETSC 3322	0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Aliphatic C8-C10	ug/l	DETSC 3322	0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Aliphatic C10-C12	ug/l	DETSC 3072*	1	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic C12-C16	ug/l	DETSC 3072*	1	< 1.0	15	< 1.0	13	18
Aliphatic C16-C21	ug/l	DETSC 3072*	1	< 1.0	15	< 1.0	8.6	19
Aliphatic C21-C35	ug/l	DETSC 3072*	1	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic C5-C7	ug/l	DETSC 3322	0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Aromatic C7-C8	ug/l	DETSC 3322	0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Aromatic C8-C10	ug/l	DETSC 3322	0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Aromatic C10-C12	ug/l	DETSC 3072*	1	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic C12-C16	ug/l	DETSC 3072*	1	< 1.0	< 1.0	< 1.0	< 1.0	6.1
Aromatic C16-C21	ug/l	DETSC 3072*	1	< 1.0	< 1.0	< 1.0	< 1.0	4.4
Aromatic C21-C35	ug/l	DETSC 3072*	1	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic C5-C35	ug/l	DETSC 3072*	10	< 10	30	< 10	21	38
Aromatic C5-C35	ug/l	DETSC 3072*	10	< 10	< 10	< 10	< 10	11
TPH Ali/Aro	ug/l	DETSC 3072*	10	< 10	30	< 10	21	48
Acenaphthene	ug/l	DETS 074*	0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Acenaphthylene	ug/l	DETS 074*	0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Anthracene	ug/l	DETS 074*	0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01

Summary of Chemical Analysis
Water Samples

Our Ref: 13-82108
Client Ref: PSL13/1880
Contract Title: EWR Testing

			Lab No.	518680	518681	518682	518683	518684
			Sample ID	WS55	WS54	WS46	WS45a	WS44
			Depth					
			Sample Ref					
			Sample Type					
			Sampling Date	28/05/2013	28/05/2013	28/05/2013	28/05/2013	28/05/2013
			Sampling Time					
Test	**Units**	**DETSxx**	**LOD**					
Benzo(a)anthracene	ug/l	DETS 074*	0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Benzo(a)pyrene	ug/l	DETS 074*	0.01	0.01	< 0.01	< 0.01	< 0.01	< 0.01
Benzo(b)fluoranthene	ug/l	DETS 074*	0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Benzo(k)fluoranthene	ug/l	DETS 074*	0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Benzo(g,h,i)perylene	ug/l	DETS 074*	0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Chrysene	ug/l	DETS 074*	0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Dibenzo(a,h)anthracene	ug/l	DETS 074*	0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Fluoranthene	ug/l	DETS 074*	0.01	0.04	< 0.01	< 0.01	< 0.01	< 0.01
Fluorene	ug/l	DETS 074*	0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Indeno(1,2,3-c,d)pyrene	ug/l	DETS 074*	0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Naphthalene	ug/l	DETS 074*	0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Phenanthrene	ug/l	DETS 074*	0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Pyrene	ug/l	DETS 074*	0.01	0.03	< 0.01	< 0.01	< 0.01	< 0.01
PAH	ug/l	DETS 074*	0.2	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20
Benzene	ug/l	DETSC 3322	1	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Ethylbenzene	ug/l	DETSC 3322	1	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Toluene	ug/l	DETSC 3322	1	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Xylene	ug/l	DETSC 3322	1	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Phenol - Monohydric	ug/l	DESTC 2130	100	< 100.0	< 100.0	< 100.0	< 100.0	< 100.0

Sample Comments

DETS cannot be held responsible for the integrity of sample(s) received whereby the laboratory did not undertake the sampling. In this instance samples received may be deviating.

Deviating Sample criteria are based on British and International standards and laboratory trials in conjunction with the UKAS note "Guidance on Deviating Samples".

All samples received are listed below. However, those samples that have additional comments in relation to hold time and/or inappropriate containers are deviating due to the reasons stated. This means that the analysis is accredited where applicable, but results may be compromised due to sample deviations.

If no sampled date (soils) or date/time (waters) has been supplied then samples are deviating. However, if you are able to supply a sampled date (and time for waters), this will prevent samples being reported as deviating where specific hold times are not exceeded and where the container supplied is suitable.

Lab No.	Sample ID	Date Sampled	Containers Received	Deviating due to holding time being exceeded for test(s)	Deviating due to inappropriate container for test(s)	Deviating due to headspace presence in container for test(s)
518665	WS163 WATER	29/05/2013	Glass Jar 500ml (500ml)			
518666	WS701 WATER	29/05/2013	Glass Jar 500ml (500ml)			
518667	WS160 WATER	29/05/2013	Glass Jar 500ml (500ml)			
518668	WS72 WATER	29/05/2013	Glass Jar 500ml (500ml)			
518669	WS708 WATER	29/05/2013	Glass Jar 500ml (500ml)			
518670	WS98 WATER	29/05/2013	Glass Jar 500ml (500ml)			
518671	WS180 WATER	29/05/2013	Glass Jar 500ml (500ml)			
518672	WS162 WATER	29/05/2013	Glass Jar 500ml (500ml)			
518673	WS800 WATER	29/05/2013	Glass Jar 500ml (500ml)			
518674	WS73A WATER	29/05/2013	Glass Jar 500ml (500ml)			
518675	WS179 WATER	29/05/2013	Glass Jar 500ml (500ml)			
518676	WS702 WATER	29/05/2013	Glass Jar 500ml (500ml)			
518677	WS707 WATER	28/05/2013	Glass Jar 500ml (500ml)			
518678	WS706 WATER	28/05/2013	Glass Jar 500ml (500ml)			
518679	WS703 WATER	28/05/2013	Glass Jar 500ml (500ml)			
518680	WS55 WATER	28/05/2013	Glass Jar 500ml (500ml)			
518681	WS54 WATER	28/05/2013	Glass Jar 500ml (500ml)			
518682	WS46 WATER	28/05/2013	Glass Jar 500ml (500ml)			
518683	WS45a WATER	28/05/2013	Glass Jar 500ml (500ml)			
518684	WS44 WATER	28/05/2013	Glass Jar 500ml (500ml)			

2531

ANALYTICAL TEST REPORT

Contract no: 47627

Contract name: EWR

Client reference: PSL13/0364

Clients name: Professional Soils Laboratory

Clients address: 5-7 Hexthorpe Road
Doncaster
DN4 0AR

Samples received: 14 March 2013

Analysis started: 14 March 2013

Analysis completed 21 March 2013

Report issued: 22 March 2013

Notes:
Opinions and interpretations expressed herein are outside the UKAS accreditation scope.
Unless otherwise stated, Chemtech Environmental Ltd was not responsible for sampling.
Methods, procedures and performance data are available on request.
Results reported herein relate only to the material supplied to the laboratory.
This report shall not be reproduced except in full, withour prior written approval.
Samples will be disposed of 6 weeks from initial receipt unless otherwise instructed.

Key:
U UKAS accredited test
M MCERTS & UKAS accredited test
$ Test carried out by an approved subcontractor
I/S Insufficient sample to carry out test
N/S Sample not suitable for testing
NAD No Asbestos Detected

Approved by:

Karan Campbell
Director

John Campbell
Director

Chemtech Environmental Limited

SAMPLE INFORMATION

MCERTS (Soils):

Soil descriptions are only intended to provide a log of sample matrices with respect to MCERTS validation. They are not intended as full geological descriptions. MCERTS accreditation applies for sand, clay and loam/topsoil, or combinations of these whether these are derived from naturally occurring soils or from made ground, as long as these materials constitute the major part of the sample. Other materials such as concrete, gravel and brick are not accredited if they comprise the major part of the sample.

All results are reported on a dry basis. Samples dried at no more than 30°C in a drying cabinet.
Analytical results are exclusive of stones.

Lab ref	Sample id	Depth (m)	Soil description passing 2mm sieve	Description of material retained on 2mm sieve	% Retained on 2mm sieve	Moisture (%)
47627-1	WS 45B	0.00-1.20	Clay	Gravel	23.0	18.0
47627-2	WS 57B	0.60	Sand	Gravel	20.4	22.2
47627-3	WS 58B	0.60	Loamy Clay	Gravel	15.2	20.9
47627-4	WS 64A	0.20-0.75	Sandy Clay	Gravel	25.0	12.5
47627-5	WS 66	0.30-0.50	Clay	Gravel	14.7	19.3
47627-6	WS 106C	0.25	Clay	N/A	<1	18.4
47627-7	WS 163	0.30	Sand	Stones & Gravel	40.8	8.1
47627-8	WS 163	1.00	Clay	Gravel	5.3	15.9
47627-9	WS 164	0.50	Sandy Clay	Gravel	32.1	8.1
47627-10	WS 164	1.00	Clay	N/A	<1	22.8
47627-11	WS 166	0.80	Clay	Gravel	11.0	20.6
47627-12	WS 181	0.70	Clay	N/A	<1	14.8
47627-13	WS 701	1.00	Sandy Clay	Gravel	9.9	10.1
47627-14	WS 703	0.50	Sand	Gravel	20.4	7.0
47627-15	WS 703	1.40-1.60	Loam	Gravel	10.5	26.4
47627-16	WS 703	3.80-4.00	Sandy Clay	Gravel	31.2	17.0
47627-17	WS 705	0.90	Clay	N/A	<1	17.5
47627-18	WS 705	1.80-2.00	Loam	Gravel	10.0	30.0
47627-19	WS 706	0.50	Sand	Gravel	10.5	9.5
47627-20	WS 706	2.00	Clay	N/A	<1	22.5
47627-21	WS 708	0.50	Sandy Clay	Stones & Gravel	38.0	8.9
47627-22	WS 708	1.00	Clay	Stones & Gravel	10.9	17.5
47627-23	WS 708	2.00-2.50	Clay	N/A	<1	23.7
47627-24	WS 709	0.80	Clay	Gravel	7.6	13.2

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SOILS

Lab number			47627-1	47627-2	47627-3	47627-4	47627-5	47627-6
Sample id			WS 45B	WS 57B	WS 58B	WS 64A	WS 66	WS 106C
Depth (m)			0.00-1.20	0.60	0.60	0.20-0.75	0.30-0.50	0.25
Date sampled			-	21/11/2012	21/11/2012	-	-	03/12/2012
Test	**Method**	**Units**						
Arsenic (total)	CE054 M	mg/kg As	7.1	23	9.1	13	8.0	12
Boron (water soluble)	CE063 M	mg/kg B	1.1	1.6	3.3	<0.3	1.3	2.1
Cadmium (total)	CE054 M	mg/kg Cd	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Chromium (VI)	CE050	mg/kg CrVI	<1	<1	<1	<1	<1	<1
Copper (total)	CE054 M	mg/kg Cu	14	172	82	19	14	18
Lead (total)	CE054 M	mg/kg Pb	84	34	17	13	88	11
Mercury (total)	CE054	mg/kg Hg	0.7	<0.5	0.7	0.7	0.6	0.7
Nickel (total)	CE054 M	mg/kg Ni	21	40	19	19	24	32
Selenium (total)	CE054 M	mg/kg Se	<0.3	0.6	<0.3	<0.3	<0.3	<0.3
Zinc (total)	CE054 M	mg/kg Zn	59	56	51	58	68	67
pH	CE004 M	units	8.2	8.0	8.4	8.7	8.1	8.3
Chloride (2:1 water soluble)	CE049 U	mg/l Cl	4.6	12	13	<1	4.0	6.8
Sulphate (total)	CE062 M	mg/kg SO_4	690	956	942	289	642	590
Sulphide	CE079	mg/kg S^{2-}	<10	<10	<10	<10	<10	<10
Cyanide (free)	CE077	mg/kg CN	<2	<2	<2	<2	<2	<2
Phenols (total)	CE078	mg/kg PhOH	<0.5	-	-	<0.5	-	-
Organic matter content (OMC)	CE005 M	% w/w	2.16	7.40	3.42	0.23	2.37	0.84
PAH								
Naphthalene	CE087	mg/kg	<0.1	-	-	<0.1	-	-
Acenaphthylene	CE087	mg/kg	<0.1	-	-	<0.1	-	-
Acenaphthene	CE087	mg/kg	<0.1	-	-	<0.1	-	-
Fluorene	CE087	mg/kg	<0.1	-	-	<0.1	-	-
Phenanthrene	CE087	mg/kg	0.2	-	-	0.1	-	-
Anthracene	CE087	mg/kg	<0.1	-	-	<0.1	-	-
Fluoranthene	CE087	mg/kg	0.2	-	-	0.1	-	-
Pyrene	CE087	mg/kg	0.1	-	-	0.1	-	-
Benzo(a)anthracene	CE087	mg/kg	<0.1	-	-	<0.1	-	-
Chrysene	CE087	mg/kg	<0.1	-	-	<0.1	-	-
Benzo(b)fluoranthene	CE087	mg/kg	<0.1	-	-	0.1	-	-
Benzo(k)fluoranthene	CE087	mg/kg	<0.1	-	-	<0.1	-	-
Benzo(a)pyrene	CE087	mg/kg	<0.1	-	-	0.1	-	-
Indeno(123cd)pyrene	CE087	mg/kg	<0.1	-	-	<0.1	-	-
Dibenz(ah)anthracene	CE087	mg/kg	<0.1	-	-	<0.1	-	-
Benzo(ghi)perylene	CE087	mg/kg	<0.1	-	-	0.1	-	-
PAH (total)	CE087	mg/kg	<5	-	-	<5	-	-
BTEX & TPH								
MTBE	CE057 U	mg/kg	<0.01	-	-	<0.01	-	-
Benzene	CE057 U	mg/kg	<0.01	-	-	<0.01	-	-
Toluene	CE057 U	mg/kg	<0.01	-	-	<0.01	-	-
Ethylbenzene	CE057 U	mg/kg	<0.01	-	-	<0.01	-	-
m & p-Xylene	CE057 U	mg/kg	<0.01	-	-	<0.01	-	-

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SOILS

Lab number			47627-1	47627-2	47627-3	47627-4	47627-5	47627-6
Sample id			WS 45B	WS 57B	WS 58B	WS 64A	WS 66	WS 106C
Depth (m)			0.00-1.20	0.60	0.60	0.20-0.75	0.30-0.50	0.25
Date sampled			-	21/11/2012	21/11/2012	-	-	03/12/2012
Test	**Method**	**Units**						
o-Xylene	CE057 [U]	mg/kg	<0.01	-	-	<0.01	-	-
TPH Aromatic EC5-EC7	CE068	mg/kg	<0.1	-	-	<0.1	-	-
TPH Aromatic EC7-EC8	CE068	mg/kg	<0.1	-	-	<0.1	-	-
TPH Aromatic EC8-EC10	CE068	mg/kg	0.1	-	-	<0.1	-	-
TPH Aromatic EC10-EC12	CE068	mg/kg	<1	-	-	<1	-	-
TPH Aromatic EC12-EC16	CE068	mg/kg	<1	-	-	<1	-	-
TPH Aromatic EC16-EC21	CE068	mg/kg	<1	-	-	<1	-	-
TPH Aromatic EC21-EC35	CE068	mg/kg	<1	-	-	<1	-	-
TPH Aromatic EC35-EC44	CE068	mg/kg	<1	-	-	<1	-	-
TPH Aliphatic EC5-EC6	CE068	mg/kg	<0.01	-	-	<0.01	-	-
TPH Aliphatic EC6-EC8	CE068	mg/kg	<0.01	-	-	<0.01	-	-
TPH Aliphatic EC8-EC10	CE068	mg/kg	<0.01	-	-	<0.01	-	-
TPH Aliphatic EC10-EC12	CE068	mg/kg	<1	-	-	<1	-	-
TPH Aliphatic EC12-EC16	CE068	mg/kg	1	-	-	<1	-	-
TPH Aliphatic EC16-EC35	CE068	mg/kg	15	-	-	5	-	-
TPH Aliphatic EC35-EC44	CE068	mg/kg	<1	-	-	<1	-	-
Subcontracted analysis								
Asbestos	$	-	Chrysotile	NAD	NAD	Amosite	NAD	NAD

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SOILS

Lab number			47627-7	47627-8	47627-9	47627-10	47627-11	47627-12
Sample id			WS 163	WS 163	WS 164	WS 164	WS 166	WS 181
Depth (m)			0.30	1.00	0.50	1.00	0.80	0.70
Date sampled			-	-	26/11/2012	26/11/2012	27/11/2012	03/12/2012
Test	**Method**	**Units**						
Arsenic (total)	CE054 M	mg/kg As	18	7.6	16	5.2	4.0	11
Boron (water soluble)	CE063 M	mg/kg B	<0.3	1.0	0.3	0.9	1.7	3.7
Cadmium (total)	CE054 M	mg/kg Cd	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Chromium (VI)	CE050	mg/kg CrVI	<1	<1	<1	<1	<1	<1
Copper (total)	CE054 M	mg/kg Cu	29	24	27	19	23	13
Lead (total)	CE054 M	mg/kg Pb	21	11	14	12	12	13
Mercury (total)	CE054	mg/kg Hg	0.7	0.7	0.6	<0.5	<0.5	0.7
Nickel (total)	CE054 M	mg/kg Ni	20	23	17	10	17	32
Selenium (total)	CE054 M	mg/kg Se	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3
Zinc (total)	CE054 M	mg/kg Zn	68	66	49	57	106	47
pH	CE004 M	units	8.6	8.1	8.6	7.3	8.3	7.8
Chloride (2:1 water soluble)	CE049 U	mg/l Cl	<1	<1	<1	1.8	1.4	4.8
Sulphate (total)	CE062 M	mg/kg SO_4	442	616	651	27700	832	60810
Sulphide	CE079	mg/kg S^{2-}	<10	<10	<10	<10	<10	<10
Cyanide (free)	CE077	mg/kg CN	<2	<2	<2	<2	<2	<2
Phenols (total)	CE078	mg/kg PhOH	<0.5	<0.5	-	-	-	-
Organic matter content (OMC)	CE005 M	% w/w	0.45	0.60	0.88	1.63	2.06	0.26
PAH								
Naphthalene	CE087	mg/kg	<0.1	<0.1	-	-	-	-
Acenaphthylene	CE087	mg/kg	<0.1	<0.1	-	-	-	-
Acenaphthene	CE087	mg/kg	<0.1	<0.1	-	-	-	-
Fluorene	CE087	mg/kg	<0.1	<0.1	-	-	-	-
Phenanthrene	CE087	mg/kg	0.2	0.1	-	-	-	-
Anthracene	CE087	mg/kg	<0.1	<0.1	-	-	-	-
Fluoranthene	CE087	mg/kg	0.2	<0.1	-	-	-	-
Pyrene	CE087	mg/kg	0.2	<0.1	-	-	-	-
Benzo(a)anthracene	CE087	mg/kg	<0.1	<0.1	-	-	-	-
Chrysene	CE087	mg/kg	<0.1	<0.1	-	-	-	-
Benzo(b)fluoranthene	CE087	mg/kg	<0.1	<0.1	-	-	-	-
Benzo(k)fluoranthene	CE087	mg/kg	<0.1	<0.1	-	-	-	-
Benzo(a)pyrene	CE087	mg/kg	<0.1	<0.1	-	-	-	-
Indeno(123cd)pyrene	CE087	mg/kg	<0.1	<0.1	-	-	-	-
Dibenz(ah)anthracene	CE087	mg/kg	<0.1	<0.1	-	-	-	-
Benzo(ghi)perylene	CE087	mg/kg	<0.1	<0.1	-	-	-	-
PAH (total)	CE087	mg/kg	<5	<5	-	-	-	-
BTEX & TPH								
MTBE	CE057 U	mg/kg	<0.01	<0.01	-	-	-	-
Benzene	CE057 U	mg/kg	<0.01	<0.01	-	-	-	-
Toluene	CE057 U	mg/kg	<0.01	<0.01	-	-	-	-
Ethylbenzene	CE057 U	mg/kg	<0.01	<0.01	-	-	-	-
m & p-Xylene	CE057 U	mg/kg	<0.01	<0.01	-	-	-	-

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SOILS

Lab number			47627-7	47627-8	47627-9	47627-10	47627-11	47627-12
Sample id			WS 163	WS 163	WS 164	WS 164	WS 166	WS 181
Depth (m)			0.30	1.00	0.50	1.00	0.80	0.70
Date sampled			-	-	26/11/2012	26/11/2012	27/11/2012	03/12/2012
Test	**Method**	**Units**						
o-Xylene	CE057 U	mg/kg	<0.01	<0.01	-	-	-	-
TPH Aromatic EC5-EC7	CE068	mg/kg	<0.1	<0.1	-	-	-	-
TPH Aromatic EC7-EC8	CE068	mg/kg	<0.1	<0.1	-	-	-	-
TPH Aromatic EC8-EC10	CE068	mg/kg	0.1	0.1	-	-	-	-
TPH Aromatic EC10-EC12	CE068	mg/kg	<1	<1	-	-	-	-
TPH Aromatic EC12-EC16	CE068	mg/kg	<1	<1	-	-	-	-
TPH Aromatic EC16-EC21	CE068	mg/kg	<1	<1	-	-	-	-
TPH Aromatic EC21-EC35	CE068	mg/kg	<1	<1	-	-	-	-
TPH Aromatic EC35-EC44	CE068	mg/kg	<1	<1	-	-	-	-
TPH Aliphatic EC5-EC6	CE068	mg/kg	<0.01	<0.01	-	-	-	-
TPH Aliphatic EC6-EC8	CE068	mg/kg	<0.01	<0.01	-	-	-	-
TPH Aliphatic EC8-EC10	CE068	mg/kg	<0.01	<0.01	-	-	-	-
TPH Aliphatic EC10-EC12	CE068	mg/kg	<1	<1	-	-	-	-
TPH Aliphatic EC12-EC16	CE068	mg/kg	<1	<1	-	-	-	-
TPH Aliphatic EC16-EC35	CE068	mg/kg	2	<1	-	-	-	-
TPH Aliphatic EC35-EC44	CE068	mg/kg	<1	<1	-	-	-	-
Subcontracted analysis								
Asbestos	$	-	NAD	NAD	Chrysotile	NAD	NAD	NAD

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SOILS

Lab number			47627-13	47627-14	47627-15	47627-16	47627-17	47627-18
Sample id			WS 701	WS 703	WS 703	WS 703	WS 705	WS 705
Depth (m)			1.00	0.50	1.40-1.60	3.80-4.00	0.90	1.80-2.00
Date sampled			11/12/2012	11/12/2012	16/01/2013	16/01/2013	11/12/2012	20/12/2012
Test	**Method**	**Units**						
Arsenic (total)	CE054 M	mg/kg As	9.5	9.4	5.6	6.2	12	7.9
Boron (water soluble)	CE063 M	mg/kg B	0.7	<0.3	1.5	1.8	1.5	2.9
Cadmium (total)	CE054 M	mg/kg Cd	<0.2	<0.2	<0.2	3.5	<0.3	<0.3
Chromium (VI)	CE050	mg/kg CrVI	<1	<1	<1	<1	<1	<1
Copper (total)	CE054 M	mg/kg Cu	33	31	21	16	15	17
Lead (total)	CE054 M	mg/kg Pb	26	9.5	12	9.7	9.7	15
Mercury (total)	CE054	mg/kg Hg	0.7	0.7	0.8	0.6	0.6	<0.5
Nickel (total)	CE054 M	mg/kg Ni	16	15	16	30	33	26
Selenium (total)	CE054 M	mg/kg Se	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3
Zinc (total)	CE054 M	mg/kg Zn	69	44	35	339	56	75
pH	CE004 M	units	8.5	8.9	8.0	8.0	8.5	7.7
Chloride (2:1 water soluble)	CE049 U	mg/l Cl	1.5	<1	4.0	5.7	1.8	3.4
Sulphate (total)	CE062 M	mg/kg SO_4	758	388	1739	1580	477	1802
Sulphide	CE079	mg/kg S^{2-}	<10	<10	<10	<10	<10	<10
Cyanide (free)	CE077	mg/kg CN	<2	<2	<2	<2	<2	<2
Phenols (total)	CE078	mg/kg PhOH	-	-	-	-	-	-
Organic matter content (OMC)	CE005 M	% w/w	2.17	0.44	4.59	3.06	0.54	6.12
PAH								
Naphthalene	CE087	mg/kg	-	-	-	-	-	-
Acenaphthylene	CE087	mg/kg	-	-	-	-	-	-
Acenaphthene	CE087	mg/kg	-	-	-	-	-	-
Fluorene	CE087	mg/kg	-	-	-	-	-	-
Phenanthrene	CE087	mg/kg	-	-	-	-	-	-
Anthracene	CE087	mg/kg	-	-	-	-	-	-
Fluoranthene	CE087	mg/kg	-	-	-	-	-	-
Pyrene	CE087	mg/kg	-	-	-	-	-	-
Benzo(a)anthracene	CE087	mg/kg	-	-	-	-	-	-
Chrysene	CE087	mg/kg	-	-	-	-	-	-
Benzo(b)fluoranthene	CE087	mg/kg	-	-	-	-	-	-
Benzo(k)fluoranthene	CE087	mg/kg	-	-	-	-	-	-
Benzo(a)pyrene	CE087	mg/kg	-	-	-	-	-	-
Indeno(123cd)pyrene	CE087	mg/kg	-	-	-	-	-	-
Dibenz(ah)anthracene	CE087	mg/kg	-	-	-	-	-	-
Benzo(ghi)perylene	CE087	mg/kg	-	-	-	-	-	-
PAH (total)	CE087	mg/kg	-	-	-	-	-	-
BTEX & TPH								
MTBE	CE057 U	mg/kg	-	-	-	-	-	-
Benzene	CE057 U	mg/kg	-	-	-	-	-	-
Toluene	CE057 U	mg/kg	-	-	-	-	-	-
Ethylbenzene	CE057 U	mg/kg	-	-	-	-	-	-
m & p-Xylene	CE057 U	mg/kg	-	-	-	-	-	-

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SOILS

Lab number			47627-13	47627-14	47627-15	47627-16	47627-17	47627-18
Sample id			WS 701	WS 703	WS 703	WS 703	WS 705	WS 705
Depth (m)			1.00	0.50	1.40-1.60	3.80-4.00	0.90	1.80-2.00
Date sampled			11/12/2012	11/12/2012	16/01/2013	16/01/2013	11/12/2012	20/12/2012
Test	**Method**	**Units**						
o-Xylene	CE057 [U]	mg/kg	-	-	-	-	-	-
TPH Aromatic EC5-EC7	CE068	mg/kg	-	-	-	-	-	-
TPH Aromatic EC7-EC8	CE068	mg/kg	-	-	-	-	-	-
TPH Aromatic EC8-EC10	CE068	mg/kg	-	-	-	-	-	-
TPH Aromatic EC10-EC12	CE068	mg/kg	-	-	-	-	-	-
TPH Aromatic EC12-EC16	CE068	mg/kg	-	-	-	-	-	-
TPH Aromatic EC16-EC21	CE068	mg/kg	-	-	-	-	-	-
TPH Aromatic EC21-EC35	CE068	mg/kg	-	-	-	-	-	-
TPH Aromatic EC35-EC44	CE068	mg/kg	-	-	-	-	-	-
TPH Aliphatic EC5-EC6	CE068	mg/kg	-	-	-	-	-	-
TPH Aliphatic EC6-EC8	CE068	mg/kg	-	-	-	-	-	-
TPH Aliphatic EC8-EC10	CE068	mg/kg	-	-	-	-	-	-
TPH Aliphatic EC10-EC12	CE068	mg/kg	-	-	-	-	-	-
TPH Aliphatic EC12-EC16	CE068	mg/kg	-	-	-	-	-	-
TPH Aliphatic EC16-EC35	CE068	mg/kg	-	-	-	-	-	-
TPH Aliphatic EC35-EC44	CE068	mg/kg	-	-	-	-	-	-
Subcontracted analysis								
Asbestos	$	-	NAD	NAD	NAD	NAD	NAD	NAD

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SOILS

Lab number			47627-19	47627-20	47627-21	47627-22	47627-23	47627-24
Sample id			WS 706	WS 706	WS 708	WS 708	WS 708	WS 709
Depth (m)			0.50	2.00	0.50	1.00	2.00-2.50	0.80
Date sampled			17/12/2012	07/01/2013	17/12/2012	17/12/2012	-	18/12/2012
Test	**Method**	**Units**						
Arsenic (total)	CE054 M	mg/kg As	14	11	12	11	12	61
Boron (water soluble)	CE063 M	mg/kg B	<0.3	3.4	0.4	1.3	1.5	0.6
Cadmium (total)	CE054 M	mg/kg Cd	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Chromium (VI)	CE050	mg/kg CrVI	<1	<1	<1	<1	<1	<1
Copper (total)	CE054 M	mg/kg Cu	28	20	12	12	13	13
Lead (total)	CE054 M	mg/kg Pb	12	12	8.5	11	11	17
Mercury (total)	CE054	mg/kg Hg	0.6	0.7	0.9	0.6	<0.5	<0.5
Nickel (total)	CE054 M	mg/kg Ni	17	41	22	31	30	38
Selenium (total)	CE054 M	mg/kg Se	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3
Zinc (total)	CE054 M	mg/kg Zn	17	41	22	31	30	66
pH	CE004 M	units	8.8	7.6	8.9	8.2	7.9	8.4
Chloride (2:1 water soluble)	CE049 U	mg/l Cl	1.1	2.2	<1	<1	2.0	<1
Sulphate (total)	CE062 M	mg/kg SO_4	290	12400	962	271	338	399
Sulphide	CE079	mg/kg S^{2-}	<10	<10	<10	<10	<10	<10
Cyanide (free)	CE077	mg/kg CN	<2	<2	<2	<2	<2	<2
Phenols (total)	CE078	mg/kg PhOH	-	-	-	-	-	-
Organic matter content (OMC)	CE005 M	% w/w	0.53	0.37	0.37	0.52	1.20	0.90
PAH								
Naphthalene	CE087	mg/kg	-	-	-	-	-	-
Acenaphthylene	CE087	mg/kg	-	-	-	-	-	-
Acenaphthene	CE087	mg/kg	-	-	-	-	-	-
Fluorene	CE087	mg/kg	-	-	-	-	-	-
Phenanthrene	CE087	mg/kg	-	-	-	-	-	-
Anthracene	CE087	mg/kg	-	-	-	-	-	-
Fluoranthene	CE087	mg/kg	-	-	-	-	-	-
Pyrene	CE087	mg/kg	-	-	-	-	-	-
Benzo(a)anthracene	CE087	mg/kg	-	-	-	-	-	-
Chrysene	CE087	mg/kg	-	-	-	-	-	-
Benzo(b)fluoranthene	CE087	mg/kg	-	-	-	-	-	-
Benzo(k)fluoranthene	CE087	mg/kg	-	-	-	-	-	-
Benzo(a)pyrene	CE087	mg/kg	-	-	-	-	-	-
Indeno(123cd)pyrene	CE087	mg/kg	-	-	-	-	-	-
Dibenz(ah)anthracene	CE087	mg/kg	-	-	-	-	-	-
Benzo(ghi)perylene	CE087	mg/kg	-	-	-	-	-	-
PAH (total)	CE087	mg/kg	-	-	-	-	-	-
BTEX & TPH								
MTBE	CE057 U	mg/kg	-	-	-	-	-	-
Benzene	CE057 U	mg/kg	-	-	-	-	-	-
Toluene	CE057 U	mg/kg	-	-	-	-	-	-
Ethylbenzene	CE057 U	mg/kg	-	-	-	-	-	-
m & p-Xylene	CE057 U	mg/kg	-	-	-	-	-	-

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SOILS

Lab number			47627-19	47627-20	47627-21	47627-22	47627-23	47627-24
Sample id			WS 706	WS 706	WS 708	WS 708	WS 708	WS 709
Depth (m)			0.50	2.00	0.50	1.00	2.00-2.50	0.80
Date sampled			17/12/2012	07/01/2013	17/12/2012	17/12/2012	-	18/12/2012
Test	**Method**	**Units**						
o-Xylene	CE057 U	mg/kg	-	-	-	-	-	-
TPH Aromatic EC5-EC7	CE068	mg/kg	-	-	-	-	-	-
TPH Aromatic EC7-EC8	CE068	mg/kg	-	-	-	-	-	-
TPH Aromatic EC8-EC10	CE068	mg/kg	-	-	-	-	-	-
TPH Aromatic EC10-EC12	CE068	mg/kg	-	-	-	-	-	-
TPH Aromatic EC12-EC16	CE068	mg/kg	-	-	-	-	-	-
TPH Aromatic EC16-EC21	CE068	mg/kg	-	-	-	-	-	-
TPH Aromatic EC21-EC35	CE068	mg/kg	-	-	-	-	-	-
TPH Aromatic EC35-EC44	CE068	mg/kg	-	-	-	-	-	-
TPH Aliphatic EC5-EC6	CE068	mg/kg	-	-	-	-	-	-
TPH Aliphatic EC6-EC8	CE068	mg/kg	-	-	-	-	-	-
TPH Aliphatic EC8-EC10	CE068	mg/kg	-	-	-	-	-	-
TPH Aliphatic EC10-EC12	CE068	mg/kg	-	-	-	-	-	-
TPH Aliphatic EC12-EC16	CE068	mg/kg	-	-	-	-	-	-
TPH Aliphatic EC16-EC35	CE068	mg/kg	-	-	-	-	-	-
TPH Aliphatic EC35-EC44	CE068	mg/kg	-	-	-	-	-	-
Subcontracted analysis								
Asbestos	$	-	Amosite	NAD	Amosite	NAD	NAD	NAD

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LEACHATES

Lab number			47627-1L	47627-4L	47627-7L	47627-8L	47627-14L	47627-15L
Sample id			WS 45B	WS 64A	WS 163	WS 163	WS 703	WS 703
Depth (m)			0.00-1.20	0.20-0.75	0.30	1.00	0.50	1.40-1.60
Test	**Method**	**Units**						
Arsenic (dissolved)	CE055	mg/l As	<0.001	<0.001	<0.001	<0.001	<0.001	0.001
Boron (dissolved)	CE063	mg/l B	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03
Cadmium (dissolved)	CE055 U	mg/l Cd	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Chromium (dissolved)	CE055 U	mg/l Cr	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003
Chromium (VI) (dissolved)	CE050	mg/l CrVI	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Copper (dissolved)	CE055 U	mg/l Cu	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004
Lead (dissolved)	CE055 U	mg/l Pb	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009
Mercury (dissolved)	CE055	mg/l Hg	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Nickel (dissolved)	CE055 U	mg/l Ni	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003
Selenium (dissolved)	CE055	mg/l Se	0.002	0.002	0.002	0.004	0.002	0.004
Zinc (dissolved)	CE055 U	mg/l Zn	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020
Hardness (by calculation)	CE055	mg/l $CaCO_3$	50	28	35	64	27	55
pH	CE004	units	8.1	8.0	8.3	8.4	8.7	8.1
Ammoniacal Nitrogen	CE012 U	mg/l N	0.02	0.06	0.07	0.04	0.08	0.01
Chloride	CE049 U	mg/l Cl	1.1	<1	<1	<1	<1	<1
Nitrate	CE049 U	mg/l NO_3	3.4	<1	<1	<1	<1	1.2
Sulphate	CE049 U	mg/l SO_4	<10	<10	<10	12	<10	<10
Cyanide (free)	CE077	mg/l CN	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Total Organic Carbon	CE071	mg/l C	5.6	2.8	3.4	2.3	2.8	6.1

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LEACHATES

Lab number			47627-16L	47627-17L	47627-18L	47627-19L	47627-20L
Sample id			WS 703	WS 705	WS 705	WS 706	WS 706
Depth (m)			3.80-4.00	0.90	1.80-2.00	0.50	2.00
Test	**Method**	**Units**					
Arsenic (dissolved)	CE055	mg/l As	<0.001	<0.001	<0.001	0.001	<0.001
Boron (dissolved)	CE063	mg/l B	0.03	<0.03	0.03	<0.03	0.07
Cadmium (dissolved)	CE055 U	mg/l Cd	<0.001	<0.001	<0.001	<0.001	<0.001
Chromium (dissolved)	CE055 U	mg/l Cr	<0.003	<0.003	<0.003	<0.003	<0.003
Chromium (VI) (dissolved)	CE050	mg/l CrVI	<0.01	<0.01	<0.01	<0.01	<0.01
Copper (dissolved)	CE055 U	mg/l Cu	<0.004	0.007	<0.004	<0.004	<0.004
Lead (dissolved)	CE055 U	mg/l Pb	<0.009	<0.009	<0.009	<0.009	<0.009
Mercury (dissolved)	CE055	mg/l Hg	<0.001	<0.001	<0.001	<0.001	<0.001
Nickel (dissolved)	CE055 U	mg/l Ni	<0.003	<0.003	<0.003	<0.003	<0.003
Selenium (dissolved)	CE055	mg/l Se	0.002	0.003	0.002	0.003	0.003
Zinc (dissolved)	CE055 U	mg/l Zn	<0.020	<0.020	<0.020	<0.020	<0.020
Hardness (by calculation)	CE055	mg/l $CaCO_3$	108	44	30	30	1651
pH	CE004	units	7.7	8.0	7.6	8.7	7.8
Ammoniacal Nitrogen	CE012 U	mg/l N	0.04	0.01	0.03	0.08	0.62
Chloride	CE049 U	mg/l Cl	<1	<1	1.0	<1	<1
Nitrate	CE049 U	mg/l NO_3	<1	<1	2.9	<1	1.4
Sulphate	CE049 U	mg/l SO_4	66	<10	<10	<10	1384
Cyanide (free)	CE077	mg/l CN	<0.02	<0.02	<0.02	<0.02	<0.02
Total Organic Carbon	CE071	mg/l C	2.4	2.7	10.2	3.9	5.1

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METHOD DETAILS

METHOD	SOILS	METHOD SUMMARY	SAMPLE	STATUS	LOD	UNITS
CE054	Arsenic (total)	Aqua regia digest, ICP-OES	Dry	M	1	mg/kg As
CE063	Boron (water soluble)	Hot water extract, ICP-OES	Dry	M	0.3	mg/kg B
CE054	Cadmium (total)	Aqua regia digest, ICP-OES	Dry	M	0.2	mg/kg Cd
CE050	Chromium (VI)	Acid extraction, Colorimetry	Dry		1	mg/kg CrVI
CE054	Copper (total)	Aqua regia digest, ICP-OES	Dry	M	1	mg/kg Cu
CE054	Lead (total)	Aqua regia digest, ICP-OES	Dry	M	1	mg/kg Pb
CE054	Mercury (total)	Aqua regia digest, ICP-OES	Dry		0.5	mg/kg Hg
CE054	Nickel (total)	Aqua regia digest, ICP-OES	Dry	M	1	mg/kg Ni
CE054	Selenium (total)	Aqua regia digest, ICP-OES	Dry	M	0.3	mg/kg Se
CE054	Zinc (total)	Aqua regia digest, ICP-OES	Dry	M	3	mg/kg Zn
CE055	Hardness (by calculation)	ICP-OES		1	mg/l $CaCO_3$	
CE004	pH	Based on BS 1377, pH Meter	Wet	M	-	units
CE049	Chloride (2:1 water soluble)	Aqueous extraction, IC-COND	Dry	U	1	mg/l Cl
CE062	Sulphate (total)	Acid extraction, ICP-OES	Dry	M	100	mg/kg SO_4
CE079	Sulphide	Extraction, Continuous Flow Colorimetry	Wet		10	mg/kg S^{2-}
CE077	Cyanide (free)	Extraction, Continuous Flow Colorimetry	Wet		2	mg/kg CN
CE078	Phenols (total)	Extraction, Continuous Flow Colorimetry	Wet		0.5	mg/kg PhOH
CE005	Organic matter content (OMC)	Based on BS 1377, Colorimetry	Dry	M	0.01	% w/w
CE087	PAH (speciated)	Solvent extraction, GC-MS	Wet		0.1	mg/kg
CE087	PAH (total)	Solvent extraction, GC-MS	Wet		5	mg/kg
CE057	BTEX & MTBE	Headspace GC-FID	Wet	U	0.01	mg/kg
CE068	TPH Aliphatic/Aromatic fractions (C5-C10)	Headspace GC-FID	Wet		0.01-0.1	mg/kg
CE068	TPH Aliphatic/Aromatic fractions (C10-C44)	Solvent extraction, GC-FID	Wet		1	mg/kg
$	Asbestos (qualitative)	HSG 248, Microscopy	Dry	U	-	-

Chemtech Environmental Limited

METHOD DETAILS

METHOD	LEACHATES	METHOD SUMMARY	STATUS	LOD	UNITS
CE055	Arsenic (dissolved)	ICP-OES		0.001	mg/l As
CE063	Boron (dissolved)	ICP-OES		0.03	mg/l B
CE055	Cadmium (dissolved)	ICP-OES	U	0.001	mg/l Cd
CE055	Chromium (dissolved)	ICP-OES	U	0.003	mg/l Cr
CE050	Chromium VI (dissolved)	Colorimetry		0.01	mg/l CrVI
CE055	Copper (dissolved)	ICP-OES	U	0.004	mg/l Cu
CE055	Lead (dissolved)	ICP-OES	U	0.009	mg/l Pb
CE055	Mercury (dissolved)	ICP-OES		0.001	mg/l Hg
CE055	Nickel (dissolved)	ICP-OES	U	0.003	mg/l Ni
CE055	Selenium (dissolved)	ICP-OES		0.001	mg/l Se
CE055	Zinc (dissolved)	ICP-OES	U	0.020	mg/l Zn
CE004	pH	Based on BS 1377, pH Meter		-	units
CE012	Ammoniacal Nitrogen	Colorimetry	U	0.01	mg/l N
CE049	Chloride	Ion Chromatography	U	1	mg/l Cl
CE049	Nitrate	Ion Chromatography	U	1	mg/l NO_3
CE049	Sulphate	Ion Chromatography	U	10	mg/l SO_4
CE077	Cyanide (free)	Distillation, Colorimetry		0.02	mg/l CN
CE071	Total Organic Carbon	TOC analyser		1	mg/l C

Annex B2

Water Eaton

Annex B - Water Eaton Soil Analytical Results

Parameter	Units	Screening Criteria / mg/kg Value	Source	T44 0.60	T44 1.00	T41 0.30	T41 0.70-0.90	T41 1.00-1.40	T42 0.30	T42 0.60	T42 1.20	S4 0.30	S4 0.60
Arsenic	(mg/kg)	362	ERM MRC	<10	<10	<10	<10	<10	28.6	<10	<10	<10	22.6
Boron (Water soluble)	(mg/kg)	NRP	NRP	<2.5	<2.5	<2.5	<2.5	3.6	3.7	3.7	<2.5	<2.5	<2.5
Cadmium	(mg/kg)	248	ERM MRC	<0.2	0.4	0.5	0.5	0.6	0.4	0.4	<0.2	0.5	0.4
Chromium (Total)	(mg/kg)	3,872	GAC No Veg Uptake	15.9	27.7	42.0	20.4	57.0	22.6	34.9	13.9	44.1	21.6
Copper	(mg/kg)	6,500	GAC No Veg Uptake	9.3	12.8	29.3	57.2	34.9	40.3	18.9	8.9	21.2	64.1
Lead	(mg/kg)	5,197	ERM MRC	20.5	33.1	18.5	36.3	9.3	34.4	13.7	12.5	8.8	25.8
Mercury	(mg/kg)	3,067	ERM MRC	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5
Nickel	(mg/kg)	130	ERM MRC	15.3	24.6	33.8	29.3	49.1	28.1	34.0	10.6	34.8	40.1
Selenium	(mg/kg)	596	GAC No Veg Uptake	<8	<8	<8	<8	<8	<8	<8	<8	<8	<8
Zinc	(mg/kg)	40,432	GAC No Veg Uptake	87.7	63.5	122	160	90.2	119	79.5	34.0	75.6	87.1
TOC	(%)	NRP	NRP										
Cyanide (Total)	(mg/kg)	n.v	n.v	<1.1	<1.2	<1.2	<1.1	<1.3	<1.1	<1.3	<1.3	<1.2	<1.2
Cyanide (Free)	(mg/kg)	59	GAC No Veg	<1.1	<1.2	<1.2	<1.1	<1.3	<1.1	<1.3	<1.3	<1.2	<1.2
Cyanide (Complex)	(mg/kg)	24,619	GAC No Veg	<1.1	<1.2	<1.2	<1.1	<1.3	<1.1	<1.3	<1.3	<1.2	<1.2
Chromium (Hexavalent)	(mg/kg)	38	GAC No Veg	<1.1	<1.2	<1.2	<1.1	<1.3	<1.1	<1.3	<1.3	12.8	<1.2
SOM	(%)	n.v	n.v	2.9	2.1	6.5	26.1	<1.7	37.7	6.4	3.2	1.9	41.0
Total Sulphate	(mg/kg)	n.v	n.v	1000	500	900	1500	1400	3800	2700	600	800	1900
Sulphide	(mg/kg)	n.v	n.v	22.7	7.2	23.9	34.7	9.6	16.7	9.6	17.9	15.5	32.3
Chloride (Water soluble)	(mg/l)	n.v	n.v	26.0	23.0	12.0	11.0	9.3	9.4	10.0	17.0	29.0	7.1
pH	pH Units	n.v	n.v	8.3	6.9	7.6	7.5	7.7	7.1	7.1	7.0	7.4	7.3
Acenaphthene	(mg/kg)	4,834	GAC No Veg Uptake	1.4	0.2	4.1	<1.0	<0.1	0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	(mg/kg)	4,830	GAC No Veg Uptake	<1.0	0.6	0.3	<1.0	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Anthracene	(mg/kg)	24,206	GAC No Veg Uptake	7.8	1.4	0.9	1.1	<0.1	0.5	0.4	<0.1	<0.1	<0.1
Benzo (a) anthracene	(mg/kg)	10	GAC No Veg Uptake	23.8	2.6	2.0	2.7	0.2	1.8	2.5	0.5	<0.1	0.2
Benzo (a) pyrene	(mg/kg)	14	ERM MRC	21.0	2.0	2.4	2.2	<0.1	1.4	1.9	0.3	<0.1	<0.1
Benzo (b) fluoranthene	(mg/kg)	10	GAC No Veg Uptake	29.0	2.6	3.6	4.1	0.2	2.5	2.6	0.5	<0.1	0.3
Benzo (g, h, i) perylene	(mg/kg)	48	GAC No Veg Uptake	16.1	1.5	2.1	2.2	0.1	1.1	1.3	0.3	<0.1	0.2
Benzo (k) fluoranthene	(mg/kg)	26	GAC No Veg Uptake	9.4	0.9	1.2	<1.0	<0.1	0.7	0.9	0.1	<0.1	<0.1
Chrysene	(mg/kg)	111	GAC No Veg Uptake	22.9	2.5	2.3	3.0	0.2	2.3	2.4	0.5	<0.1	0.4
Dibenzo (a,h) anthracene	(mg/kg)	1.0	GAC No Veg Uptake	3.3	0.3	0.5	<1.0	<0.1	0.3	0.2	<0.1	<0.1	<0.1
Fluoranthene	(mg/kg)	1,007	GAC No Veg Uptake	55.5	7.1	3.9	6.8	0.5	4.2	5.4	1.0	0.1	0.6
Fluorene	(mg/kg)	3,223	GAC No Veg Uptake	1.6	0.7	2.5	<1.0	<0.1	0.5	<0.1	<0.1	<0.1	0.1
Indeno (1, 2, 3,-cd) pyrene	(mg/kg)	10	GAC No Veg Uptake	17.2	1.6	2.4	2.1	<0.1	1.1	1.4	0.3	<0.1	<0.1
Naphthalene	(mg/kg)	3.6	ERM MRC	<1.0	0.6	17.6	2.2	0.2	3.2	0.8	0.1	<0.1	0.9
Phenanthrene	(mg/kg)	1,001	GAC No Veg Uptake	34.2	7.2	5.4	4.7	0.4	5.0	2.1	0.4	0.1	1.2
Pyrene	(mg/kg)	2,419	GAC No Veg Uptake	44.7	5.8	3.4	6.7	0.4	3.7	4.5	0.9	0.1	0.5
Total PAH (Sum of USEPA 16)	(mg/kg)	n.v.	GAC No Veg Uptake	290	37.4	54.5	42.8	2.9	28.4	26.6	5.4	1.7	5.0
Phenols (Total)	(mg/kg)	843	ERM MRC	<1.1	<1.2	<1.2	<1.1	<1.3	<1.1	<1.3	<1.3	<1.2	<1.2
Aliphatics													
>C_5 to C_6	(mg/kg)	35	GAC No Veg Uptake	<0.03	0.05	<0.04	0.12	<0.03	0.16	<0.04	0.03	0.12	<0.03
>C_6 to C_8	(mg/kg)	90	GAC No Veg Uptake	0.06	0.07	<0.04	0.16	0.09	0.30	<0.04	0.03	0.05	<0.03
>C_8 to C_{10}	(mg/kg)	25	GAC No Veg Uptake	<0.03	<0.03	<0.04	<0.03	<0.03	<0.03	<0.04	<0.03	<0.03	<0.03
>C_{10} to C_{12}	(mg/kg)	2,862	GAC No Veg Uptake	<11	<12	<11	<11	<13	<11	<13	<13	<12	<12
>C_{12} to C_{16}	(mg/kg)	4,322	GAC No Veg Uptake	<11	<12	<11	<11	<13	<11	<13	<13	<12	<12
>C_{16} to C_{21}	(mg/kg)	89,023	GAC No Veg Uptake	12	<12	<11	14	<13	<11	<13	<13	<12	<12
>C_{21} to C_{35}	(mg/kg)	89,023	GAC No Veg Uptake	44	<12	16	59	<13	27	<13	<13	25	12
Aromatics													
>C_5 to C_7	(mg/kg)	260	GAC No Veg Uptake	<0.03	<0.03	<0.04	<0.03	<0.03	0.03	<0.04	<0.03	<0.03	<0.03
>C_7 to C_8	(mg/kg)	555	GAC No Veg Uptake	<0.03	<0.03	<0.04	<0.03	<0.03	<0.03	<0.04	<0.03	<0.03	<0.03
>C_8 to C_{10}	(mg/kg)	42	GAC No Veg Uptake	<0.03	<0.03	<0.04	<0.03	<0.03	0.05	<0.04	<0.03	0.06	<0.03
>C_{10} to C_{12}	(mg/kg)	230	GAC No Veg Uptake	<11	<12	<11	<11	<13	<11	<13	<13	<12	<12
>C_{12} to C_{16}	(mg/kg)	1,578	GAC No Veg Uptake	19	<12	<11	33	<13	<11	<13	<13	<12	<12
>C_{16} to C_{21}	(mg/kg)	1,328	GAC No Veg Uptake	150	<12	12	60	<13	17	<13	<13	<12	<12
>C_{21} to C_{35}	(mg/kg)	1,335	GAC No Veg Uptake	609	<12	56	195	<13	64	<13	<13	42	<12
Benzene	(mg/kg)	1.1	ERM MRC	<0.05	<0.06	<0.05	<0.04	<0.06	<0.05	<0.06	<0.04	<0.06	<0.04
Toluene	(mg/kg)	159	ERM MRC	<0.05	<0.06	<0.05	<0.04	<0.06	<0.05	<0.06	<0.04	<0.06	<0.04
Ethyl Benzene	(mg/kg)	661	ERM MRC	<0.05	<0.06	<0.05	<0.04	<0.06	<0.05	<0.06	<0.04	<0.06	<0.04
Xylene (meta / para)	(mg/kg)	305,338	GAC No Veg Uptake	<0.05	<0.06	<0.05	<0.04	<0.06	<0.05	<0.06	<0.04	<0.06	<0.04
Xylene (ortho)	(mg/kg)	305,338	GAC No Veg Uptake	<0.05	<0.06	<0.05	<0.04	<0.06	<0.05	<0.06	<0.04	<0.06	<0.04
MTBE	(mg/kg)	10,952	GAC No Veg Uptake	<0.05	<0.06	<0.05	<0.04	<0.06	<0.05	<0.06	<0.04	<0.06	<0.04

ERM Material Re-use Criteria (MRC) are presented in Annex *

Assumptions for GAC calculations are presented in Annex *

NRP- No risk predicted

n.v - No value

NAD - no asbestos detected

- present above detection limit

- exceeds ERM MRC

- exceeds residential GAC/SGV

East-West Rail Combined Report

Project / Site name: East-West Rail Phase 1

Lab Sample Number				290652	287956	291001	287970	287971
Sample Reference				TB027	TB030	TB030	TB032	TB032
Sample Number				ES	ES	ES	ES	ES
Depth (m)				0.10-0.20	0.50	0.00-0.35	0.00-0.20	0.50
Date Sampled				Deviating	20/09/2013	Deviating	Deviating	17/09/2013
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Moisture Content	%	N/A	NONE	3.3	22	2.5	0.12	7.2
Total mass of sample received	kg	0.001	NONE	2.0	2.0	2.0	2.0	2.0
Asbestos in Soil	Type	N/A	ISO 17025	Not-detected	Not-detected	Not-detected	Not-detected	Not-detected
General Inorganics								
pH	pH Units	N/A	MCERTS	7.5	7.0	8.1	7.8	7.9
Total Cyanide	mg/kg	1	MCERTS	< 1	< 1	< 1	< 1	< 1
Complex Cyanide	mg/kg	1	NONE	< 1	< 1	< 1	< 1	< 1
Free Cyanide	mg/kg	1	NONE	< 1	< 1	< 1	< 1	< 1
Total Sulphate as SO_4	mg/kg	100	ISO 17025	2000	640	240	630	190
Sulphide	mg/kg	1	MCERTS	810	25	7.4	110	1.1
Total Chloride	mg/kg	5	NONE	110	37	49	30	24
Organic Matter	%	0.1	MCERTS	1.8	2.0	0.4	< 0.1	< 0.1
Phenols by HPLC								
Catechol	µg/kg	1	NONE	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Resorcinol	µg/kg	1	NONE	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Butyl Phenols	µg/kg	1	NONE	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Cresols	µg/kg	1	NONE	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Naphthols	µg/kg	1	NONE	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Phenol	µg/kg	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Trimethylphenol	µg/kg	1	NONE	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Total Phenols								
Total Phenols (HPLC)	µg/kg	7	NONE	< 7.0	< 7.0	< 7.0	< 7.0	< 7.0
Speciated PAHs								
Naphthalene	mg/kg	0.05	MCERTS	0.26	< 0.05	< 0.05	< 0.05	< 0.05
Acenaphthylene	mg/kg	0.2	MCERTS	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20
Acenaphthene	mg/kg	0.1	MCERTS	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Fluorene	mg/kg	0.2	MCERTS	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20
Phenanthrene	mg/kg	0.2	MCERTS	0.52	< 0.20	0.41	< 0.20	< 0.20
Anthracene	mg/kg	0.1	MCERTS	0.11	< 0.10	< 0.10	< 0.10	< 0.10
Fluoranthene	mg/kg	0.2	MCERTS	1.4	< 0.20	0.73	< 0.20	< 0.20
Pyrene	mg/kg	0.2	MCERTS	1.3	< 0.20	0.75	< 0.20	< 0.20
Benzo(a)anthracene	mg/kg	0.2	MCERTS	0.60	< 0.20	0.27	< 0.20	< 0.20
Chrysene	mg/kg	0.05	MCERTS	0.83	< 0.05	0.50	< 0.05	< 0.05
Benzo(b)fluoranthene	mg/kg	0.1	MCERTS	0.44	< 0.10	0.47	< 0.10	< 0.10
Benzo(k)fluoranthene	mg/kg	0.2	MCERTS	0.38	< 0.20	0.28	< 0.20	< 0.20
Benzo(a)pyrene	mg/kg	0.1	MCERTS	0.27	< 0.10	0.33	< 0.10	< 0.10
Indeno(1,2,3-cd)pyrene	mg/kg	0.2	MCERTS	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20
Dibenz(a,h)anthracene	mg/kg	0.2	MCERTS	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Total PAH								
Speciated Total EPA-16 PAHs	mg/kg	1.6	MCERTS	6.2	< 1.6	3.8	< 1.6	< 1.6

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East-West Rail Combined Report

Project / Site name: East-West Rail Phase 1

Lab Sample Number				290652	287956	291001	287970	287971
Sample Reference				TB027	TB030	TB030	TB032	TB032
Sample Number				ES	ES	ES	ES	ES
Depth (m)				0.10-0.20	0.50	0.00-0.35	0.00-0.20	0.50
Date Sampled				Deviating	20/09/2013	Deviating	Deviating	17/09/2013
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Heavy Metals / Metalloids								
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	17	14	6.7	1.1	5.4
Boron (water soluble)	mg/kg	0.2	MCERTS	3.6	1.1	0.3	0.5	< 0.2
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	0.2	< 0.2	< 0.2	< 0.2	< 0.2
Chromium (hexavalent)	mg/kg	4	MCERTS	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	24	38	16	19	8.9
Copper (aqua regia extractable)	mg/kg	1	MCERTS	43	20	33	18	15
Lead (aqua regia extractable)	mg/kg	2	MCERTS	18	21	21	5.4	16
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
Nickel (aqua regia extractable)	mg/kg	2	MCERTS	14	23	12	8.9	11
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Zinc (aqua regia extractable)	mg/kg	2	MCERTS	56	65	90	37	46
Monoaromatics								
Benzene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Toluene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Ethylbenzene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
p & m-xylene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
o-xylene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Petroleum Hydrocarbons								
TPH-CWG - Aliphatic >EC5 - EC6	mg/kg	0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
TPH-CWG - Aliphatic >EC6 - EC8	mg/kg	0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
TPH-CWG - Aliphatic >EC8 - EC10	mg/kg	0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
TPH-CWG - Aliphatic >EC10 - EC12	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH-CWG - Aliphatic >EC12 - EC16	mg/kg	2	MCERTS	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
TPH-CWG - Aliphatic >EC16 - EC21	mg/kg	8	MCERTS	< 8.0	< 8.0	< 8.0	< 8.0	< 8.0
TPH-CWG - Aliphatic >EC21 - EC35	mg/kg	8	MCERTS	< 8.0	< 8.0	45	56	< 8.0
TPH-CWG - Aliphatic (EC5 - EC35)	mg/kg	10	MCERTS	< 10	< 10	45	56	< 10
TPH-CWG - Aromatic >EC5 - EC7	mg/kg	0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
TPH-CWG - Aromatic >EC7 - EC8	mg/kg	0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
TPH-CWG - Aromatic >EC8 - EC10	mg/kg	0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
TPH-CWG - Aromatic >EC10 - EC12	mg/kg	1	MCERTS	1.4	< 1.0	< 1.0	< 1.0	< 1.0
TPH-CWG - Aromatic >EC12 - EC16	mg/kg	2	MCERTS	4.4	< 2.0	< 2.0	< 2.0	< 2.0
TPH-CWG - Aromatic >EC16 - EC21	mg/kg	10	MCERTS	< 10	< 10	< 10	< 10	< 10
TPH-CWG - Aromatic >EC21 - EC35	mg/kg	10	MCERTS	13	< 10	< 10	< 10	< 10
TPH-CWG - Aromatic (EC5 - EC35)	mg/kg	10	MCERTS	19	< 10	< 10	< 10	< 10

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East-West Rail Combined Report

Project / Site name: East-West Rail Phase 1

Lab Sample Number				287972	287960	287961	287962	287963
Sample Reference				TB034	TB037	TB037	TB040	TB040
Sample Number				ES	ES	ES	ES	ES
Depth (m)				0.00-0.50	0.00-0.45	0.50	0.00-0.25	0.40
Date Sampled				Deviating	Deviating	18/09/2013	Deviating	18/09/2013
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Moisture Content	%	N/A	NONE	0.08	3.4	9.2	0.64	5.3
Total mass of sample received	kg	0.001	NONE	2.0	2.0	2.0	2.0	2.0
Asbestos in Soil	Type	N/A	ISO 17025	Not-detected	Not-detected	Not-detected	Not-detected	Not-detected
General Inorganics								
pH	pH Units	N/A	MCERTS	7.9	7.8	8.0	7.9	7.8
Total Cyanide	mg/kg	1	MCERTS	< 1	< 1	< 1	< 1	< 1
Complex Cyanide	mg/kg	1	NONE	< 1	< 1	< 1	< 1	< 1
Free Cyanide	mg/kg	1	NONE	< 1	< 1	< 1	< 1	< 1
Total Sulphate as SO_4	mg/kg	100	ISO 17025	340	820	990	560	640
Sulphide	mg/kg	1	MCERTS	13	170	190	2.8	440
Total Chloride	mg/kg	5	NONE	18	45	8	37	20
Organic Matter	%	0.1	MCERTS	< 0.1	1.9	0.4	0.1	1.4
Phenols by HPLC								
Catechol	µg/kg	1	NONE	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Resorcinol	µg/kg	1	NONE	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Butyl Phenols	µg/kg	1	NONE	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Cresols	µg/kg	1	NONE	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Naphthols	µg/kg	1	NONE	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Phenol	µg/kg	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Trimethylphenol	µg/kg	1	NONE	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Total Phenols								
Total Phenols (HPLC)	µg/kg	7	NONE	< 7.0	< 7.0	< 7.0	< 7.0	< 7.0
Speciated PAHs								
Naphthalene	mg/kg	0.05	MCERTS	< 0.05	0.30	< 0.05	< 0.05	0.36
Acenaphthylene	mg/kg	0.2	MCERTS	< 0.20	0.36	< 0.20	< 0.20	< 0.20
Acenaphthene	mg/kg	0.1	MCERTS	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Fluorene	mg/kg	0.2	MCERTS	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20
Phenanthrene	mg/kg	0.2	MCERTS	< 0.20	1.6	0.32	< 0.20	6.0
Anthracene	mg/kg	0.1	MCERTS	< 0.10	0.65	< 0.10	< 0.10	0.70
Fluoranthene	mg/kg	0.2	MCERTS	< 0.20	8.7	1.2	< 0.20	9.4
Pyrene	mg/kg	0.2	MCERTS	< 0.20	7.2	1.2	< 0.20	8.4
Benzo(a)anthracene	mg/kg	0.2	MCERTS	< 0.20	2.0	0.37	< 0.20	2.1
Chrysene	mg/kg	0.05	MCERTS	< 0.05	4.2	0.55	< 0.05	2.9
Benzo(b)fluoranthene	mg/kg	0.1	MCERTS	< 0.10	3.1	0.63	< 0.10	2.6
Benzo(k)fluoranthene	mg/kg	0.2	MCERTS	< 0.20	1.5	0.35	< 0.20	1.4
Benzo(a)pyrene	mg/kg	0.1	MCERTS	< 0.10	1.6	0.41	< 0.10	1.5
Indeno(1,2,3-cd)pyrene	mg/kg	0.2	MCERTS	< 0.20	0.74	0.27	< 0.20	0.75
Dibenz(a,h)anthracene	mg/kg	0.2	MCERTS	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	< 0.05	0.86	0.31	< 0.05	0.81
Total PAH								
Speciated Total EPA-16 PAHs	mg/kg	1.6	MCERTS	< 1.6	33	5.6	< 1.6	37

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East-West Rail Combined Report

Project / Site name: East-West Rail Phase 1

Lab Sample Number				287972	287960	287961	287962	287963
Sample Reference				TB034	TB037	TB037	TB040	TB040
Sample Number				ES	ES	ES	ES	ES
Depth (m)				0.00-0.50	0.00-0.45	0.50	0.00-0.25	0.40
Date Sampled				Deviating	Deviating	18/09/2013	Deviating	18/09/2013
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Heavy Metals / Metalloids								
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	1.4	13	34	7.7	24
Boron (water soluble)	mg/kg	0.2	MCERTS	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2	3.0	< 0.2	0.6	0.5
Chromium (hexavalent)	mg/kg	4	MCERTS	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	9.9	29	23	7.5	24
Copper (aqua regia extractable)	mg/kg	1	MCERTS	4.8	140	51	13	67
Lead (aqua regia extractable)	mg/kg	2	MCERTS	4.3	32	22	12	38
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
Nickel (aqua regia extractable)	mg/kg	2	MCERTS	5.8	31	34	5.5	27
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Zinc (aqua regia extractable)	mg/kg	2	MCERTS	47	150	120	82	130
Monoaromatics								
Benzene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Toluene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Ethylbenzene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
p & m-xylene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
o-xylene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Petroleum Hydrocarbons								
TPH-CWG - Aliphatic >EC5 - EC6	mg/kg	0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
TPH-CWG - Aliphatic >EC6 - EC8	mg/kg	0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
TPH-CWG - Aliphatic >EC8 - EC10	mg/kg	0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
TPH-CWG - Aliphatic >EC10 - EC12	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH-CWG - Aliphatic >EC12 - EC16	mg/kg	2	MCERTS	< 2.0	< 2.0	< 2.0	< 2.0	2.9
TPH-CWG - Aliphatic >EC16 - EC21	mg/kg	8	MCERTS	< 8.0	< 8.0	9.7	< 8.0	13
TPH-CWG - Aliphatic >EC21 - EC35	mg/kg	8	MCERTS	93	84	29	31	40
TPH-CWG - Aliphatic (EC5 - EC35)	mg/kg	10	MCERTS	93	84	39	31	57
TPH-CWG - Aromatic >EC5 - EC7	mg/kg	0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
TPH-CWG - Aromatic >EC7 - EC8	mg/kg	0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
TPH-CWG - Aromatic >EC8 - EC10	mg/kg	0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
TPH-CWG - Aromatic >EC10 - EC12	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH-CWG - Aromatic >EC12 - EC16	mg/kg	2	MCERTS	< 2.0	< 2.0	< 2.0	< 2.0	3.9
TPH-CWG - Aromatic >EC16 - EC21	mg/kg	10	MCERTS	< 10	47	13	< 10	70
TPH-CWG - Aromatic >EC21 - EC35	mg/kg	10	MCERTS	< 10	110	34	< 10	93
TPH-CWG - Aromatic (EC5 - EC35)	mg/kg	10	MCERTS	< 10	160	47	< 10	170

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Nicholls Colton Analytical
7 - 11 Harding Street
Leicester
LE1 4DH

G13066-D/001

Project Reference - East West Rail, Water Eaton Parkway

Analytical Test Results - Basic Suite

NCA Reference			13-16214	13-16215	13-16216	13-16217	13-16218
Client Sample Location			T44	T44	T41	T41	T41
Client Sample Reference			E3	E5	E1	E3	B4
Depth (m)			0.60	1.00	0.30	0.70-0.90	1.00-1.40
Date of Sampling			11.07.2013	11.07.2013	11.07.2013	11.07.2013	11.07.2013
Time of Sampling			AM	AM	AM	AM	AM
Sample Matrix			Sand	Clay	Clay	Loam	Clay
Determinant	**Units**	**Accreditation**					
Arsenic	(mg/kg)	MCERTS	<10	<10	<10	<10	<10
Boron (Water soluble)	(mg/kg)	None	<2.5	<2.5	<2.5	<2.5	3.6
Cadmium	(mg/kg)	MCERTS	<0.2	0.4	0.5	0.5	0.6
Chromium (Total)	(mg/kg)	MCERTS	15.9	27.7	42.0	20.4	57.0
Copper	(mg/kg)	MCERTS	9.3	12.8	29.3	57.2	34.9
Lead	(mg/kg)	MCERTS	20.5	33.1	18.5	36.3	9.3
Mercury	(mg/kg)	UKAS	<2.5	<2.5	<2.5	<2.5	<2.5
Nickel	(mg/kg)	MCERTS	15.3	24.6	33.8	29.3	49.1
Selenium	(mg/kg)	None	<8	<8	<8	<8	<8
Zinc	(mg/kg)	MCERTS	87.7	63.5	122	160	90.2
Cyanide (Total)	(mg/kg)	MCERTS	<1.1	<1.2	<1.2	<1.1	<1.3
Cyanide (Free)	(mg/kg)	MCERTS	<1.1	<1.2	<1.2	<1.1	<1.3
Cyanide (Complex)	(mg/kg)	MCERTS	<1.1	<1.2	<1.2	<1.1	<1.3
Chromium (Hexavalent)	(mg/kg)	None	<1.1	<1.2	<1.2	<1.1	<1.3
SOM	(%)	MCERTS	2.9	2.1	6.5	26.1	<1.7
Total Sulphate	(mg/kg)	None	1000	500	900	1500	1400
Sulphide	(mg/kg)	None	22.7	7.2	23.9	34.7	9.6
Chloride (Water soluble)	(mg/l)	None	26.0	23.0	12.0	11.0	9.3
pH	pH Units	MCERTS	8.3	6.9	7.6	7.5	7.7
Asbestos	-	None	No asbestos detected	No asbestos detected	No asbestos detected	No asbestos detected	No asbestos detected

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7 - 11 Harding Street
Leicester
LE1 4DH

G13066-D/001

Project Reference - East West Rail, Water Eaton Parkway

Analytical Test Results - Basic Suite

NCA Reference			13-16219	13-16220	13-16221	13-16222	13-16223
Client Sample Location			T42	T42	T42	S4	S4
Client Sample Reference			E2	E4	E6	E1	E2
Depth (m)			0.30	0.60	1.20	0.30	0.60
Date of Sampling			11.07.2013	11.07.2013	11.07.2013	12.07.2013	12.07.2013
Time of Sampling			PM	PM	PM	AM	AM
Sample Matrix			Loam	Clay	Clay	Clay	Loam
Determinant	**Units**	**Accreditation**					
Arsenic	(mg/kg)	MCERTS	28.6	<10	<10	<10	22.6
Boron (Water soluble)	(mg/kg)	None	3.7	3.7	<2.5	<2.5	<2.5
Cadmium	(mg/kg)	MCERTS	0.4	0.4	<0.2	0.5	0.4
Chromium (Total)	(mg/kg)	MCERTS	22.6	34.9	13.9	44.1	21.6
Copper	(mg/kg)	MCERTS	40.3	18.9	8.9	21.2	64.1
Lead	(mg/kg)	MCERTS	34.4	13.7	12.5	8.8	25.8
Mercury	(mg/kg)	UKAS	<2.5	<2.5	<2.5	<2.5	<2.5
Nickel	(mg/kg)	MCERTS	28.1	34.0	10.6	34.8	40.1
Selenium	(mg/kg)	None	<8	<8	<8	<8	<8
Zinc	(mg/kg)	MCERTS	119	79.5	34.0	75.6	87.1
Cyanide (Total)	(mg/kg)	MCERTS	<1.1	<1.3	<1.3	<1.2	<1.2
Cyanide (Free)	(mg/kg)	MCERTS	<1.1	<1.3	<1.3	<1.2	<1.2
Cyanide (Complex)	(mg/kg)	MCERTS	<1.1	<1.3	<1.3	<1.2	<1.2
Chromium (Hexavalent)	(mg/kg)	None	<1.1	<1.3	<1.3	12.8	<1.2
SOM	(%)	MCERTS	37.7	6.4	3.2	1.9	41.0
Total Sulphate	(mg/kg)	None	3800	2700	600	800	1900
Sulphide	(mg/kg)	None	16.7	9.6	17.9	15.5	32.3
Chloride (Water soluble)	(mg/l)	None	9.4	10.0	17.0	29.0	7.1
pH	pH Units	MCERTS	7.1	7.1	7.0	7.4	7.3
Asbestos	-	None	No asbestos detected	No asbestos detected	No asbestos detected	No asbestos detected	No asbestos detected

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G13066-D/001

Project Reference - East West Rail, Water Eaton Parkway

Analytical Test Results - Basic Suite

NCA Reference		
Client Sample Location		
Client Sample Reference		
Depth (m)		
Date of Sampling		
Time of Sampling		
Sample Matrix		
Determinant	**Units**	**Accreditation**
Arsenic	(mg/kg)	MCERTS
Boron (Water soluble)	(mg/kg)	None
Cadmium	(mg/kg)	MCERTS
Chromium (Total)	(mg/kg)	MCERTS
Copper	(mg/kg)	MCERTS
Lead	(mg/kg)	MCERTS
Mercury	(mg/kg)	UKAS
Nickel	(mg/kg)	MCERTS
Selenium	(mg/kg)	None
Zinc	(mg/kg)	MCERTS
Cyanide (Total)	(mg/kg)	MCERTS
Cyanide (Free)	(mg/kg)	MCERTS
Cyanide (Complex)	(mg/kg)	MCERTS
Chromium (Hexavalent)	(mg/kg)	None
SOM	(%)	MCERTS
Total Sulphate	(mg/kg)	None
Sulphide	(mg/kg)	None
Chloride (Water soluble)	(mg/l)	None
pH	pH Units	MCERTS
Asbestos	-	None

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G13066-D/001

Project Reference - East West Rail, Water Eaton Parkway

Analytical Test Results - Advanced Suite

NCA Reference			13-16214	13-16215	13-16216	13-16217	13-16218	13-16219
Client Sample Reference			T44	T44	T41	T41	T41	T42
Client Sample Location			E3	E5	E1	E3	B4	E2
Depth (m)			0.60	1.00	0.30	0.70-0.90	1.00-1.40	0.30
Date of Sampling			11.07.2013	11.07.2013	11.07.2013	11.07.2013	11.07.2013	11.07.2013
Time of Sampling			AM	AM	AM	AM	AM	PM
Sample Matrix			Sand	Clay	Clay	Loam	Clay	Loam
Determinant	**Units**	**Accreditation**						
Acenaphthene	(mg/kg)	MCERTS	1.4	0.2	4.1	<1.0	<0.1	0.1
Acenaphthylene	(mg/kg)	UKAS	<1.0	0.6	0.3	<1.0	<0.1	<0.1
Anthracene	(mg/kg)	UKAS	7.8	1.4	0.9	1.1	<0.1	0.5
Benzo (a) anthracene	(mg/kg)	MCERTS	23.8	2.6	2.0	2.7	0.2	1.8
Benzo (a) pyrene	(mg/kg)	MCERTS	21.0	2.0	2.4	2.2	<0.1	1.4
Benzo (b) fluoranthene	(mg/kg)	MCERTS	29.0	2.6	3.6	4.1	0.2	2.5
Benzo (g, h, i) perylene	(mg/kg)	MCERTS	16.1	1.5	2.1	2.2	0.1	1.1
Benzo (k) fluoranthene	(mg/kg)	MCERTS	9.4	0.9	1.2	<1.0	<0.1	0.7
Chrysene	(mg/kg)	MCERTS	22.9	2.5	2.3	3.0	0.2	2.3
Dibenzo (a,h) anthracene	(mg/kg)	MCERTS	3.3	0.3	0.5	<1.0	<0.1	0.3
Fluoranthene	(mg/kg)	MCERTS	55.5	7.1	3.9	6.8	0.5	4.2
Fluorene	(mg/kg)	MCERTS	1.6	0.7	2.5	<1.0	<0.1	0.5
Indeno (1, 2, 3,-cd) pyrene	(mg/kg)	MCERTS	17.2	1.6	2.4	2.1	<0.1	1.1
Naphthalene	(mg/kg)	MCERTS	<1.0	0.6	17.6	2.2	0.2	3.2
Phenanthrene	(mg/kg)	MCERTS	34.2	7.2	5.4	4.7	0.4	5.0
Pyrene	(mg/kg)	MCERTS	44.7	5.8	3.4	6.7	0.4	3.7
Total PAH (Sum of USEPA 16)	(mg/kg)	UKAS	290	37.4	54.5	42.8	2.9	28.4
Phenols (Total)	(mg/kg)	MCERTS	<1.1	<1.2	<1.2	<1.1	<1.3	<1.1
Aliphatics								
>C_5 to C_6	(mg/kg)	None	<0.03	0.05	<0.04	0.12	<0.03	0.16
>C_6 to C_8	(mg/kg)	None	0.06	0.07	<0.04	0.16	0.09	0.30
>C_8 to C_{10}	(mg/kg)	None	<0.03	<0.03	<0.04	<0.03	<0.03	<0.03
>C_{10} to C_{12}	(mg/kg)	None	<11	<12	<11	<11	<13	<11
>C_{12} to C_{16}	(mg/kg)	None	<11	<12	<11	<11	<13	<11
>C_{16} to C_{21}	(mg/kg)	None	12	<12	<11	14	<13	<11
>C_{21} to C_{35}	(mg/kg)	None	44	<12	16	59	<13	27
Aromatics								
>C_5 to C_7	(mg/kg)	None	<0.03	<0.03	<0.04	<0.03	<0.03	0.03
>C_7 to C_8	(mg/kg)	None	<0.03	<0.03	<0.04	<0.03	<0.03	<0.03
>C_8 to C_{10}	(mg/kg)	None	<0.03	<0.03	<0.04	<0.03	<0.03	0.05
>C_{10} to C_{12}	(mg/kg)	None	<11	<12	<11	<11	<13	<11
>C_{12} to C_{16}	(mg/kg)	None	19	<12	<11	33	<13	<11
>C_{16} to C_{21}	(mg/kg)	None	150	<12	12	60	<13	17
>C_{21} to C_{35}	(mg/kg)	None	609	<12	56	195	<13	64
Benzene	(mg/kg)	MCERTS	<0.05	<0.06	<0.05	<0.04	<0.06	<0.05
Toluene	(mg/kg)	MCERTS	<0.05	<0.06	<0.05	<0.04	<0.06	<0.05
Ethyl Benzene	(mg/kg)	MCERTS	<0.05	<0.06	<0.05	<0.04	<0.06	<0.05
Xylene (meta / para)	(mg/kg)	MCERTS	<0.05	<0.06	<0.05	<0.04	<0.06	<0.05
Xylene (ortho)	(mg/kg)	MCERTS	<0.05	<0.06	<0.05	<0.04	<0.06	<0.05
MTBE	(mg/kg)	MCERTS	<0.05	<0.06	<0.05	<0.04	<0.06	<0.05

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G13066-D/001

Project Reference - East West Rail, Water Eaton Parkway

Analytical Test Results - Advanced Suite

NCA Reference			13-16220	13-16221	13-16222	13-16223
Client Sample Reference			T42	T42	S4	S4
Client Sample Location			E4	E6	E1	E2
Depth (m)			0.60	1.20	0.30	0.60
Date of Sampling			11.07.2013	11.07.2013	12.07.2013	12.07.2013
Time of Sampling			PM	PM	AM	AM
Sample Matrix			Clay	Clay	Clay	Loam
Determinant	**Units**	**Accreditation**				
Acenaphthene	(mg/kg)	MCERTS	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	(mg/kg)	UKAS	<0.1	<0.1	<0.1	<0.1
Anthracene	(mg/kg)	UKAS	0.4	<0.1	<0.1	<0.1
Benzo (a) anthracene	(mg/kg)	MCERTS	2.5	0.5	<0.1	0.2
Benzo (a) pyrene	(mg/kg)	MCERTS	1.9	0.3	<0.1	<0.1
Benzo (b) fluoranthene	(mg/kg)	MCERTS	2.6	0.5	<0.1	0.3
Benzo (g, h, i) perylene	(mg/kg)	MCERTS	1.3	0.3	<0.1	0.2
Benzo (k) fluoranthene	(mg/kg)	MCERTS	0.9	0.1	<0.1	<0.1
Chrysene	(mg/kg)	MCERTS	2.4	0.5	<0.1	0.4
Dibenzo (a,h) anthracene	(mg/kg)	MCERTS	0.2	<0.1	<0.1	<0.1
Fluoranthene	(mg/kg)	MCERTS	5.4	1.0	0.1	0.6
Fluorene	(mg/kg)	MCERTS	<0.1	<0.1	<0.1	0.1
Indeno (1, 2, 3,-cd) pyrene	(mg/kg)	MCERTS	1.4	0.3	<0.1	<0.1
Naphthalene	(mg/kg)	MCERTS	0.8	0.1	<0.1	0.9
Phenanthrene	(mg/kg)	MCERTS	2.1	0.4	0.1	1.2
Pyrene	(mg/kg)	MCERTS	4.5	0.9	0.1	0.5
Total PAH (Sum of USEPA 16)	(mg/kg)	UKAS	26.6	5.4	1.7	5.0
Phenols (Total)	(mg/kg)	MCERTS	<1.3	<1.3	<1.2	<1.2
Aliphatics						
>C_5 to C_6	(mg/kg)	None	<0.04	0.03	0.12	<0.03
>C_6 to C_8	(mg/kg)	None	<0.04	0.03	0.05	<0.03
>C_8 to C_{10}	(mg/kg)	None	<0.04	<0.03	<0.03	<0.03
>C_{10} to C_{12}	(mg/kg)	None	<13	<13	<12	<12
>C_{12} to C_{16}	(mg/kg)	None	<13	<13	<12	<12
>C_{16} to C_{21}	(mg/kg)	None	<13	<13	<12	<12
>C_{21} to C_{35}	(mg/kg)	None	<13	<13	25	12
Aromatics						
>C_5 to C_7	(mg/kg)	None	<0.04	<0.03	<0.03	<0.03
>C_7 to C_8	(mg/kg)	None	<0.04	<0.03	<0.03	<0.03
>C_8 to C_{10}	(mg/kg)	None	<0.04	<0.03	0.06	<0.03
>C_{10} to C_{12}	(mg/kg)	None	<13	<13	<12	<12
>C_{12} to C_{16}	(mg/kg)	None	<13	<13	<12	<12
>C_{16} to C_{21}	(mg/kg)	None	<13	<13	<12	<12
>C_{21} to C_{35}	(mg/kg)	None	<13	<13	42	<12
Benzene	(mg/kg)	MCERTS	<0.06	<0.04	<0.06	<0.04
Toluene	(mg/kg)	MCERTS	<0.06	<0.04	<0.06	<0.04
Ethyl Benzene	(mg/kg)	MCERTS	<0.06	<0.04	<0.06	<0.04
Xylene (meta / para)	(mg/kg)	MCERTS	<0.06	<0.04	<0.06	<0.04
Xylene (ortho)	(mg/kg)	MCERTS	<0.06	<0.04	<0.06	<0.04
MTBE	(mg/kg)	MCERTS	<0.06	<0.04	<0.06	<0.04

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Annex C

Human Health Quantitative Risk Assessment Methodology

1.1 GENERAL RATIONALE

ERM GAC have been developed in general accordance with the guidance published by the Environment Agency for undertaking the assessment of chronic risks to human health from land contamination collectively commonly referred to as the 'CLEA framework' as contained in the following documents:

- Updated technical background to the CLEA model (SR3), Environment Agency, January 2009;
- Human health toxicological assessment of contaminants in soil (SR2), Environment Agency, January 2009;
- Compilation of Data for Priority Organic Pollutants for Derivation of Soil Guideline Values (SR7), November 2008; and
- CLEA software (version 1.06) and handbook (SR4 version 1.05), Environment Agency, September 2009.

During 2009, the Environment Agency published a number of Soil Guideline Values (SGVs) using the 'CLEA Framework'. The SGVs are an example of authoritative generic assessment criteria used in the preliminary evaluation of the risk to human health from long term exposure to chemicals in soil. However, only a limited number of SGVs have been published to date, (As, Cd, Hg, Ni, Se, benzene, toluene, ethylbenzene, phenol, Dioxins/Furans & Dioxin like PCB's).

Environment Agency document "*Using Soil Guideline Values*" published in March 2009 states that in the absence of an SGV the simplest option might be to derive a generic assessment criterion using (where appropriate) the generic models used to define SGVs, and based on appropriately sourced physical-chemical and toxicity data.

Due to the limited number of published SGVs, ERM has developed an expanded set of Generic Assessment Criteria (GACs) in accordance with the techniques and protocols set out in the CLEA Framework of publications detailed above. The intention is that these GACs are used in an equivalent way to SGVs in terms of being applicable to the majority of sites and a means of undertaking a generic assessment of chronic risks to human health and help refine any requirement for further DQRA.

The SGVs and ERMs GACs are considered to represent "cautious estimates of levels of contaminants in soil at which there is considered to be no risk to health or, at most, a minimal risk to health" (1). SGVs and GACs are not levels which indicate a significant possibility of **significant harm or levels which describe the boundary between categories 3 and 4, as detailed** within the statutory Guidance (1), neither are they indicators of levels of contamination above which detailed risk assessment would automatically be required under Part 2a. SGV's and GAC do however describe levels of contamination which are comfortably within category 4 of the statutory guidance.

The CLEA framework does not currently include specific guidance for assessing the potential risks to human health via the inhalation of groundwater-derived vapours. In the absence of UK specific guidance ERM has followed the spirit of the methodology to derive a set of GAC_{GW} for groundwater adopting where applicable the same standard land use assumptions detailed within SR3 and the fate and transport algorithms adopted within the software RISC V4.5.

The SGVs and GACs rely on predicting the concentration of vapours within the unsaturated zone using partitioning equations. However, due to the inherent uncertainty with estimating vapour partitioning there is growing international consensus that when assessing vapour inhalation risks from land contamination less reliance is placed on predicting contaminant partitioning and greater emphasis on directly measured soil vapour concentrations. Therefore, ERM has also produced Soil Vapour GACs (GAC_{SV}) with respect to assessing the vapour

(1) Environmental Protection Act 1990: Part 2A, Contaminated Land Statutory Guidance, DEFRA, April 2012.

inhalation pathway. The GAC_{SV} have been based on the standard land use assumptions detailed within SR3 and modelling the migration of vapours through the unsaturated zone and subsequent flow inside buildings and into ambient air. The GAC_{SV} enable a tiered approach to assessing vapour inhalation to be adopted involving an initial assessment based on calculating partitioning from soil and groundwater phases, supplemented where appropriate by the assessment of directly measured soil vapour concentrations. This tiered approach to the assessment of vapour inhalation is consistent with the approach suggested within DEFRA way forward publication CLAN 6/06 and CIRIA C682 (The VOC Handbook).

1.2 *CONCEPTUAL EXPOSURE MODEL*

Harmful effects from exposure to hazardous substances may occur as a result of either short-term exposure (acute effects) or long-term exposure (chronic effects). Generally for the vast majority of contaminants the long-term exposure to relatively low levels of the substance is of greatest concern since short-term effects generally occur at much higher concentrations. Any assessment based on the effects of long-term exposure is also likely to be overly protective with respect to the effects from short-term exposure. The assessment of risks to human health for the vast majority of the contaminants of concern is, therefore, based on the assessment of chronic exposure. However, free cyanide may elicit harmful effects from short-term exposure at relatively low concentrations. Therefore, GAC for free cyanide have been derived for both chronic and acute exposure.

The land use behaviour will significantly influence the exposure of end users to soil contaminants and should be reflected in any site specific assessment of those contaminants which represent a hazard as a result of chronic exposure. Influencing factors include: the age and gender of site users; the number of visits to the site; the duration of each visit; and the likely activities that could bring about contact with soil contamination. In the derivation of ERM's GACs three types of 'generic' land use have been included:

- Residential including Consumption of Home-grown Vegetables;
- Residential excluding the Consumption of Home-grown Vegetables; and
- Commercial/Industrial.

The generic land use conceptual exposure models presented within SR3 have been adopted in the derivation of the GAC. *Table 1* presents the exposure pathways included in the derivation of ERMs GAC for each land use.

Table 1 Exposure Pathways Included For Land Use

	Residential Land Use with Gardens	Residential Land Use without Gardens	Commercial Land Use
GAC_{Soil} - Exposure from Substances Present in Soils			
Ingestion of Soil and Dust	✓	✓	✓
Ingestion of Home grown Vegetables	✓	-	-
Ingestion of Soil Attached to Vegetables	✓	-	-
Inhalation of Fugitive Dust – Indoors	✓	✓	✓
Inhalation of Fugitive Dust – Outdoors	✓	✓	✓
Inhalation of Vapours – Indoors	✓	✓	✓
Inhalation of Vapours – Outdoors	✓	✓	✓
Dermal contact – Indoors	✓	✓	✓
Dermal contact – Outdoors	✓	✓	✓
GAC_{GW} - Exposure from Substances Present in Groundwaters			
Inhalation of Vapours – Indoors	✓	✓	✓
Inhalation of Vapours – Outdoors	✓	✓	✓
GAC_{SV} - Exposure from Substances Present in Soil Vapours			
Inhalation of Vapours – Indoors	✓	✓	✓
Inhalation of Vapours – Outdoors	✓	✓	✓

The generic human exposure assumptions and building parameters detailed within SR3 for each standard land use have been adopted in the derivation of the GAC.

1.3 CONTAMINANT SPECIFIC PROPERTIES

Toxicological Parameters

Health criteria values (HCV) used to benchmark exposure have been compiled from a review of the scientific and technical literature. Where several health criteria values have been identified, preference has been given to authoritative UK sources where available, as per SR2. In the absence of any appropriate authoritative UK sources, the selection of the most appropriate value has been made with consideration of the following hierarchy:

1. Authoritative UK Sources (e.g. Environment Agency TOX reports, UK Drinking Water Inspectorate, UK Air Quality Strategy);
2. European/International Authoritative Sources (e.g. WHO Drinking Water Guidelines (underlying toxicological data), WHO Air Quality Guidelines for Europe, International Programme on Chemical Safety (IPCS) Environmental Health Criteria Monographs (EHC), IPCS Concise International Chemical Assessment Documents (CICADs));
3. Other National Organisations (e.g. USEPA, RIVM)

In deriving HCVs for non threshold substances, preference was given to the use of an Index Dose (ID) where these were available. Where ID were not available slope factors have been used and amended by multiplying by an appropriate level of excess lifetime cancer risk. SR2 states that, when using human data, the ID is based on estimates of the daily dose corresponding to an excess lifetime cancer risk of 1 in 100,000. This has been used, where required for slope factors in the absence of an ID.

In the absence of appropriate dermal or inhalation HCVs, extrapolated oral values have been adopted as described within SR2. Where available, the dermal absorption fractions presented within SR3 have been adopted. In their absence the default approach adopted within the CLEA model, as outlined within SR3, has been adopted (0.1 for all organic chemicals and zero for inorganic chemicals).

Where required, inhalation HCVs have been converted from reference concentrations quoted in mg/m^{-3} unit risk factors by assuming a 70kg adult typically inhales $20m^3$ of air per day.

Where available, the mean daily intakes (MDI) have been sourced from UK diet studies and the Food Standard Agency. In the absence of any UK sources, the IPCS EHC and CICADs have been reviewed to help determine potential background exposure. In accordance with SR2, if no data or information on background information are available, background exposure is considered to be negligible and MDI set to zero for all age groups. If qualitative information is available suggesting background exposure may significantly contribute to overall exposure the pragmatic default outlined within SR2, that land should be allowed to contribute at least half the tolerable daily intake (TDI), has been applied.

Toxicological Equivalents

For non threshold PAHs the index dose has been calculated from published(1) estimated relative potencies to benzo(a)pyrene, and calculated from the ID for benzo(a)pyrene detailed within the DEFRA/EA toxicity report.

Polychlorinated Biphenyls (PCBs) have been assessed according to the Toxicity Equivalency Factor (TEF) approach(2) for dioxin-like PCBs (the PCBs considered to represent the greatest health risk). Each of the PCBs toxicity is related to 2,3,7,8-tetrachlorodibenzo-p-dioxin (2,3,7,8-

(1) Provisional Guidance for Quantitative Risk Assessment of Polycyclic Aromatic Hydrocarbons. USEPA, July 1993

(2) Environment Agency 'Contaminants In Soil: Updated collation of toxicological data and intake values for humans. Dioxins, furans and dioxin-like PCBs'. SC050021/TOX 12. September 2009.

TCDD), which is considered to be the most carcinogenic dioxin, using a multiplication factor (the TEF). The concentration of each PCB is multiplied by its respective TEF giving a 2,3,7,8-TCDD toxic equivalent (TEQ). The total TEQ for the mixture is compared with the GAC for 2,3,7,8-TCDD.

The toxicity assumptions presented within the TPH Criteria Working Group have been adopted in the derivation of the GAC for aliphatic and aromatic TPH fractions. The TPH fractions are therefore protective of threshold human health effects and indicator compounds are used to assess non-threshold health effects (in line with Environment Agency publication on assessing petroleum hydrocarbons). An attenuation factor of 10 has been adopted for petroleum hydrocarbons in accordance with the recommendations contained within SR3.

Physico-chemical Parameters

Physico-chemical properties have been compiled from a review of the scientific and technical literature. Where available, the physico-chemical properties have been adopted from the Environment Agency Report SR7 (1). In their absence, parameters have been sourced from the references detailed within SR7, where available.

Many of the references present a range of values from numerous scientific studies, with the same studies being presented within each reference. Based upon the values presented within the studies and their own professional expertise, Mackay et al (2) provide recommended values for many parameters and have been adopted where available.

Where a range of values have been sourced, consideration has been given to the selection hierarchy detailed within SR7:

1. If all values the same, select this value;
2. Select Value from consistent range;
3. Central value from consistent range;
4. Newest value (if there is no consistent range or no single central value)

Where available, parameters have been sourced at 10^0C, which is the assumed annual average temperature of UK soils (SR3) and required for the CLEA model.

Where chemical data was unavailable in the literature, or adjustments needed for temperature (i.e. literature source not at 10^0C), property estimation methods and adjustment calculations detailed within SR7 have been used.

1.4 SOIL PROPERTIES

ERM GAC have been developed using a generic set of soil properties which are considered to represent a reasonable conservative scenario. SR3 states that although the sand soil type represents the most conservative choice for modelling diffusion and advection transport processes, it is not geographically widespread. Most common UK sandy soils are closer to a sandy loam and it is this default soil type that is used in the derivation of SGVs by the Environment Agency and has been adopted in the derivation of ERM GAC.

In deriving SGVs, the Environment Agency, have adopted a soil organic matter content of 6%. ERM do not consider this value to be sufficiently conservative for the production of GAC. Therefore, a SOM of 1% (or TOC 0.58%) has been adopted in the derivation of ERM GAC.

(1) Compilation of Data for Priority Organic Pollutants for Derivation of Soil Guideline Values (SR7). Environment Agency, November 2008.
(2) Handbook of Physical-Chemical Properties and Environmental fate for Organic Chemicals. 2nd edition. Mackay et al, 2006.

1.5 *MODELLING APPROACH*

In deriving human health GAC for soils, ERM have adopted the CLEA software version 1.06, which implements the modelling approach detailed within SR3 and is used by the Environment Agency to derive Soil Guideline Values.

The ERM soil vapour GAC (GAC_{SV}) have been back calculated from the indoor and outdoor vapour inhalation soil criteria derived using the CLEA software using the soil to soil vapour partioning approach detailed within Section 5 of SR3. The results have been directly compared to the soil gas media concentration provided within the CLEA outputs when running the model for vapour inhalation pathways only, to ensure parity.

The ERM GAC for groundwater derived vapours (GAC_{GW}) have been calculated using the groundwater vapour transport algorithms developed by the ASTM (E1739), used by RISC V4.05 and outlined within Appendix E of the RISC user manual. Where applicable the standard CLEA receptor, soil and building properties have been utilised.

For acute exposure to free cyanide the conceptual exposure model assumes a one off ingestion of 2000mg of soil by a 1 to 2 year old female child using the algorithms presented by Beck et al 2006 (1) and SNIFFER 2000 (2) .

1.6 *ESTIMATING COMBINED EXPOSURE FROM ALL RELEVANT PATHWAYS*

For some chemicals, intake and/or uptake via different routes (via the nose, mouth, or through the skin) may lead to different local effects or may affect different organs. People using a contaminated site may be exposed to the same chemical via all three routes of exposure. If the contaminant exhibits systemic toxicity (i.e. reaches the main blood circulation system unchanged following absorption), each route of exposure may contribute to an aggregate total systemic load that results in adverse systemic effects. The ERM GAC takes this possible effect into account by automatically adopting the methodology used by the CLEA software and the Environment Agency, and combining the reciprocal from each relevant exposure pathway. This helps ensure that the assessment criteria is set at a concentration where the total risk via all relevant routes of entry into the body is mathematically no greater than the risk due to exposure by any single route of entry. The only exception is where an Environment Agency Soil Guideline Value (SGV) report identifies that a single exposure route is more appropriate for an individual contaminant, in such cases the same exposure routes used by the Environment Agency in deriving the SGV have been adopted by ERM in deriving the GAC for the same contaminant.

Environment Agency report SR4, states that an important assumption used in the CLEA model is that of simple linear partitioning of a chemical in the soil between the sorbed, dissolved, and vapour phases. The theoretical upper boundaries to this behaviour are represented by the maximum aqueous solubility and pure saturated vapour concentration of the chemical. Environment Agency report SR3 presents equations for using these chemical properties to estimate the saturated soil concentrations where these limits are reached. These boundaries are important when considering vapour phase transport of chemicals into ambient and indoor air.

The CLEA software uses a traffic-light system to identify when individual and/or combined assessment criteria exceed the lower of either the aqueous or vapour based saturation limit.

In instances where the combined assessment criteria of all relevant pathways outputted from the CLEA software is highlighted green or amber and the vapour pathway is not an important contributor, these have been adopted as ERM GAC.

(1) Human Health Risk Assessment of Cyanide in Water and Soil. Beck et al. *Published in Cyanide in water and Soil, Chemistry Risk and Management, Dzombak et al 2006.*
(2) Framework for Deriving Numeric Targets to Minimise the Adverse Human Health Effects of Long-term Exposure to Contaminants in Soil. SR99(02)F. SNIFFER April 2000.

Where the combined assessment criteria exceeds the theoretical saturation limits (aqueous or vapour based) and the vapour pathway is an important contributor to exposure, the methodology detailed within the CLEA Software Handbook for such circumstances has been adopted:

1. Determining the relevant inhalation ADE/HCV ratio at the lower saturation limit;
2. Estimate relevant contribution required from other pathways by subtracting this value by 1 (since the contribution from the vapour pathway is capped at the saturation limit);
3. Determine the soil concentration at which the relevant combined HCV/ADE ratio is equal to the value calculated in (2) without the vapour inhalation pathways.

1.7 Assessing Mixtures

Knowledge about the toxicology of a chemical comes, in the main, from studies involving the exposure of relatively large doses to a single substance. In contrast, an individual may be exposed to many different chemicals every day, including priority soil contaminants. The possibility exists, therefore, that the mixture of chemicals to which any one individual may be exposed may have a greater cumulative effect on health than that predicted by toxicological risk assessment of individual chemicals. Environment Agency report SR2 states that 'where there is evidence for chemical interaction, this should be taken into account: when such evidence is not available, each chemical should be assumed to be acting independently. SR2 goes on to identify that interactions between chemicals are however unlikely at exposures below the HCVs.

Environment Agency Guidance does however identify two groups of similar substances where additive affects should be considered:

1.7.1 Dioxins Furans & Dioxin Like PCBs

The assessment of Dioxin like PCB's assumes the effect from exposure to any individual dioxin like PCB will potentially be additive to exposure to other dioxin like PCB's (as well as similarly acting dioxins/furans) and therefore when assessing risks to human health the 12 congeners should be considered as a mixture rather than isolated substances (1) . The assessment of the PCB mixture is undertaken by calculating the Hazard Quotient (HQ) for each individual congener (ratio of soil concentration and congener specific GAC) and summing the individual HQ to derive a Hazard Index (HI) for the mixture. Where the HI for the mixture is greater than 1 a potentially significant risk may arise and further investigation and or assessment is likely to be required.

1.7.2 Petroleum Hydrocarbons

When assessing the significance of petroleum hydrocarbon mixtures the assessment should consider both indicator compounds and petroleum fractions. Environment Agency report P5-080/TR3 (2) identifies 16 Petroleum Hydrocarbon fractions for use in UK human health risk assessments based on equivalent carbon numbers corresponding to the 13 fractions proposed by the TPHCWG (3) up to EC35 but with the addition of 3 further heavier hydrocarbon fractions (pending further review/evaluation). When assessing petroleum hydrocarbon fractions P5-080/TR3 also identifies the potential for additivity across fractions and that a Hazard Index approach should be adopted for fractions exhibiting similar toxicological properties and that further guidance would be published on this issue. The TPHCWG identified 6 toxicological fractions between C5 - C35 and pending the release of the further guidance ERM

(1) Environment Agency, October 2009. Soil Guideline values for dioxins, furans and dioxin like PCBs in soil. Science Report SC050021/Dioxins SGV.
(2) Environment Agency, February 2005. The UK Approach for Evaluating Human Health Risks from Petroleum Hydrocarbons in Soils. Science Report P5-080/TR3.
(3) Total Petroleum Hydrocarbon Criteria Working Group Series Volumes 1 to 5.

approach to Petroleum Hydrocarbon mixtures will be to treat the 13 TPH fractions as essentially 6 Petroleum Hydrocarbon mixtures based on the 6 toxicological fractions.

The assessment of each Petroleum Hydrocarbon mixture is undertaken by calculating the Hazard Quotient (HQ) for each individual fraction (ratio of soil concentration and fraction specific GAC) and summing the relevant individual HQ within each mixture to derive a Hazard Index (HI) for each mixture. Where the HI for the mixture is greater than 1 a potentially significant risk may arise and further investigation and or assessment is likely to be required.

1.8 UNCERTAINTY

As with any form of modelling of the interaction between humans and the wider environment, there is a substantial amount of uncertainty involved. This relates both to the way in which the interaction is modelled (the pathway algorithms) and the input parameters defining the substances, the pathways and the receptors. The CLEA model is deterministic, meaning that in any calculation a single value is assigned to each variable. Many of these values are assigned on the basis of average or conservative (the most health protective) measurements and by expert judgement.

Historically, in dealing with parameter uncertainty and variability in a deterministic model, it has been good practice to select values representative of a worst case exposure scenario. This has the assumed comfort of being more protective against an unforeseen situation or risks to sensitive individuals. However, the problem with this approach can be that such choices, however defensible individually, tend to be implausible collectively.

Over the recent years there has been an increasing desire on the part of authoritative bodies to move away from modelling a worst case individual to more realistic or reasonable exposure scenarios. This is the approach adopted by the CLEA model and takes into account not only the degree of conservatism from individual choices, but also the collective effect of these choices.

It should be noted that ERM's GACs are not a static set of values, but are reviewed on a regular basis and reissued as more guidance is made available by the Environment Agency, or when improved knowledge of toxicity is published.

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