

# **Appendix D** – WorleyParsons Field Borehole Logs

# BOREHOLE LOG



## WorleyParsons

BOREHOLE: **BH-12**

SHEET: 1 OF 4

CLIENT: **Australian Industrial Energy**  
 PROJECT: **Port Kembla Gas Terminal Project**  
 LOCATION: **Port Kembla, NSW**  
 JOB NUMBER: **401010-01496**

DATE COMMENCED: **29.8.2018**  
 DATE COMPLETED: **29.8.2018**  
 LOGGED BY: **BO**  
 REVISION: **0**

Drill Contractor: BG Drilling      Bore Size: 96 mm      Hole Angle: -90°      Easting: 306947.5      Surface R.L.: 4.23mAH  
 Drill Model: Hanjin D&B      Drill Fluid: Pac L + CRP60      Bearing: NA      Northing: 6185119.1      Ref. System: GDA94 / MGA56

Method	Casing	Drill Rate (min/m)	RL (mAHD)	Depth (m)	Geological Unit	Graphic Log	Material Description	Moisture Condition	Weathering / Cementation	Consistency / Strength	Defect Spacing (mm)			Core Run No.	TCR / SCR (%)	RQD (%)	Sample / Test	Field Records / Comments and Defect Description
											20	60	200					
SOLID AUGER	HWT	NA	4.0	0.5	FILL	[Cross-hatched pattern]	FILL: Gravelly SAND: Fine to medium grained, sub-angular to sub-rounded, quartz, lithic fragments, coal?, slag?; fine to coarse gravel, sub-angular, slag, coal.	D-M	Uc	D				NA	NA	NA	SPT 4,7,10 N=17	Environmental bag samples taken from auger spoil at 0.5, 1.0 and 1.5m
							MD											
SOLID AUGER	HWT	NA	3.5	1.0	FILL	[Cross-hatched pattern]	FILL: SAND: Fine to medium grained, sub-angular to sub-rounded, quartz, lithic fragments, pale grey-brown, trace gravel of slag and coal.	D-M	Uc	D				NA	NA	NA	SPT 4,7,10 N=17	SPT: Recovered 400 mm
							MD											
SOLID AUGER	HWT	NA	3.0	1.5	FILL	[Cross-hatched pattern]	FILL: SAND: Fine to medium grained, sub-angular to sub-rounded, quartz, dark grey-dark brown; with fine to coarse gravel of slag and coal.	D-M	Uc	D				NA	NA	NA	SPT 4,7,10 N=17	SPT: Recovered 400 mm
							MD											
SOLID AUGER	HWT	NA	2.5	2.0	FILL	[Cross-hatched pattern]	SAND (SP): Fine to medium grained, sub-angular to rounded, quartz, trace mafics, pale brown-pale yellow.	D-M	Uc	D				NA	NA	NA	SPT 4,7,10 N=17	SPT: Recovered 400 mm
							MD											
WASH BORE	HWT	NA	2.0	2.0	BEACH DEPOSITS	[Dotted pattern]	...trace gravel, fine to medium grained, angular (coal?)	NA		L				NA	NA	NA	SPT 5,8,12 N=20	SPT: Recovered 400 mm
WASH BORE	HWT	NA	1.5	3.0	BEACH DEPOSITS	[Dotted pattern]	...trace gravel, fine to medium grained, angular (coal?)	NA		L				NA	NA	NA	SPT 5,8,12 N=20	SPT: Recovered 400 mm
WASH BORE	HWT	NA	1.0	3.5	BEACH DEPOSITS	[Dotted pattern]	...trace gravel, fine to medium grained, angular (coal?)	NA		L				NA	NA	NA	SPT 5,8,12 N=20	SPT: Recovered 400 mm
WASH BORE	HWT	NA	0.5	4.0	BEACH DEPOSITS	[Dotted pattern]	...trace gravel of shell fragments	NA		L				NA	NA	NA	SPT 2,3,5 N=8	SPT: Recovered 400 mm
WASH BORE	HWT	NA	0.0	4.5	BEACH DEPOSITS	[Dotted pattern]	...trace gravel of shell fragments	NA		L				NA	NA	NA	SPT 2,3,5 N=8	SPT: Recovered 400 mm
WASH BORE	HWT	NA	-0.5	5.0	BEACH DEPOSITS	[Dotted pattern]	...trace gravel of shell fragments	NA		L				NA	NA	NA	SPT 2,3,5 N=8	SPT: Recovered 400 mm

# BOREHOLE LOG



**WorleyParsons**

BOREHOLE: **BH-12**

SHEET: 2 OF 4

CLIENT: **Australian Industrial Energy**  
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 Drill Model: Hanjin D&B      Drill Fluid: Pac L + CRP60      Bearing: NA      Northing: 6185119.1      Ref. System: GDA94 / MGA56

Method	Casing	Drill Rate (min/m)	RL (mAHD)	Depth (m)	Geological Unit	Graphic Log	Material Description	Moisture Condition	Weathering / Cementation	Consistency / Strength	Defect Spacing (mm)	Core Run No.	TCR / SCR (%)	RQD (%)	Sample / Test	Field Records / Comments and Defect Description
WASH BORE	HWT	NA	-1.0		BEACH DEPOSITS		SAND (SP): Fine to medium grained, sub-angular to rounded, quartz, trace mafics, pale brown-pale yellow, trace gravel of shell fragments.	NA	Uc	L						
			5.5				SAND (SP): Fine to medium grained, sub-angular to rounded, quartz, mafics, pale brown mottled dark grey; with fine to medium grained gravel of shell fragments.			MD						Casing advanced to 5.6m
WASH BORE	HWT	NA	-1.5		BEACH DEPOSITS											
			6.0											SPT 8,12,15 N=27	SPT: Recovered 450 mm	
WASH BORE	HWT	NA	-2.0		BEACH DEPOSITS											
			6.5													
WASH BORE	HWT	NA	-2.5		BEACH DEPOSITS											
			7.0													
WASH BORE	HWT	NA	-3.0		BEACH DEPOSITS		...reduced shell fragments, trace gravel to 10 mm									
			7.5												SPT 10,17,24 N=41	SPT: Recovered 450 mm
WASH BORE	HWT	NA	-3.5		BEACH DEPOSITS											
			8.0													
WASH BORE	HWT	NA	-4.0		BEACH DEPOSITS											
			8.5													Casing advanced to 8.5 m
WASH BORE	HWT	NA	-4.5		BEACH DEPOSITS											
			9.0													
OPEN HOLE			-5.0		ALLUVIUM		SAND (SP): Fine to medium grained, sub-angular to rounded, quartz, dark brown, iron-oxide stained; trace fines.		Vwk	D						
			8.5													
OPEN HOLE			-4.5		ALLUVIUM											
			9.0													
OPEN HOLE			-5.0		ALLUVIUM											
			9.5												SPT 26,35,47 N=82	SPT: Recovered 400 mm
OPEN HOLE			-5.5		ALLUVIUM											
			10.0													

# BOREHOLE LOG



**WorleyParsons**

BOREHOLE: **BH-12**

SHEET: 3 OF 4

CLIENT: **Australian Industrial Energy**  
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DATE COMMENCED: **29.8.2018**  
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Method	Casing	Drill Rate (min/m)	RL (mAHD)	Depth (m)	Geological Unit	Graphic Log	Material Description	Moisture Condition	Weathering / Cementation	Consistency / Strength	Defect Spacing (mm)	Core Run No.	TCR / SCR (%)	RQD (%)	Sample / Test	Field Records / Comments and Defect Description						
WASH BORE OPEN HOLE NA	NA	NA	-6.0		ALLUVIUM		SAND (SP-SM): Fine to medium grained, sub-angular to rounded, quartz, trace lithics, pale yellow speckled dark grey; trace to with fines; with dark brown weakly cemented inclusions.	NA	Uc	MD	20 60 200 600 2000	NA	NA	NA								
			10.5													SPT 8,13,15 N=28	SPT: Recovered 450 mm					
			-6.5																			
			11.0																			
			-7.0																			
			11.5				Clayey SAND (SC): Fine to medium grained, sub-angular to rounded, quartz, pale grey to dark grey; low to medium plasticity clay.															
			-7.5																			
			12.0																			
			-8.0																			
			12.5																			
			-8.5																			
			13.0				Sandy CLAY (CL): Low plasticity, dark grey, some orange-brown mottling; fine to medium grained sand, sub-angular to sub-rounded, quartz.			F												
			-9.0																			
			13.5																			
			-9.5				...at 13.65 m, decomposing wood fragments; fibrous															
			14.0																			
			-10.0																			
			14.5																			
			-10.5							Hd												
			15.0																			

# BOREHOLE LOG



## WorleyParsons

BOREHOLE: **BH-12**

SHEET: 4 OF 4

CLIENT: <b>Australian Industrial Energy</b>	DATE COMMENCED: <b>29.8.2018</b>
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LOCATION: <b>Port Kembla, NSW</b>	LOGGED BY: <b>BO</b>
JOB NUMBER: <b>401010-01496</b>	REVISION: <b>0</b>

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Drill Model: Hanjin D&B	Drill Fluid: Pac L + CRP60	Bearing: NA	Northing: 6185119.1	Ref. System: GDA94 / MGA56

Method	Casing	Drill Rate (min/m)	RL (mAHD)	Depth (m)	Geological Unit	Graphic Log	Material Description	Moisture Condition	Weathering / Cementation	Consistency / Strength	Defect Spacing (mm)			Core Run No.	TCR / SCR (%)	RQD (%)	Sample / Test	Field Records / Comments and Defect Description
											20	60	200					
WASH BORE	OPEN HOLE	NA	-11.0	15.5	ALLUVIUM		Sandy CLAY (CL): Low plasticity, pale to dark grey mottled orange-brown; fine to medium grained sand (up to 65%), sub-angular to rounded, quartz.	NA	Uc	Hd				NA	NA	NA	SPT 11,18,24 N=42	SPT: Recovered 450 mm
				15.5			End of BH-12 at 15.45m											
				-11.5														
				16.0														
				-12.0														
				16.5														
				-12.5														
				17.0														
				-13.0														
				17.5														
				-13.5														
				18.0														
				-14.0														
				18.5														
				-14.5														
				19.0														
				-15.0														
				19.5														
				-15.5														
				20.0														

# BOREHOLE LOG



## WorleyParsons

BOREHOLE: **BH-14**

SHEET: 1 OF 6

CLIENT: **Australian Industrial Energy**  
 PROJECT: **Port Kembla Gas Terminal Project**  
 LOCATION: **Port Kembla, NSW**  
 JOB NUMBER: **401010-01496**

DATE COMMENCED: **3.9.2018**  
 DATE COMPLETED: **5.9.2018**  
 LOGGED BY: **BO**  
 REVISION: **A**

Drill Contractor: BG Drilling    Bore Size: 96 mm    Hole Angle: -90°    Easting: 306684.1    Surface R.L.: 4.78mAHD  
 Drill Model: Hydrapower Scout 300    Drill Fluid: Pac L + CRP60    Bearing: NA    Northing: 6186084.6    Ref. System: GDA94 / MGA56

Method	Casing	Drill Rate (min/m)	RL (mAHD)	Depth (m)	Geological Unit	Graphic Log	Material Description	Moisture Condition	Weathering / Cementation	Consistency / Strength	Defect Spacing (mm)	Core Run No.	TCR / SCR (%)	RQD (%)	Sample / Test	Field Records / Comments and Defect Description							
WASH BORE	HWT	NA	4.5	0.5	FILL		FILL: Gravelly SAND: Fine to medium grained, sub-angular to sub-rounded, quartz, trace lithics, slag, dark grey to brown-grey; fine to coarse gravel, sub-angular to sub-rounded, lithics, slag; trace silt, trace cobbles of basalt and slag.	D	Uc	MD	20												
SOLID AUGER	HWT	NA	4.0	1.0	FILL																		
SOLID AUGER	HWT	NA	3.5	1.5	FILL																		
SOLID AUGER	HWT	NA	3.0	2.0	FILL																		
SOLID AUGER	HWT	NA	2.5	2.5	FILL																		
SOLID AUGER	HWT	NA	2.0	3.0	FILL		FILL: Silty GRAVEL: Fine to coarse grained, sub-angular to sub-rounded, lithic fragments, slag, road base/asphalt; dark grey to black; non-plastic silt, coal fines; with sand, fine to medium grained, sub-angular to sub-rounded, quartz, lithics, coal			VL-L													
SOLID AUGER	HWT	NA	1.5	3.5	FILL																		
SOLID AUGER	HWT	NA	1.0	4.0	FILL		FILL: Gravelly CLAY: Low plasticity, dark grey-black, coal fines?; fine to coarse gravel, sub-angular to sub-rounded, lithic fragments, slag; with sand.																
SOLID AUGER	HWT	NA	0.5	4.5	FILL																		
SOLID AUGER	HWT	NA	0.0	5.0	ALLUVIUM		SAND (SP): Fine to medium grained, sub-angular to sub-rounded, quartz, trace lithics, pale grey to dark grey; trace to with silt, trace organic rootlets (fibrous).			L													

# BOREHOLE LOG



## WorleyParsons

BOREHOLE: **BH-14**

SHEET: 2 OF 6

CLIENT: **Australian Industrial Energy**  
 PROJECT: **Port Kembla Gas Terminal Project**  
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 Drill Model: Hydrapower Scout 300    Drill Fluid: Pac L + CRP60    Bearing: NA    Northing: 6186084.6    Ref. System: GDA94 / MGA56

Method	Casing	Drill Rate (min/m)	RL (mAHD)	Depth (m)	Geological Unit	Graphic Log	Material Description	Moisture Condition	Weathering / Cementation	Consistency / Strength	Defect Spacing (mm)			Core Run No.	TCR / SCR (%)	RQD (%)	Sample / Test	Field Records / Comments and Defect Description								
											20	60	200													
WASH BORE	HWT	NA		0.5	ALLUVIUM		SAND (SP): Fine to medium grained, sub-angular to sub-rounded, quartz, trace lithics, pale grey to dark grey; trace to with silt, trace organic rootlets (fibrous).	NA	Uc	L																
				5.5			Silty SAND (SM): Fine to medium grained, sub-angular to sub-rounded, quartz, dark grey, mottled brown; non-plastic silt, possibly organic.		VL																	
				6.0																			Driller noted something solid at 6.0 m (likely caved-in gravel/cobbles from Fill)			
				6.5																			Casing advanced to 6.0 m			
				7.0								SAND (SP): Fine to medium grained, sub-angular to sub-rounded, quartz, dark brown to orange-brown; trace to with silt, possibly organic; trace gravel, fine to medium grained, sub-rounded to rounded, quartz.		VD										SPT 1.0,0 N=0	SPT: Recovered 400 mm	
				7.5																						
				8.0																						
				8.5																						
				9.0																						Driller noted that slag/rock had fallen prior to SPT at 9.0 m, SPT performed at 9.5 m to clear debris
				9.5									...pale brown-orange													
9.5							...slight increase of fines																			
10.0																										
																					SPT 10,18,29 N=47	SPT: Recovered 350 mm				
																						Casing advanced to 8.0 m				
																							SPT 10,13,19 N=32	SPT: Recovered 350 mm		

# BOREHOLE LOG



## WorleyParsons

BOREHOLE: **BH-14**

SHEET: 3 OF 6

CLIENT: **Australian Industrial Energy**  
 PROJECT: **Port Kembla Gas Terminal Project**  
 LOCATION: **Port Kembla, NSW**  
 JOB NUMBER: **401010-01496**

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Method	Casing	Drill Rate (min/m)	RL (mAHD)	Depth (m)	Geological Unit	Graphic Log	Material Description	Moisture Condition	Weathering / Cementation	Consistency / Strength	Defect Spacing (mm)			Core Run No.	TCR / SCR (%)	RQD (%)	Sample / Test	Field Records / Comments and Defect Description
											20	60	200					
WASH BORE	HWT	NA	-5.5	10.5	ALLUVIUM		SAND (SP): Fine to medium grained, sub-angular to sub-rounded, quartz, pale orange-brown; trace to with silt, possibly organic; trace gravel, fine to medium grained, sub-rounded to rounded, quartz.	NA	Uc	D								Casing advanced to 10.5 m
			-6.0	11.0			...with quartz and lithic gravel								SPT 8,13,19 N=32	SPT: Recovered 350 mm		
			-6.5	11.5			...pale brown to pale grey		VD									
			-7.0	12.0													Casing advanced to 12.0 m	
			-7.5	12.5			SAND (SP-SM): Fine to medium grained, sub-angular to sub-rounded, quartz, lithics, pale grey speckled dark grey; with silt; trace fine grained gravel, sub-angular to sub-rounded, quartz, lithics.										SPT 19,31,39 N=70	SPT: Recovered 350 mm
-8.0	13.0																	
-8.5	13.5					CLAY (CI-CH): Medium to high plasticity, dark grey.			VL									
-9.0	14.0																	
-9.5	14.5																	
-10.0	15.0																	SPT: RW, Recovered 450 mm



# BOREHOLE LOG



## WorleyParsons

BOREHOLE: **BH-14**

SHEET: 4 OF 6

CLIENT: **Australian Industrial Energy**  
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 Drill Model: Hydrapower Scout 300    Drill Fluid: Pac L + CRP60    Bearing: NA    Northing: 6186084.6    Ref. System: GDA94 / MGA56

Method	Casing	Drill Rate (min/m)	RL (mAHD)	Depth (m)	Geological Unit	Graphic Log	Material Description	Moisture Condition	Weathering / Cementation	Consistency / Strength	Defect Spacing (mm)	Core Run No.	TCR / SCR (%)	RQD (%)	Sample / Test	Field Records / Comments and Defect Description
WASH BORE	HWT	NA	-10.5	15.5	ALLUVIUM		CLAY (CI-CH): Medium to high plasticity, dark grey. ...with fine grained sand	NA	Uc	VS	20 60 200 600 2000	NA	NA	NA	SPT 0,0,0 N=0	SPT: HW, Recovered 400 mm
			-11.0	16.0			Sandy CLAY (CL): Low plasticity, dark grey; fine grained sand, sub-rounded to rounded, quartz; trace gravel, angular, coal.	NA	Uc	VS	20 60 200 600 2000				SPT 0,0,0 N=0	SPT: HW, Recovered 400 mm
			-11.5	16.5											Clayey SAND (SC): Fine to medium grained, sub-rounded to rounded, quartz, dark grey-green; low to medium plasticity clay; trace coal.	NA
			-12.0	17.0			CLAY (CL-CI): Low to medium plasticity, pale green-grey mottled orange-brown; with sand, fine grained, sub-rounded to rounded, quartz.	NA	RS	VSt	20 60 200 600 2000					
			-12.5	17.5											SHOALHAVEN GROUP	
-13.0	18.0	SHOALHAVEN GROUP		CLAY (CL-CI): Low to medium plasticity, pale green-grey mottled orange-brown; with sand, fine grained, sub-rounded to rounded, quartz.	NA	RS	VSt	20 60 200 600 2000	SPT 3,7,12 N=19	SPT: Recovery not recorded						
-13.5	18.5										SHOALHAVEN GROUP		CLAY (CL-CI): Low to medium plasticity, pale green-grey mottled orange-brown; with sand, fine grained, sub-rounded to rounded, quartz.	NA	RS	VSt
-14.0	19.0	SHOALHAVEN GROUP		CLAY (CL-CI): Low to medium plasticity, pale green-grey mottled orange-brown; with sand, fine grained, sub-rounded to rounded, quartz.	NA	RS	VSt	20 60 200 600 2000	SPT 3,7,12 N=19	SPT: Recovery not recorded						
-14.5	19.5										SHOALHAVEN GROUP		CLAY (CL-CI): Low to medium plasticity, pale green-grey mottled orange-brown; with sand, fine grained, sub-rounded to rounded, quartz.	NA	RS	VSt
-15.0	20.0	SHOALHAVEN GROUP		CLAY (CL-CI): Low to medium plasticity, pale green-grey mottled orange-brown; with sand, fine grained, sub-rounded to rounded, quartz.	NA	RS	VSt	20 60 200 600 2000	SPT 3,7,12 N=19	SPT: Recovery not recorded						

# BOREHOLE LOG



**WorleyParsons**

BOREHOLE: **BH-14**

SHEET: 5 OF 6

CLIENT: **Australian Industrial Energy**  
 PROJECT: **Port Kembla Gas Terminal Project**  
 LOCATION: **Port Kembla, NSW**  
 JOB NUMBER: **401010-01496**

DATE COMMENCED: **3.9.2018**  
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 REVISION: **A**

Drill Contractor: BG Drilling    Bore Size: 96 mm    Hole Angle: -90°    Easting: 306684.1    Surface R.L.: 4.78mAHD  
 Drill Model: Hydrapower Scout 300    Drill Fluid: Pac L + CRP60    Bearing: NA    Northing: 6186084.6    Ref. System: GDA94 / MGA56

Method	Casing	Drill Rate (min/m)	RL (mAHD)	Depth (m)	Geological Unit	Graphic Log	Material Description	Moisture Condition	Weathering / Cementation	Consistency / Strength	Defect Spacing (mm)	Core Run No.	TCR / SCR (%)	RQD (%)	Sample / Test	Field Records / Comments and Defect Description	
WASH BORE	HWT		-15.5	20.5	SHOALHAVEN GROUP		CLAY (CL-CI): Low to medium plasticity, pale green-grey mottled orange-brown; with sand, fine grained, sub-rounded to rounded, quartz.	NA	RS	VSt							
			-16.0	21.0			...pale brown to pale grey mottled orange-red brown (iron-oxide staining)							SPT 7,8,11 N=79	Casing advanced to 21.0 m SPT: Recovered 450 mm		
OPEN HOLE	NA		-16.5	21.5	SHOALHAVEN GROUP		Sandy CLAY (CL): Low plasticity, pale brown mottled pale grey, with red brown (iron-oxide) mottles; fine grained sand, sub-rounded to rounded, quartz.										
			-17.0	22.0										SPT 6,10,12 N=22	SPT: Recovered 400 mm		
OPEN HOLE	NA		-17.5	22.5	SHOALHAVEN GROUP												
			-18.0	23.0													
OPEN HOLE	NA		-18.5	23.5	SHOALHAVEN GROUP		Clayey SAND (SC): Fine to medium grained, sub-rounded to rounded, quartz, lithics, pale grey-dark grey mottled brown; low plasticity clay.			D							
			-19.0	24.0													
OPEN HOLE	NA		-19.5	24.5	SHOALHAVEN GROUP		Sandy CLAY (CL): Low plasticity, dark grey-brown; sand, fine to medium grained, sub-angular to sub-rounded, quartz, lithics; with gravel, fine to medium grained, sub-angular to sub-rounded, quartz, lithic fragments.			Hd							
			-20.0	25.0										SPT 9,8,23 N=31	SPT: Recovered 400 mm 24.3-24.45 m: Environmental sample taken		

# BOREHOLE LOG



**WorleyParsons**

BOREHOLE: **BH-14**

SHEET: 6 OF 6

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Drill Contractor: BG Drilling    Bore Size: 96 mm    Hole Angle: -90°    Easting: 306684.1    Surface R.L.: 4.78mAH  
 Drill Model: Hydrapower Scout 300    Drill Fluid: Pac L + CRP60    Bearing: NA    Northing: 6186084.6    Ref. System: GDA94 / MGA56

Method	Casing	Drill Rate (min/m)	RL (mAHD)	Depth (m)	Geological Unit	Graphic Log	Material Description	Moisture Condition	Weathering / Cementation	Consistency / Strength	Defect Spacing (mm)				Core Run No.	TCR / SCR (%)	RQD (%)	Sample / Test	Field Records / Comments and Defect Description					
											20	60	200	600										
WASH BORE	NA	NA	-20.5		SHOALHAVEN GROUP		Sandy CLAY (CL): Low plasticity, pale grey-green mottled orange-brown; fine grained sand, sub-rounded to rounded, quartz; with silt, rock fabric visible.	NA		Hd														
			25.5				RS-XW																	
			-21.0				CL	Sandy MUDSTONE: Grey-brown, fine grained sand, sub-angular to sub-rounded, quartz.	CL	CL												SPT: HB		
			26.0				XW-HW	VL															B, 0°, Un, SR, Cl, Fi, 5 mm	
			-21.5	30			HW	L	...26.1-26.3 m: with pale grey clay seams 5-25 mm thick	VL-L													B, 10°, Un, SR, Cl, Fi, 25 mm	
			26.5				MW	L-M															B, 20°, Un, SR, Cl, Fi	
			-22.0				XW	St	...26.6-26.7 m: Gravelly CLAY, gravel of highly weathered rock														B, 15°, Un, SR, Cl, Fi, 15mm	
			27.0				HW	L	...26.85-26.95 m: Silty GRAVEL to Gravelly CLAY															B, 15°, Un, SR, Cl, Fi, 5mm
			-22.5				XW	VSt	...26.95-27.25 m: With lenses of Clayey SAND / Sandy CLAY to 5 mm thick															B, 10°, Un, SR, Cl, Fi, 3 mm
			27.5				HW	VL-L																B, 10°, Un, SR, Cl, Fi, 2 mm
OPEN HOLE	NR	NR	-23.0		SHOALHAVEN GROUP		SILTSTONE: Grey, with fine grained sand, with dark grey lenticular claystone beds to ~2 mm thick.			M										B, 10°, Un, SR, Cl, Fi, 10 mm				
			27.5				SW	M													J, 5°, Un, R, Su			
			-28.0				SW-FR	H														27.55-27.95m: J, 80°, Un, R, Su		
			28.0				MW-SW	M															M	
			-28.5				SW-FR	H	...28.2-28.3m and 28.6-28.7m: weathering around defects															J, 5°, Un, R, Su
			28.5				MW	L-M																J, 15°, Un, R, Su
			-29.0				SW-FR	H																J, 10°, Un, R, Su
			29.0				MW	L-M																B, 10°, Un, R, Su, broken joint margins
			-29.5				SW-FR	H																M
			29.5				MW	L-M																J, 10°, Un, R, Ca, Vn
End of BH-14 at 29.8m	NR	NR	-25.0		SHOALHAVEN GROUP															J, 10, Un, R, Su				
			30.0																					

# CORE PHOTOGRAPHS



## WorleyParsons

BOREHOLE: **BH-14**

SHEET: 1 OF 1

CLIENT: **Australian Industrial Energy**  
PROJECT: **Port Kembla Gas Terminal Project**  
LOCATION: **Port Kembla, NSW**  
JOB NUMBER: **401010-01496**

DATE COMMENCED: **3.9.2018**  
DATE COMPLETED: **5.9.2018**  
LOGGED BY: **BO**

Drill Contractor:	BG Drilling	Bore Size:	96 mm	Hole Angle:	-90°	Easting:	306684.1	Surface R.L.:	4.78mAHD
Drill Model:	Hydrapower Scout 300	Drill Fluid:	Pac L + CRP60	Bearing:	NA	Northing:	6186084.6	Ref. System:	GDA94 / MGA56



25.90 to 29.80 m

# BOREHOLE LOG



**WorleyParsons**

BOREHOLE: **BH-15**

SHEET: 1 OF 6

CLIENT: **Australian Industrial Energy**  
 PROJECT: **Port Kembla Gas Terminal Project**  
 LOCATION: **Port Kembla, NSW**  
 JOB NUMBER: **401010-01496**

DATE COMMENCED: **3.9.2018**  
 DATE COMPLETED: **5.9.2018**  
 LOGGED BY: **DO**  
 REVISION: **A**

Drill Contractor: BG Drilling      Bore Size: 96 mm      Hole Angle: -90°      Easting: 306575.8      Surface R.L.: 5.43mAHD  
 Drill Model: Hanjin D&B      Drill Fluid: Pac L + CRP60      Bearing: NA      Northing: 6186060.5      Ref. System: GDA94 / MGA56

Method	Casing	Drill Rate (min/m)	RL (mAHD)	Depth (m)	Geological Unit	Graphic Log	Material Description	Moisture Condition	Weathering / Cementation	Consistency / Strength	Defect Spacing (mm)	Core Run No.	TCR / SCR (%)	RQD (%)	Sample / Test	Field Records / Comments and Defect Description
VACUUM	HWT	NA	5.0	0.5	FILL		FILL: Silty SAND: Fine to medium grained, sub-angular to sub-rounded, quartz, some lithics, grey, black, non-plastic to low plasticity silt; with fine to coarse gravel of lithics and slag; trace and locally with cobbles of lithics and lesser slag.	D-M	Uc	MD		NA	NA	NA	SPT 1,4,5 N=9	SPT: Recovered 180 mm
			4.5	1.0				M								
SOLID AUGER	HWT	NA	4.0	1.5	FILL		FILL: Silty SAND: Fine to medium grained, angular to sub-angular, coal fragments, some quartz, black, non-plastic silt.	M	Uc	MD		NA	NA	NA	SPT 4,3,2 N=5	SPT: Recovered 500 mm; Split into two samples: 3.0-3.2 m and 3.2-3.45 m
			3.5	2.0												
WASH BORE	HWT	NA	3.0	2.5	FILL		FILL: Silty SAND: Fine to medium grained, angular to sub-angular, coal fragments, some quartz, black, non-plastic silt.	W	Uc	MD		NA	NA	NA	SPT 4,10,14 N=24	SPT: Recovered 208 mm Casing advanced to 4.0 m after SPT
			2.5	3.0												
WASH BORE	HWT	NA	2.0	3.5	FILL		FILL: Silty SAND: Fine to medium grained, angular to sub-angular, coal fragments, some quartz, black, non-plastic silt.	W	Uc	MD		NA	NA	NA	SPT 4,10,14 N=24	SPT: Recovered 208 mm Casing advanced to 4.0 m after SPT
			1.5	4.0												
WASH BORE	HWT	NA	1.0	4.5	ALLUVIUM		SAND (SP): Fine to medium grained; some coarse grained, sub-angular to sub-rounded, quartz, some carbonate, pale brown; trace silt.	W	Uc	MD		NA	NA	NA	SPT 4,10,14 N=24	SPT: Recovered 208 mm Casing advanced to 4.0 m after SPT
			0.5	5.0												

# BOREHOLE LOG



## WorleyParsons

BOREHOLE: **BH-15**

SHEET: 2 OF 6

CLIENT: **Australian Industrial Energy**  
 PROJECT: **Port Kembla Gas Terminal Project**  
 LOCATION: **Port Kembla, NSW**  
 JOB NUMBER: **401010-01496**

DATE COMMENCED: **3.9.2018**  
 DATE COMPLETED: **5.9.2018**  
 LOGGED BY: **DO**  
 REVISION: **A**

Drill Contractor: BG Drilling      Bore Size: 96 mm      Hole Angle: -90°      Easting: 306575.8      Surface R.L.: 5.43mAHD  
 Drill Model: Hanjin D&B      Drill Fluid: Pac L + CRP60      Bearing: NA      Northing: 6186060.5      Ref. System: GDA94 / MGA56

Method	Casing	Drill Rate (min/m)	RL (mAHD)	Depth (m)	Geological Unit	Graphic Log	Material Description	Moisture Condition	Weathering / Cementation	Consistency / Strength	Defect Spacing (mm)			Core Run No.	TCR / SCR (%)	RQD (%)	Sample / Test	Field Records / Comments and Defect Description							
											20	60	200												
WASH BORE	HWT	NA	5.5	5.5	ALLUVIUM		SAND (SP): Fine to medium grained; some coarse grained, sub-angular to sub-rounded, quartz, some carbonate, pale brown; trace silt.	NA	Uc	MD															
									VL																
									6.0																
									6.5					Silty SAND (SM): Fine grained, sub-rounded, quartz, some carbonate, grey; non-plastic silt, trace fine grained gravel of shell fragments.											SPT: Recovered 270 mm; Environmental sample taken from 6.00-6.35 m
									7.0					SAND (SP-SM): Fine to medium grained, sub-angular to sub-rounded, quartz, some carbonate, dark brown; with organic silt, with sand-sized decomposing organic fragments.		MD									
		7.5																							
		8.0																	SPT: Recovered 320 mm						
		8.5																	Casing advanced to 6.5 m						
		9.0																							
		9.5																	SPT: Recovered 280 mm						
		10.0																							

# BOREHOLE LOG



## WorleyParsons

BOREHOLE: **BH-15**

SHEET: 3 OF 6

CLIENT: **Australian Industrial Energy**  
 PROJECT: **Port Kembla Gas Terminal Project**  
 LOCATION: **Port Kembla, NSW**  
 JOB NUMBER: **401010-01496**

DATE COMMENCED: **3.9.2018**  
 DATE COMPLETED: **5.9.2018**  
 LOGGED BY: **DO**  
 REVISION: **A**

Drill Contractor: BG Drilling      Bore Size: 96 mm      Hole Angle: -90°      Easting: 306575.8      Surface R.L.: 5.43mAHD  
 Drill Model: Hanjin D&B      Drill Fluid: Pac L + CRP60      Bearing: NA      Northing: 6186060.5      Ref. System: GDA94 / MGA56

Method	Casing	Drill Rate (min/m)	RL (mAHD)	Depth (m)	Geological Unit	Graphic Log	Material Description	Moisture Condition	Weathering / Cementation	Consistency / Strength	Defect Spacing (mm)			Core Run No.	TCR / SCR (%)	RQD (%)	Sample / Test	Field Records / Comments and Defect Description	
											20	60	200						
WASH BORE	HWT	NA	-	10.5	ALLUVIUM		SAND (SP): Fine to medium grained, sub-rounded, quartz, pale grey-grey; trace silt, organic odour.	NA	Uc	D-VD								Casing advanced to 8.5 m	
				11.0			...pale brown-brown, organic odour absent									SPT 13,21,29 N=50	SPT: Recovered 300 mm		
WASH BORE	HWT	NA	-	11.5	ALLUVIUM		...grey, with silt, organic odour			VD								SPT 13,44/150mm N=R	SPT: HB; Recovered 250 mm
				12.0			...pale brown-brown, organic odour absent												
WASH BORE	HWT	NA	-	12.5	ALLUVIUM														
				13.0			CLAY (CI-CH): Medium to high plasticity, black; with fine grained sand.												
WASH BORE	HWT	NA	-	13.5	ALLUVIUM														
				14.0															
OPEN HOLE				14.5															
				15.0															

# BOREHOLE LOG



## WorleyParsons

BOREHOLE: **BH-15**

SHEET: 4 OF 6

CLIENT: **Australian Industrial Energy**  
 PROJECT: **Port Kembla Gas Terminal Project**  
 LOCATION: **Port Kembla, NSW**  
 JOB NUMBER: **401010-01496**

DATE COMMENCED: **3.9.2018**  
 DATE COMPLETED: **5.9.2018**  
 LOGGED BY: **DO**  
 REVISION: **A**

Drill Contractor: BG Drilling      Bore Size: 96 mm      Hole Angle: -90°      Easting: 306575.8      Surface R.L.: 5.43mAH  
 Drill Model: Hanjin D&B      Drill Fluid: Pac L + CRP60      Bearing: NA      Northing: 6186060.5      Ref. System: GDA94 / MGA56

Method	Casing	Drill Rate (min/m)	RL (mAHD)	Depth (m)	Geological Unit	Graphic Log	Material Description	Moisture Condition	Weathering / Cementation	Consistency / Strength	Defect Spacing (mm)	Core Run No.	TCR / SCR (%)	RQD (%)	Sample / Test	Field Records / Comments and Defect Description		
											20 60 200 600 2000							
WASH BORE	NA	NA	-10.0	15.5	ALLUVIUM		CLAY (CI-CH): Medium to high plasticity, dark grey-black; with fine grained sand.	NA	Uc	St						SPT 5,5,7 N=12	15.00-15.45m: Environmental sample taken SPT: Recovered 450 mm	
			-10.5	16.0			Sandy CLAY (CL-CI): Low to medium plasticity, grey, some brown iron-oxide mottles; fine to medium grained sand, sub-angular to sub-rounded, quartz.		Vwk	VSt								Casing advanced to 14.0 m
			-11.0	16.5														
OPEN HOLE	17	17	-11.5	17.0	ALLUVIUM		CLAY (CI): Medium plasticity, grey, some brown mottling; with fine grained sand, with very low strength claystone bands to ~100 mm thick spaced ~250 to 400 mm apart.	CL	CL								SPT 11,29,45/100 N=R	Change to HQ3 coring due to SPT refusal
			-12.0	17.5			...at 17.65m and 17.9m: Irregular sandy clay seams, 10-25 mm thick	Vwk	Hd			1	86 / 0	NA				
			-12.5	18.0														
HQ3	18	18	-13.0	18.5	ALLUVIUM		Clayey SAND (SC): Fine to medium grained, sub-angular to sub-rounded, quartz, grey, some brown patches; low to medium plasticity clay. ...silty sand, low plasticity fines		Uc	D								
			-13.5	19.0			CLAY (CI): Medium plasticity, grey, with fine grained sand, trace and locally with sandy clay lenses to ~10 mm thick.		RS	VSt			2	90 / 0	NA			
			-14.0	19.5														
WASH BORE	NA	NA	-14.5	20.0	SHOALHAVEN GROUP											SPT 6,11,13 N=24	SPT: Recovered 410 mm 19.50-19.95m: Environmental sample taken	



# BOREHOLE LOG



## WorleyParsons

BOREHOLE: **BH-15**

SHEET: 5 OF 6

CLIENT: **Australian Industrial Energy**  
 PROJECT: **Port Kembla Gas Terminal Project**  
 LOCATION: **Port Kembla, NSW**  
 JOB NUMBER: **401010-01496**

DATE COMMENCED: **3.9.2018**  
 DATE COMPLETED: **5.9.2018**  
 LOGGED BY: **DO**  
 REVISION: **A**

Drill Contractor: BG Drilling      Bore Size: 96 mm      Hole Angle: -90°      Easting: 306575.8      Surface R.L.: 5.43mAHD  
 Drill Model: Hanjin D&B      Drill Fluid: Pac L + CRP60      Bearing: NA      Northing: 6186060.5      Ref. System: GDA94 / MGA56

Method	Casing	Drill Rate (min/m)	RL (mAHD)	Depth (m)	Geological Unit	Graphic Log	Material Description	Moisture Condition	Weathering / Cementation	Consistency / Strength	Defect Spacing (mm)	Core Run No.	TCR / SCR (%)	RQD (%)	Sample / Test	Field Records / Comments and Defect Description	
WASH BORE OPEN HOLE NA				20.5	SHOALHAVEN GROUP		CLAY (CI): Medium plasticity, grey, with fine grained sand, trace and locally with sandy clay lenses to ~10 mm thick.	NA	RS	VSt	20 60 200 600 2000						
				-15.0			21.0										...some brown patches (iron-oxide stained)
				-15.5			21.5										Sandy CLAY (CI): Medium plasticity, grey, fine to medium grained sand, sub-angular to sub-rounded, quartz, trace feldspar?
				-16.0			22.0										
				-16.5			22.5										...grey and brown
				-17.0			23.0										...22.65-22.85 m: increase in sand content, at 22.75m a 20 mm thick lens of clayey sand
				-17.5			23.5										Clayey SAND (SC): Fine to coarse grained, sub-angular, quartz, some lithics, dark brown, medium plasticity clay; trace and locally with fine, angular to sub-angular, lithic gravel.
				-18.0			24.0										
				-18.5			24.5										
				-19.0			25.0										
															SPT 7,10,12 N=22	SPT: Recovered 380 mm	
															SPT 7,9,9 N=18	SPT: Recovered 360 mm	
															SPT 6,6,9 N=15	SPT: Recovered 300 mm	

# BOREHOLE LOG



**WorleyParsons**

BOREHOLE: **BH-15**

SHEET: 6 OF 6

CLIENT: **Australian Industrial Energy**  
 PROJECT: **Port Kembla Gas Terminal Project**  
 LOCATION: **Port Kembla, NSW**  
 JOB NUMBER: **401010-01496**

DATE COMMENCED: **3.9.2018**  
 DATE COMPLETED: **5.9.2018**  
 LOGGED BY: **DO**  
 REVISION: **A**

Drill Contractor: BG Drilling    Bore Size: 96 mm    Hole Angle: -90°    Easting: 306575.8    Surface R.L.: 5.43mAHD  
 Drill Model: Hanjin D&B    Drill Fluid: Pac L + CRP60    Bearing: NA    Northing: 6186060.5    Ref. System: GDA94 / MGA56

Method	Casing	Drill Rate (min/m)	RL (mAHD)	Depth (m)	Geological Unit	Graphic Log	Material Description	Moisture Condition	Weathering / Cementation	Consistency / Strength	Defect Spacing (mm)	Core Run No.	TCR / SCR (%)	RQD (%)	Sample / Test	Field Records / Comments and Defect Description	
											20 60 200 600 2000						
WASH BORE	NA	NA	-20.0	25.5	SHOALHAVEN GROUP		Sandy CLAY (CL-CI): Low to medium plasticity, grey, some brown (iron oxide) mottling; fine to medium grained sand, sub-angular to sub-rounded, quartz, trace and locally with fine to coarse gravel, very weakly to moderate iron oxide cemented.	NA	RS	St-VSt							
OPEN HOLE	NR	NR	-20.5	26.0			...gravelly/gravel			Hd						SPT 6,16,30 N=46	SPT: Recovered 360 mm
HQ3	NR	NR	-21.0	26.5			MUDSTONE: Dark grey-brown, with fine grained sand.		HW	VL							Difficult wash boring below ~26.5 m
HQ3	NR	NR	-21.5	27.0						CL							Change to HQ3 SPT: HB; Recovered 30 mm
HQ3	NR	NR	-22.0	27.5			...grey		HW-MW	L		3	85 / 85	37			Highly fractured: defects spaced 40-80 mm apart, 10-30°, Un, SR-R, +/- Fe, Si, Vn-Co
HQ3	NR	NR	-22.5	28.0					MW								
HQ3	NR	NR	-23.0	28.5			...with frequent crosscutting seams of silty sand, potentially acts as a soil			L-M		4	100 / 40	0			Highly fractured, crosscutting, 30-70°, Cl, Vn-Co J, 40°, Un, S, Cl, Fi, 8 mm J, 40°, Un, SR, Ca, Cl, Co
HQ3	NR	NR	-23.5	29.0			Sandy CLAY (CL): Low plasticity, grey; fine grained sand, some medium grained, sub-angular to sub-rounded, quartz.		XW	VSt							
HQ3	NR	NR	-24.0	29.5						CL		5	33 / 0	NA			Core loss, blocked off
HQ3	NR	NR	-24.5	30.0						CL							

End of BH-15 at 30m

# CORE PHOTOGRAPHS



## WorleyParsons

BOREHOLE: **BH-15**

SHEET: 1 OF 1

CLIENT: **Australian Industrial Energy**  
PROJECT: **Port Kembla Gas Terminal Project**  
LOCATION: **Port Kembla, NSW**  
JOB NUMBER: **401010-01496**

DATE COMMENCED: **3.9.2018**  
DATE COMPLETED: **5.9.2018**  
LOGGED BY: **DO**

Drill Contractor: BG Drilling	Bore Size: 96 mm	Hole Angle: -90°	Easting: 306575.8	Surface R.L.: 5.43mAHD
Drill Model: Hanjin D&B	Drill Fluid: Pac L + CRP60	Bearing: NA	Northing: 6186060.5	Ref. System: GDA94 / MGA56



16.90 to 19.50 m



27.06 to 30.00 m

# BOREHOLE LOG



**WorleyParsons**

BOREHOLE: **BH-16**

SHEET: 1 OF 5

CLIENT: **Australian Industrial Energy**  
 PROJECT: **Port Kembla Gas Terminal Project**  
 LOCATION: **Port Kembla, NSW**  
 JOB NUMBER: **401010-01496**

DATE COMMENCED: **5.9.2018**  
 DATE COMPLETED: **7.9.2018**  
 LOGGED BY: **DO**  
 REVISION: **A**

Drill Contractor: BG Drilling      Bore Size: 96 mm      Hole Angle: -90°      Easting: 306155.7      Surface R.L.: 8.09mAHD  
 Drill Model: Hanjin D&B      Drill Fluid: Pac L + CRP60      Bearing: NA      Northing: 6186637.4      Ref. System: GDA94 / MGA56

Method	Casing	Drill Rate (min/m)	RL (mAHD)	Depth (m)	Geological Unit	Graphic Log	Material Description	Moisture Condition	Weathering / Cementation	Consistency / Strength	Defect Spacing (mm)	Core Run No.	TCR / SCR (%)	RQD (%)	Sample / Test	Field Records / Comments and Defect Description												
SOLID AUGER	HWT	NA	8.0		FILL		FILL: Silty SAND: Fine to coarse grained, sub-angular, quartz, lithics?, dark grey-black; non-plastic silt (coal fines); with fine to coarse gravel of lithics and slag, locally gravelly; trace cobbles of slag and lithics.	D-M	Uc	MD	20 60 200 600 2000					SPT 6,10,17 N=27	SPT: Recovered 350 mm											
			7.5													7.0		6.5		2.0		6.0		SPT 8,25/100mm N=R	SPT: HB; Recovered 210 mm; Refusal likely on cobble			
WASH BORE	HWT	NA	2.5		FILL		FILL: Silty GRAVEL: Fine to coarse grained, angular, slag and lithics, black, grey; non-plastic silt; with sand.	M									SPT 2,24,19 N=43	SPT: Recovered 230 mm; Some HB throughout test, likely on gravels, SPT-N value possibly inflated										
			3.0														2.5		2.0		1.5		1.0		0.5		8.0	
			4.0														3.5		3.0		2.5		2.0		1.5		1.0	
			4.5				...trace steel cobbles to 80 mm thick	NA										Auger lost down hole at 5 m, new hole started										
			5.0																									

# BOREHOLE LOG



## WorleyParsons

BOREHOLE: **BH-16**

SHEET: 2 OF 5

CLIENT: **Australian Industrial Energy**  
 PROJECT: **Port Kembla Gas Terminal Project**  
 LOCATION: **Port Kembla, NSW**  
 JOB NUMBER: **401010-01496**

DATE COMMENCED: **5.9.2018**  
 DATE COMPLETED: **7.9.2018**  
 LOGGED BY: **DO**  
 REVISION: **A**

Drill Contractor: BG Drilling      Bore Size: 96 mm      Hole Angle: -90°      Easting: 306155.7      Surface R.L.: 8.09mAHD  
 Drill Model: Hanjin D&B      Drill Fluid: Pac L + CRP60      Bearing: NA      Northing: 6186637.4      Ref. System: GDA94 / MGA56

Method	Casing	Drill Rate (min/m)	RL (mAHD)	Depth (m)	Geological Unit	Graphic Log	Material Description	Moisture Condition	Weathering / Cementation	Consistency / Strength	Defect Spacing (mm)			Core Run No.	TCR / SCR (%)	RQD (%)	Sample / Test	Field Records / Comments and Defect Description		
											20	60	200							
WASH BORE	HWT	NA	3.0	2.5	FILL		FILL: Silty GRAVEL: Fine to coarse grained, angular to sub-angular, lithics and slag, grey; non-plastic silt; with sand; trace cobbles of steel, slag and lithics.	NA	Uc	MD				NA	NA	NA	SPT 24,20/90mm N=R	SPT: HB; Recovered 160 mm!; Refusal likely on gravel / cobble, some HB throughout test, SPT blows likely elevated due to gravels		
							5.5										...decrease in gravel content and increase in sand content; tending to silty sand with gravel, cobbles absent		SPT 10,14,13 N=27	SPT: Recovered 310 mm
							6.0													
							6.5													
							7.0													
7.5	FILL: Silty SAND: Fine to coarse grained, sub-angular, lithics, some quartz, black; non-plastic to low plastic silt; with fine to coarse gravel of slag and lithics; trace clay; locally silty gravel with sand.	D	NA	NA	NA	SPT 12,16,20 N=36	SPT: Recovered 340 mm													
8.0																				
8.5	...trace cobbles of slag and lithics																			
9.0																				
9.5							...recovered as gravel, finer material inferred to have been washed away (possible cuttings)									SPT 20,14/40mm N=R	SPT: HB; Recovered 100 mm; Refusal likely on cobble			
10.0																				

# BOREHOLE LOG



## WorleyParsons

BOREHOLE: **BH-16**

SHEET: 3 OF 5

CLIENT: **Australian Industrial Energy**  
 PROJECT: **Port Kembla Gas Terminal Project**  
 LOCATION: **Port Kembla, NSW**  
 JOB NUMBER: **401010-01496**

DATE COMMENCED: **5.9.2018**  
 DATE COMPLETED: **7.9.2018**  
 LOGGED BY: **DO**  
 REVISION: **A**

Drill Contractor: BG Drilling      Bore Size: 96 mm      Hole Angle: -90°      Easting: 306155.7      Surface R.L.: 8.09mAHd  
 Drill Model: Hanjin D&B      Drill Fluid: Pac L + CRP60      Bearing: NA      Northing: 6186637.4      Ref. System: GDA94 / MGA56

Method	Casing	Drill Rate (min/m)	RL (mAHd)	Depth (m)	Geological Unit	Graphic Log	Material Description	Moisture Condition	Weathering / Cementation	Consistency / Strength	Defect Spacing (mm)			Core Run No.	TCR / SCR (%)	RQD (%)	Sample / Test	Field Records / Comments and Defect Description
											20	60	200					
WASH BORE	HWT		-2.0		FILL	[Cross-hatched pattern]	FILL: Silty GRAVEL: Fine to coarse grained, angular to sub-angular, lithics, slag, grey, black; non-plastic silt; with sand; trace cobbles.	NA	Uc	MD								
			10.5	-2.5			[Diagonal lines pattern]	Sandy CLAY (Cl): Medium plasticity, grey, brown; fine to medium grained sand, sub-angular to sub-rounded, quartz.			F							
WASH BORE	NA		11.0	-3.0													SPT 4,6,9 N=75	SPT: No recovery; Inferred Fill gravel fragment covering mouth of SPT which was driven through the clay; Layer logged from clay on outside of SPT
			11.5	-3.5														
WASH BORE	NA		12.0	-4.0			...grey			St								Casing advanced to 12.0 m
			12.5	-4.5		ALLUVIUM	[Dotted pattern]	Silty SAND (SM): Fine to medium grained sand, sub-angular to sub-rounded, quartz, pale grey-grey; low plasticity silt; with clay.			MD							SPT 8,9,8 N=17
OPEN HOLE			13.0	-5.0														
			13.5	-5.5			[Diagonal lines pattern]	CLAY (Cl): Medium plasticity; grey, mottled brown; with fine grained sand.			VSt							
OPEN HOLE			14.0	-6.0														
			14.5	-6.5														SPT 6,8,14 N=22
			15.0	-6.5														

# BOREHOLE LOG



**WorleyParsons**

BOREHOLE: **BH-16**

SHEET: 4 OF 5

CLIENT: **Australian Industrial Energy**  
 PROJECT: **Port Kembla Gas Terminal Project**  
 LOCATION: **Port Kembla, NSW**  
 JOB NUMBER: **401010-01496**

DATE COMMENCED: **5.9.2018**  
 DATE COMPLETED: **7.9.2018**  
 LOGGED BY: **DO**  
 REVISION: **A**

Drill Contractor: BG Drilling      Bore Size: 96 mm      Hole Angle: -90°      Easting: 306155.7      Surface R.L.: 8.09mAH  
 Drill Model: Hanjin D&B      Drill Fluid: Pac L + CRP60      Bearing: NA      Northing: 6186637.4      Ref. System: GDA94 / MGA56

Method	Casing	Drill Rate (min/m)	RL (mAHD)	Depth (m)	Geological Unit	Graphic Log	Material Description	Moisture Condition	Weathering / Cementation	Consistency / Strength	Defect Spacing (mm)	Core Run No.	TCR / SCR (%)	RQD (%)	Sample / Test	Field Records / Comments and Defect Description
											20 60 200 600 2000					
WASH BORE	NA	NA	-7.0		ALLUVIUM		CLAY (Cl): Medium plasticity, grey, mottled brown; with fine grained sand.	NA	Uc	VSt		NA	NA	NA	SPT 5.8.9 N=17	SPT: Recovered 450 mm
			-7.5													
OPEN HOLE	NR	NR	-8.0		CL		Clayey SILT (ML): Low plasticity, pale grey-white mottled orange-red; with lenses of fine grained sand up to 10 mm thick; with iron-oxide nodules.	RS				NA	NA	NA	SPT 20/110mm N=R	Change to HQ3 SPT: HB; Recovery not recorded
			-8.5													
HQ3	NR	NR	-9.0		SHOALHAVEN GROUP		Sandy MUDSTONE: Brown-grey, some brown patches; fine grained sand, sub-angular to sub-rounded, quartz, with numerous healed and partially open defects. ...at 17.85m, 25 mm thick clay seam	HW-MW	VL-L			1	58 / 22	9		Highly fractured, crosscutting, ~10-80°, Un, S-SR, Cl, Co-Fi, 3 mm
			-9.5													
			-10.0				...18.4-18.45 m: CLAY	MW	L-M							Defects spaced ~50-120 mm apart, 5-15°, Un, SR, Fe, +/- Cl, Co
			-10.5					XW	VSt							M (core broken during removal from catcher)
			-11.0					HW-MW	L							
			-11.5				...19.35-19.45 m: CLAY, with highly weathered gravel	MW	L-M							
			-12.0				...19.75-19.8 m: with clay seams to 10 mm thick	XW	VSt							Defects spaced ~40-140 mm apart, 0-40°, Un, SR-R, +/- Fe, Cl, Co; Some defects with up to 3 mm of clay infill and some defects broken irregularly through more than one defect
			-12.5					HW	VL							
			-13.0					MW	L-M							
			-13.5													
			-14.0													
			-14.5													
			-15.0													
			-15.5													
			-16.0													
			-16.5													
			-17.0													
			-17.5													
			-18.0													
			-18.5													
			-19.0													
			-19.5													
			-20.0													

# BOREHOLE LOG



**WorleyParsons**

BOREHOLE: **BH-16**

SHEET: 5 OF 5

CLIENT: **Australian Industrial Energy**  
 PROJECT: **Port Kembla Gas Terminal Project**  
 LOCATION: **Port Kembla, NSW**  
 JOB NUMBER: **401010-01496**

DATE COMMENCED: **5.9.2018**  
 DATE COMPLETED: **7.9.2018**  
 LOGGED BY: **DO**  
 REVISION: **A**

Drill Contractor: BG Drilling      Bore Size: 96 mm      Hole Angle: -90°      Easting: 306155.7      Surface R.L.: 8.09mAHD  
 Drill Model: Hanjin D&B      Drill Fluid: Pac L + CRP60      Bearing: NA      Northing: 6186637.4      Ref. System: GDA94 / MGA56

Method	Casing	Drill Rate (min/m)	RL (mAHD)	Depth (m)	Geological Unit	Graphic Log	Material Description	Moisture Condition	Weathering / Cementation	Consistency / Strength	Defect Spacing (mm)	Core Run No.	TCR / SCR (%)	RQD (%)	Sample / Test	Field Records / Comments and Defect Description					
		NR	-12.0				Sandy MUDSTONE: Brown-grey, some brown patches; fine grained sand, sub-angular to sub-rounded, quartz, with numerous healed and partially open defects. ...at 20.07 m, gravelly clay seam, 10 mm thick End of BH-16 at 20.1m	NA	MW	L-M	<table border="1"> <tr><td>20</td></tr> <tr><td>60</td></tr> <tr><td>200</td></tr> <tr><td>600</td></tr> <tr><td>2000</td></tr> </table>	20	60	200	600	2000	2		25		
20																					
60																					
200																					
600																					
2000																					
				20.5																	
				-12.5																	
				21.0																	
				-13.0																	
				21.5																	
				-13.5																	
				22.0																	
				-14.0																	
				22.5																	
				-14.5																	
				23.0																	
				-15.0																	
				23.5																	
				-15.5																	
				24.0																	
				-16.0																	
				24.5																	
				-16.5																	
				25.0																	



# CORE PHOTOGRAPHS



## WorleyParsons

BOREHOLE: **BH-16**

SHEET: 1 OF 1

CLIENT: **Australian Industrial Energy**  
PROJECT: **Port Kembla Gas Terminal Project**  
LOCATION: **Port Kembla, NSW**  
JOB NUMBER: **401010-01496**

DATE COMMENCED: **5.9.2018**  
DATE COMPLETED: **7.9.2018**  
LOGGED BY: **DO**

Drill Contractor:	BG Drilling	Bore Size:	96 mm	Hole Angle:	-90°	Easting:	306155.7	Surface R.L.:	8.09mAHD
Drill Model:	Hanjin D&B	Drill Fluid:	Pac L + CRP60	Bearing:	NA	Northing:	6186637.4	Ref. System:	GDA94 / MGA56



17.11 to 20.10 m

# BOREHOLE LOG



**WorleyParsons**

BOREHOLE: **BH-17**

SHEET: 1 OF 5

CLIENT: <b>Australian Industrial Energy</b>	DATE COMMENCED: <b>5.9.2018</b>
PROJECT: <b>Port Kembla Gas Terminal Project</b>	DATE COMPLETED: <b>7.9.2018</b>
LOCATION: <b>Port Kembla, NSW</b>	LOGGED BY: <b>BO</b>
JOB NUMBER: <b>401010-01496</b>	REVISION: <b>A</b>

Drill Contractor: BG Drilling	Bore Size: 96 mm	Hole Angle: -90°	Eastings: 305988.7	Surface R.L.: 8.08mAHD
Drill Model: Hydrapower Scout 300	Drill Fluid: Pac L + CRP60	Bearing: NA	Northing: 6186586.3	Ref. System: GDA94 / MGA56

Method	Casing	Drill Rate (min/m)	RL (mAHD)	Depth (m)	Geological Unit	Graphic Log	Material Description	Moisture Condition	Weathering / Cementation	Consistency / Strength	Defect Spacing (mm)			Core Run No.	TCR / SCR (%)	RQD (%)	Sample / Test	Field Records / Comments and Defect Description																					
											20	60	200																										
SOLID AUGER	HWT	NA	8.0	7.5	FILL		FILL: Gravelly SAND: Fine to medium grained, sub-angular to sub-rounded, coal, quartz, dark grey, black; fine to coarse gravel, sub-angular to sub-rounded, coal, slag, lithic fragments, trace cobbles.	D-M	Uc	MD				NA	NA	NA			Environmental sample taken																				
																				WASH BORE	NA	6.5	6.0	FILL		...trace steel fragments to 80 mm thick	M	NA				NA	NA	NA		SPT 6,16,13 N=29	SPT: Recovered 400 mm		
																																						SPTs attempted at 3.0m, 3.5m and 4.5m; Refusal without any penetration, refusal inferred on cobbles	
																																							SPTs attempted at 3.0m, 3.5m and 4.5m; Refusal without any penetration, refusal inferred on cobbles

# BOREHOLE LOG



**WorleyParsons**

BOREHOLE: **BH-17**

SHEET: 2 OF 5

CLIENT: **Australian Industrial Energy**  
 PROJECT: **Port Kembla Gas Terminal Project**  
 LOCATION: **Port Kembla, NSW**  
 JOB NUMBER: **401010-01496**

DATE COMMENCED: **5.9.2018**  
 DATE COMPLETED: **7.9.2018**  
 LOGGED BY: **BO**  
 REVISION: **A**

Drill Contractor: BG Drilling    Bore Size: 96 mm    Hole Angle: -90°    Easting: 305988.7    Surface R.L.: 8.08mAHD  
 Drill Model: Hydrapower Scout 300    Drill Fluid: Pac L + CRP60    Bearing: NA    Northing: 6186586.3    Ref. System: GDA94 / MGA56

Method	Casing	Drill Rate (min/m)	RL (mAHD)	Depth (m)	Geological Unit	Graphic Log	Material Description	Moisture Condition	Weathering / Cementation	Consistency / Strength	Defect Spacing (mm)	Core Run No.	TCR / SCR (%)	RQD (%)	Sample / Test	Field Records / Comments and Defect Description																		
WASH BORE	HWT	NA	3.0		FILL		FILL: Silty GRAVEL: Fine to coarse grained, angular, slag, lithics, grey/black, non-plastic silt; with sand; trace to with cobbles of slag, lithics and steel.	NA	Uc	MD	20 60 200 600 2000																							
			5.5																															
			6.0		ALLUVIUM		CLAY (CI-OI): Medium plasticity, potentially organic, black; trace fine grained sand.	NA			S								SPT 1.0,0 N=0	SPT: No recovery														
			6.5																Casing advanced to 5.0 m															
			7.0																															
			7.5																														Environmental sample taken at 7.5 m	
			8.0																														SPT 0.0,0 N=0	SPT: HW, Recovered 450 mm
			8.5																															
			9.0																															
			9.5																															SPT 0.0,0 N=0
10.0						...trace / with shell fragments at bottom of SPT, up to medium gravel size																												

# BOREHOLE LOG



**WorleyParsons**

BOREHOLE: **BH-17**

SHEET: 3 OF 5

CLIENT: **Australian Industrial Energy**  
 PROJECT: **Port Kembla Gas Terminal Project**  
 LOCATION: **Port Kembla, NSW**  
 JOB NUMBER: **401010-01496**

DATE COMMENCED: **5.9.2018**  
 DATE COMPLETED: **7.9.2018**  
 LOGGED BY: **BO**  
 REVISION: **A**

Drill Contractor: BG Drilling      Bore Size: 96 mm      Hole Angle: -90°      Easting: 305988.7      Surface R.L.: 8.08mAHD  
 Drill Model: Hydapower Scout 300      Drill Fluid: Pac L + CRP60      Bearing: NA      Northing: 6186586.3      Ref. System: GDA94 / MGA56

Method	Casing	Drill Rate (min/m)	RL (mAHD)	Depth (m)	Geological Unit	Graphic Log	Material Description	Moisture Condition	Weathering / Cementation	Consistency / Strength	Defect Spacing (mm)			Core Run No.	TCR / SCR (%)	RQD (%)	Sample / Test	Field Records / Comments and Defect Description			
											20	60	200								
WASH BORE	HWT		-2.0		ALLUVIUM		CLAY (Cl): Medium plasticity, pale blue-grey mottled orange-brown, with pockets of fine grained sand, trace decomposing rootlets.	NA	Uc	St											
			10.5																		
		-2.5																			
		11.0																			
OPEN HOLE	NA		-3.0																		
			11.5																		
			-3.5																		
			12.0																		
			-4.0																		
			12.5																		
			-4.5																		
			13.0																		
			-5.0																		
			13.5																		
			-5.5																		
			14.0																		
			-6.0																		
			14.5																		
			-6.5																		
			15.0																		

# BOREHOLE LOG



**WorleyParsons**

BOREHOLE: **BH-17**

SHEET: 4 OF 5

CLIENT: **Australian Industrial Energy**  
 PROJECT: **Port Kembla Gas Terminal Project**  
 LOCATION: **Port Kembla, NSW**  
 JOB NUMBER: **401010-01496**

DATE COMMENCED: **5.9.2018**  
 DATE COMPLETED: **7.9.2018**  
 LOGGED BY: **BO**  
 REVISION: **A**

Drill Contractor: BG Drilling    Bore Size: 96 mm    Hole Angle: -90°    Easting: 305988.7    Surface R.L.: 8.08mAHD  
 Drill Model: Hydrapower Scout 300    Drill Fluid: Pac L + CRP60    Bearing: NA    Northing: 6186586.3    Ref. System: GDA94 / MGA56

Method	Casing	Drill Rate (min/m)	RL (mAHD)	Depth (m)	Geological Unit	Graphic Log	Material Description	Moisture Condition	Weathering / Cementation	Consistency / Strength	Defect Spacing (mm)	Core Run No.	TCR / SCR (%)	RQD (%)	Sample / Test	Field Records / Comments and Defect Description										
WASH BORE	NA	NA	-7.0		ALLUVIUM		Sandy CLAY (Cl): Medium plasticity, pale grey-orange brown; fine to medium grained sand, sub-angular to sub-rounded, quartz; with gravel, Fine to coarse grained, sub-angular, iron-oxide nodules.	NA	Uc	VSt		NA	NA	NA	SPT 5,9,10 N=19	SPT: Recovered 450 mm										
			-7.5																							
OPEN HOLE	NA	NA	-8.0		SHOALHAVEN GROUP		Clayey SILT (ML): Low plasticity, pale grey-white, mottled orange-brown, with gravel of iron-oxide nodules, with lenses of low plasticity sandy clay up to 10 mm thick (sand is fine to medium grained, sub-rounded to rounded, quartz).	RS	Hd			NA	NA	NA	SPT 10,20,35 N=55	SPT: Recovered 450 mm										
			-8.5																							
HQ3	NR	NR	-9.0		SHOALHAVEN GROUP		...decrease in orange-brown mottling	CL	CL	VSt		1	89 / 74	49	SPT 16,5/10mm N=R	SPT: HB										
			-9.5				...becoming laminated, rock fabric slightly visible																			
			-10.0				Sandy MUDSTONE: Grey, with brown (iron-oxide) banding; fine grained sand, sub-angular to rounded, quartz. ...18.3-18.35 m: Sandy CLAY								XW	VSt										
			-10.5				...18.6-18.65 m: Sandy CLAY ...18.65-18.70 m: Clayey SILT								HW	VL-L										
			-11.0				...18.9-19.0 m and 19.1-19.2 m: with bands of sandy clay to 25 mm thick ...grey, with lenticular laminations of dark grey claystone to 2 mm thick								MW	L									B, 45°, Pl, R, Cl, Fi, 2 mm J, 20°, Un, R, Fe, Co	
			-11.5				...19.7-19.9 m: with medium strength bands of increased weathering up to 60 mm thick around defects								XW	VSt									J, 40°, Un, R, Fe, Co	
			20.0												HW-MW	L									J, 40°, Un, R, Fe, Co	
															HW	VL										J, 15°, Un, R, Fe, Si, Co J, 15°, Un, R, Gr, Fi, 10 mm
															HW-MW	L										B, 15°, Un, R, Fe, Co
															HW	VL-L										B, 10°, Un, R, Su B, 10°, Un, SR, Su J, 10°, Un, SR, Cl, Vn
			MW-SW	L-M																						
			SW-FR	H																						
			SW	M-H																						
			SW-FR	H																						

# BOREHOLE LOG



**WorleyParsons**

BOREHOLE: **BH-17**

SHEET: 5 OF 5

CLIENT: **Australian Industrial Energy**  
 PROJECT: **Port Kembla Gas Terminal Project**  
 LOCATION: **Port Kembla, NSW**  
 JOB NUMBER: **401010-01496**

DATE COMMENCED: **5.9.2018**  
 DATE COMPLETED: **7.9.2018**  
 LOGGED BY: **BO**  
 REVISION: **A**

Drill Contractor: BG Drilling      Bore Size: 96 mm      Hole Angle: -90°      Easting: 305988.7      Surface R.L.: 8.08mAHD  
 Drill Model: Hydrapower Scout 300      Drill Fluid: Pac L + CRP60      Bearing: NA      Northing: 6186586.3      Ref. System: GDA94 / MGA56

Method	Casing	Drill Rate (min/m)	RL (mAHD)	Depth (m)	Geological Unit	Graphic Log	Material Description	Moisture Condition	Weathering / Cementation	Consistency / Strength	Defect Spacing (mm)	Core Run No.	TCR / SCR (%)	RQD (%)	Sample / Test	Field Records / Comments and Defect Description
HQ3	OPEN HOLE	NR	-12.0				Sandy MUDSTONE: Grey; fine grained sand, sub-angular to rounded, quartz, with lenticular laminations of dark grey claystone to 2 mm thick.	NA	SW-FR	H		1	89 / 74	49		M J, 30°, Un, R, Su Core loss (dropped from lifter)
			20.5				End of BH-17 at 20.4m									
			-12.5													
			21.0													
			-13.0													
			21.5													
			-13.5													
			22.0													
			-14.0													
			22.5													
			-14.5													
			23.0													
			-15.0													
			23.5													
			-15.5													
			24.0													
			-16.0													
			24.5													
			-16.5													
			25.0													

# CORE PHOTOGRAPHS



## WorleyParsons

BOREHOLE: **BH-17**

SHEET: 1 OF 1

CLIENT: **Australian Industrial Energy**  
PROJECT: **Port Kembla Gas Terminal Project**  
LOCATION: **Port Kembla, NSW**  
JOB NUMBER: **401010-01496**

DATE COMMENCED: **5.9.2018**  
DATE COMPLETED: **7.9.2018**  
LOGGED BY: **BO**

Drill Contractor:	BG Drilling	Bore Size:	96 mm	Hole Angle:	-90°	Easting:	305988.7	Surface R.L.:	8.08mAHD
Drill Model:	Hydrapower Scout 300	Drill Fluid:	Pac L + CRP60	Bearing:	NA	Northing:	6186586.3	Ref. System:	GDA94 / MGA56



18.16 to 20.40 m

# BOREHOLE LOG



## WorleyParsons

BOREHOLE: **BH-18**

SHEET: 1 OF 3

CLIENT: **Australian Industrial Energy**  
 PROJECT: **Port Kembla Gas Terminal Project**  
 LOCATION: **Port Kembla, NSW**  
 JOB NUMBER: **401010-01496**

DATE COMMENCED: **3.10.2018**  
 DATE COMPLETED: **4.10.2018**  
 LOGGED BY: **ACE**  
 REVISION: **A**

Drill Contractor: BG Drilling      Bore Size: 96 mm      Hole Angle: -90°      Easting: 305455.6      Surface R.L.: 3.75mAHD  
 Drill Model: Hydrapower Scout 300      Drill Fluid: Pac L + CRP60      Bearing: NA      Northing: 6186555.0      Ref. System: GDA94 / MGA56

Method	Casing	Drill Rate (min/m)	RL (mAHD)	Depth (m)	Geological Unit	Graphic Log	Material Description	Moisture Condition	Weathering / Cementation	Consistency / Strength	Defect Spacing (mm)			Core Run No.	TCR / SCR (%)	RQD (%)	Sample / Test	Field Records / Comments and Defect Description								
											20	60	200													
SOLID AUGER	HWT	NA		3.5	FILL		FILL: Sandy GRAVEL: Fine to coarse grained, angular to sub-angular, lithics; black; sand, fine to coarse grained, angular to sub-rounded, lithics and quartz; with silt (coal fines).	D	Uc	MD-D?				NA	NA	NA	SPT 3,3,2 N=5	Upper Fill logged from cuttings  Density inferred from difficult augering								
				3.0																						
				2.5																						
				2.0							L															
				2.0																						
			2.0	ALLUVIUM		Organic CLAY (OH): High plasticity, dark grey to black; with sand, fine to medium grained, angular to sub-angular, quartz; with organics.	M		F				NA	NA	NA	SPT 2,10,12 N=22	SPT: Recovered 400 mm  Boundary inferred off auger									
			2.5							CLAY (CH): High plasticity, brown-grey; trace fine grained sand.																
			3.0																							
			3.5	SHOALHAVEN GROUP		...from 4.5 m: brown, mottled pale-grey; trace mica			Hd							SPT 20,20/90mm N=R	SPT: HB									
			4.0																							
			4.5																							
			5.0																							



# BOREHOLE LOG



## WorleyParsons

BOREHOLE: **BH-18**

SHEET: 2 OF 3

CLIENT: **Australian Industrial Energy**  
 PROJECT: **Port Kembla Gas Terminal Project**  
 LOCATION: **Port Kembla, NSW**  
 JOB NUMBER: **401010-01496**

DATE COMMENCED: **3.10.2018**  
 DATE COMPLETED: **4.10.2018**  
 LOGGED BY: **ACE**  
 REVISION: **A**

Drill Contractor: BG Drilling    Bore Size: 96 mm    Hole Angle: -90°    Easting: 305455.6    Surface R.L.: 3.75mAHD  
 Drill Model: Hydrapower Scout 300    Drill Fluid: Pac L + CRP60    Bearing: NA    Northing: 6186555.0    Ref. System: GDA94 / MGA56

Method	Casing	Drill Rate (min/m)	RL (mAHD)	Depth (m)	Geological Unit	Graphic Log	Material Description	Moisture Condition	Weathering / Cementation	Consistency / Strength	Defect Spacing (mm)			Core Run No.	TCR / SCR (%)	RQD (%)	Sample / Test	Field Records / Comments and Defect Description					
											20	60	200										
SOLID AUGER	HWT	NA	-1.5	5.5	SHOALHAVEN GROUP		CLAY (Cl): Medium plasticity, brown, mottled pale grey; with sand, fine to medium grained, sub-angular to sub-rounded, quartz and minor mica, weakly cemented.	M	RS	Hd													
			-2.0	6.0			...from 6.0 m: moderately well cemented, grey-brown	W	XW	Hd-VL										Water at 6.0 m on 03/10/2018 at 17:00 hours, SPT rod dip			
			-2.5	6.5																		SPT: HB SPT 10/90mm N=R	
			-3.0	7.0																			Inferred as Sandy CLAY from auger returns
			-3.5	7.5																			SPT: HB SPT 15/150mm N=R
			-4.0	8.0																			
			-4.5	8.5																			
			-5.0	9.0																			
			-5.5	9.5			SILTSTONE (Inferred): Recovered as Sandy CLAY: Medium plasticity, pale-grey mottled orange; sand, fine to medium grained, sub-angular to sub-rounded, quartz and minor mica; trace fine grained gravel, sub-angular, lithics.	XW-HW?	VL-L?										SPT: HB; No recovery SPT 5/10mm N=R				
			-6.0	10.0																			

# BOREHOLE LOG



**WorleyParsons**

BOREHOLE: **BH-18**

SHEET: 3 OF 3

CLIENT: **Australian Industrial Energy**  
 PROJECT: **Port Kembla Gas Terminal Project**  
 LOCATION: **Port Kembla, NSW**  
 JOB NUMBER: **401010-01496**

DATE COMMENCED: **3.10.2018**  
 DATE COMPLETED: **4.10.2018**  
 LOGGED BY: **ACE**  
 REVISION: **A**

Drill Contractor: BG Drilling      Bore Size: 96 mm      Hole Angle: -90°      Easting: 305455.6      Surface R.L.: 3.75mAHD  
 Drill Model: Hydrapower Scout 300      Drill Fluid: Pac L + CRP60      Bearing: NA      Northing: 6186555.0      Ref. System: GDA94 / MGA56

Method	Casing	Drill Rate (min/m)	RL (mAHD)	Depth (m)	Geological Unit	Graphic Log	Material Description	Moisture Condition	Weathering / Cementation	Consistency / Strength	Defect Spacing (mm)	Core Run No.	TCR / SCR (%)	RQD (%)	Sample / Test	Field Records / Comments and Defect Description
SOLID AUGER	HWT	NA	-6.5	10.5	SHOALHAVEN GROUP		SILTSTONE (Inferred): Recovered as Sandy CLAY: Medium plasticity, pale-grey mottled orange; sand, fine to medium grained, sub-angular to sub-rounded, quartz and minor mica; trace fine grained gravel, sub-angular, lithics.	W	XW-HW?	VL-L?		NA	NA	NA		10.5-12.0 m: Very slow augering, rock
			-7.0	11.0												
HQ3 OPEN HOLE	NR	21	-8.5	12.5	SHOALHAVEN GROUP		Sandy SILTSTONE: Fine grained, dark grey, speckled and streaked grey, laminated; with inclusions, 3 mm to 15 mm in diameter, angular to rounded, lithics.	NA	SW	M		1	100 / 96	75		12.08, 12.1, 12.14 and 12.2 m: XW Seam, Ir, Vr, clay infill, 5-10 mm XW Seam, Ir, Vr, Clay infill, 25 mm
			-9.0	13.0												
			-10.5	14.5			...from 14.8-15.0 m: mineral veining associated with healed joint; white, calcite?					2	100 / 100	100		
			-11.0	15.0			...At 15.0 m: granitic inclusions, ~20 mm in diameter, angular to sub-angular									End of BH-18 at 15m

# CORE PHOTOGRAPHS



# WorleyParsons

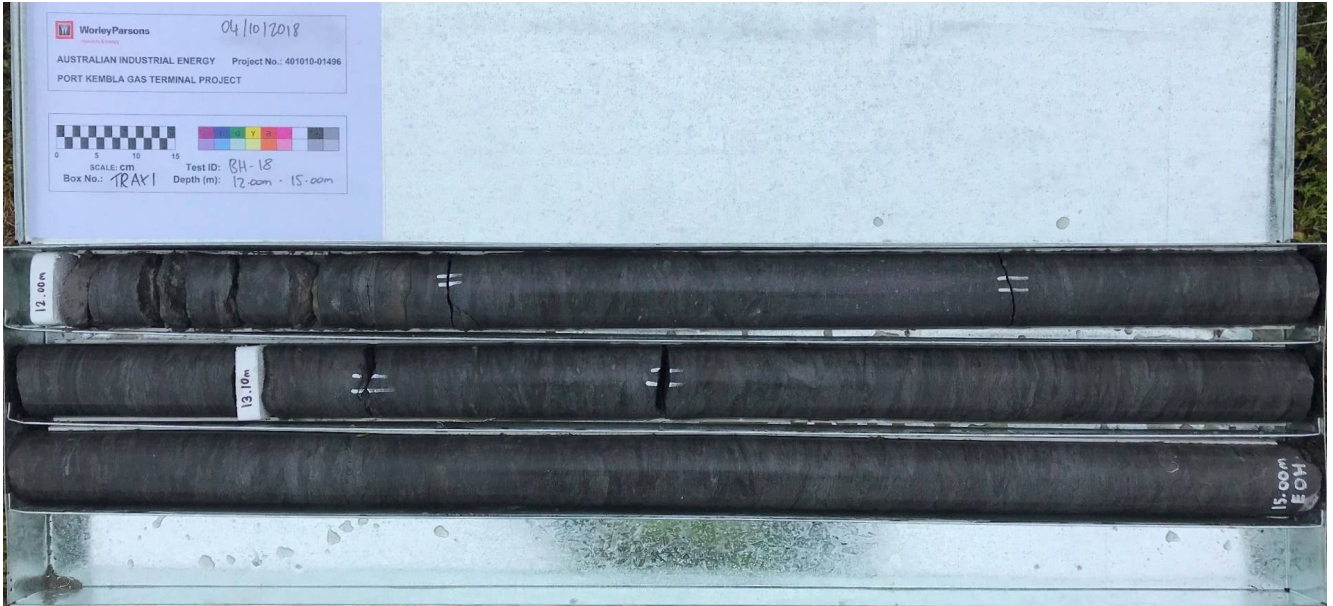
BOREHOLE: **BH-18**

SHEET: 1 OF 1

CLIENT: **Australian Industrial Energy**  
PROJECT: **Port Kembla Gas Terminal Project**  
LOCATION: **Port Kembla, NSW**  
JOB NUMBER: **401010-01496**

DATE COMMENCED: **3.10.2018**  
DATE COMPLETED: **4.10.2018**  
LOGGED BY: **ACE**

Drill Contractor:	BG Drilling	Bore Size:	96 mm	Hole Angle:	-90°	Easting:	305455.6	Surface R.L.:	3.75mAHD
Drill Model:	Hydrapower Scout 300	Drill Fluid:	Pac L + CRP60	Bearing:	NA	Northing:	6186555.0	Ref. System:	GDA94 / MGA56



12.00 to 15.00 m

# BOREHOLE LOG



**WorleyParsons**

BOREHOLE: **BH-19**

SHEET: 1 OF 3

CLIENT: **Australian Industrial Energy**  
 PROJECT: **Port Kembla Gas Terminal Project**  
 LOCATION: **Port Kembla, NSW**  
 JOB NUMBER: **401010-01496**

DATE COMMENCED: **2.10.2018**  
 DATE COMPLETED: **3.10.2018**  
 LOGGED BY: **ACE**  
 REVISION: **A**

Drill Contractor: BG Drilling      Bore Size: 96 mm      Hole Angle: -90°      Easting: 305360.6      Surface R.L.: 6.26mAHD  
 Drill Model: Hydrapower Scout 300      Drill Fluid: Pac L + CRP60      Bearing: NA      Northing: 6186566.4      Ref. System: GDA94 / MGA56

Method	Casing	Drill Rate (min/m)	RL (mAHD)	Depth (m)	Geological Unit	Graphic Log	Material Description	Moisture Condition	Weathering / Cementation	Consistency / Strength	Defect Spacing (mm)			Core Run No.	TCR / SCR (%)	RQD (%)	Sample / Test	Field Records / Comments and Defect Description					
											20	60	200										
SOLID AUGER	HWT	NA		6.0	FILL		FILL: Sandy GRAVEL: Fine to medium grained, angular to sub-angular, lithics, dark brown to black; sand, fine to coarse grained, angular to sub-rounded, lithics; with sandy clay nodules (<20 mm), medium to high plasticity, dark brown; with silt, coal fines.	D	Uc	MD-D?								Gravelly augering conditions to 1.0 m 0.0-1.0 m: logged cuttings from solid auger					
				0.5																			
				5.5																			
				1.0																			Driller noted easy drilling
SOLID AUGER	HWT	NA		5.0	ALLUVIUM		Organic CLAY (OI): Medium plasticity, black; with sand, fine to coarse grained, angular to sub-angular, quartz; trace fine grained gravel, angular to sub-rounded, quartz.	M		S													
				1.5																			
				4.5																		SPT 1,2,4 N=6	
				2.0																		SPT: Recovered 500 mm; Initial 50 mm under hammer weight	
SOLID AUGER	HWT	NA		2.5	SHOALHAVEN GROUP		CLAY (CH): High plasticity, brown, speckled dark grey; trace fine grained sand, trace rootlets. ...from 1.7 m: no speckles, brown; no rootlets			F													
				4.0																			
				2.5																		Driller noted change in ground conditions at 2.5 m; Inferred alluvial / residual contact	
				3.5																			
SOLID AUGER	HWT	NA		3.0	SHOALHAVEN GROUP		CLAY (CI): Medium plasticity, pale grey streaked, grey and mottled orange-brown; with sand, fine grained.		RS	St													
				3.0																			
				3.5																		SPT 3,5,7 N=12	
				4.0																			SPT: Recovered 450 mm
SOLID AUGER	HWT	NA		4.5	SHOALHAVEN GROUP		CLAY (CI): Medium plasticity, pale grey streaked, grey and mottled orange-brown; with sand, fine grained.				Hd												
				4.5																		SPT: HB	
HQ3	OPEN HOLE	NR		1.5			...from 4.7 m: higher sand content, Sandy CLAY, weakly cemented Sandy CLAY (CI): See below.	NA	XW										SPT: HB Switched to HQ3 at 4.74 m, advanced HWT casing to 4.6 m				
				5.0										1	100 / 0	0			SPT 9,15,90mm N=R				

# BOREHOLE LOG



## WorleyParsons

BOREHOLE: **BH-19**

SHEET: 2 OF 3

**CLIENT:** Australian Industrial Energy  
**PROJECT:** Port Kembla Gas Terminal Project  
**LOCATION:** Port Kembla, NSW  
**JOB NUMBER:** 401010-01496

**DATE COMMENCED:** 2.10.2018  
**DATE COMPLETED:** 3.10.2018  
**LOGGED BY:** ACE  
**REVISION:** A

**Drill Contractor:** BG Drilling    **Bore Size:** 96 mm    **Hole Angle:** -90°    **Easting:** 305360.6    **Surface R.L.:** 6.26mAH D  
**Drill Model:** Hydapower Scout 300    **Drill Fluid:** Pac L + CRP60    **Bearing:** NA    **Northing:** 6186566.4    **Ref. System:** GDA94 / MGA56

Method	Casing	Drill Rate (min/m)	RL (mAH D)	Depth (m)	Geological Unit	Graphic Log	Material Description	Moisture Condition	Weathering / Cementation	Consistency / Strength	Defect Spacing (mm)				Core Run No.	TCR / SCR (%)	RQD (%)	Sample / Test	Field Records / Comments and Defect Description						
											20	60	200	600											
HQ3	OPEN HOLE	NR	NR	1.0	SHOALHAVEN GROUP		Sandy CLAY (CI): Medium plasticity, orange-brown, streaked grey, pale grey and mottled brown/red-brown; sand, fine to medium grained, sub-angular to sub-rounded, quartz; trace fine to medium grained gravel, angular to sub-angular, lithics, rock fabric visible (laminations and bedding structures), trace dark grey veining; trace localised ferricrete layers/nodules, 5 mm to 10 mm thick. ...At ~5.2 m: joint structure, extremely weathered calcite infill	NA	XW	Hd					1	100 / 0	0								
				5.5																					
				6.0							...At ~6.0 m: clay seam, high plasticity, pale grey (15 mm-35 mm thick)														
				6.5							Sandy SILTSTONE: Finely laminated, brown and orange-brown streaked grey, dark grey and pale grey, trace dark grey veining, 0° to 15° bedding planes; trace inclusions (<15 mm diameter), of extremely weathered lithics														
				7.0			7.0	7.0	NR	7.0		2	97 / 83	6											
				7.5			7.5	7.5	NR	7.5															
				8.0			8.0	8.0	NR	8.0													B, 5°, P, R, Vn, 1-2 mm		
				8.5			8.5	8.5	NR	8.5														B, 5°, P, R, Vn, 1-2 mm	
				9.0			9.0	9.0	NR	9.0														Core loss (bit blocked off)	
				9.5			9.5	9.5	NR	9.5														M	
				10.0			10.0	10.0	NR	10.0														J, 10-15°, Ir, R, Vn, 1-2 mm	
																									J, 10-15°, Ir, R, Vn, 1-2 mm
																									J, 10-15°, Ir, R, Vn, 1-2 mm
																									J, 10-15°, Ir, R, Vn, 1-2 mm
																									Core loss Bit blocked at 9.8 m

# BOREHOLE LOG



**WorleyParsons**

BOREHOLE: **BH-19**

SHEET: 3 OF 3

CLIENT: **Australian Industrial Energy**  
 PROJECT: **Port Kembla Gas Terminal Project**  
 LOCATION: **Port Kembla, NSW**  
 JOB NUMBER: **401010-01496**

DATE COMMENCED: **2.10.2018**  
 DATE COMPLETED: **3.10.2018**  
 LOGGED BY: **ACE**  
 REVISION: **A**

Drill Contractor: BG Drilling    Bore Size: 96 mm    Hole Angle: -90°    Easting: 305360.6    Surface R.L.: 6.26mAHD  
 Drill Model: Hydrapower Scout 300    Drill Fluid: Pac L + CRP60    Bearing: NA    Northing: 6186566.4    Ref. System: GDA94 / MGA56

Method	Casing	Drill Rate (min/m)	RL (mAHD)	Depth (m)	Geological Unit	Graphic Log	Material Description	Moisture Condition	Weathering / Cementation	Consistency / Strength	Defect Spacing (mm)	Core Run No.	TCR / SCR (%)	RQD (%)	Sample / Test	Field Records / Comments and Defect Description
HQ3	OPEN HOLE	NR	4.0		SHOALHAVEN GROUP		SILTSTONE: Dark grey, finely laminated, cross-bedded fabric present; trace inclusion (~10 mm), lithics, pale grey, sub-rounded; variable sand content.	NA	SW-FR	H	20 60 80 200 600 2000	4	100 / 100	56		Healed joint, iron stained, 90°, extends to 10.6 m
			10.5													M
			4.5													J, 80°, Ir, R, Cl / Si, Co
			11.0													J, 80°, P, R, Vn, Co
			5.0													J, 85°, P, Vr, Cl / Si, Fi, 1-2 mm
			11.5				...from 11.5-11.8 m: sub-vertical healed joint, iron staining (1-3 mm thick)									
			5.5													M
			12.0													M
			6.0													
			12.5													
			6.5													
			13.0									5	100 / 100	100		M
			7.0													
			13.5													
			7.5													
			14.0													
			8.0													
			14.5				End of BH-19 at 14.5m									
			8.5													
			15.0													

# CORE PHOTOGRAPHS



## WorleyParsons

BOREHOLE: **BH-19**

SHEET: 1 OF 2

CLIENT: **Australian Industrial Energy**  
PROJECT: **Port Kembla Gas Terminal Project**  
LOCATION: **Port Kembla, NSW**  
JOB NUMBER: **401010-01496**

DATE COMMENCED: **2.10.2018**  
DATE COMPLETED: **3.10.2018**  
LOGGED BY: **ACE**

Drill Contractor:	BG Drilling	Bore Size:	96 mm	Hole Angle:	-90°	Easting:	305360.6	Surface R.L.:	6.26mAHD
Drill Model:	Hydrapower Scout 300	Drill Fluid:	Pac L + CRP60	Bearing:	NA	Northing:	6186566.4	Ref. System:	GDA94 / MGA56



4.60 to 7.98 m



7.98 to 11.50 m

# CORE PHOTOGRAPHS



## WorleyParsons

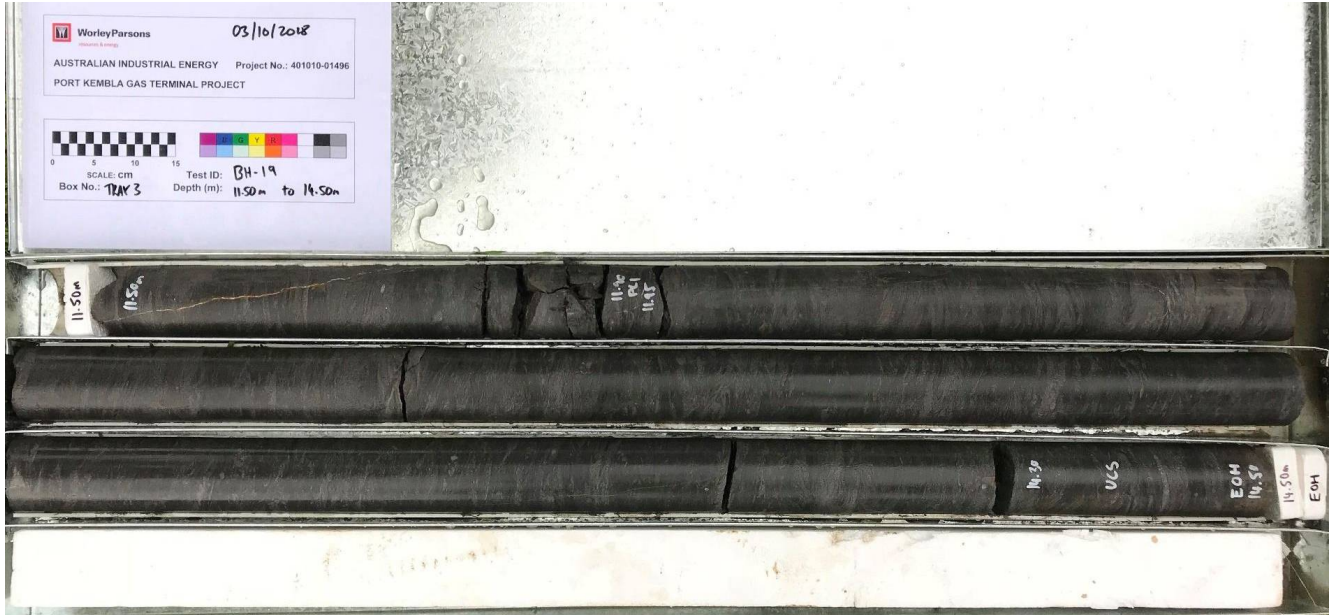
BOREHOLE: **BH-19**

SHEET: 2 OF 2

CLIENT: **Australian Industrial Energy**  
PROJECT: **Port Kembla Gas Terminal Project**  
LOCATION: **Port Kembla, NSW**  
JOB NUMBER: **401010-01496**

DATE COMMENCED: **2.10.2018**  
DATE COMPLETED: **3.10.2018**  
LOGGED BY: **ACE**

Drill Contractor:	BG Drilling	Bore Size:	96 mm	Hole Angle:	-90°	Easting:	305360.6	Surface R.L.:	6.26mAHD
Drill Model:	Hydrapower Scout 300	Drill Fluid:	Pac L + CRP60	Bearing:	NA	Northing:	6186566.4	Ref. System:	GDA94 / MGA56



11.50 to 14.50 m



# BOREHOLE LOG



## WorleyParsons

BOREHOLE: **BH-20**

SHEET: 1 OF 4

CLIENT: **Australian Industrial Energy**  
 PROJECT: **Port Kembla Gas Terminal Project**  
 LOCATION: **Port Kembla, NSW**  
 JOB NUMBER: **401010-01496**

DATE COMMENCED: **4.10.2018**  
 DATE COMPLETED: **5.10.2018**  
 LOGGED BY: **ACE**  
 REVISION: **A**

Drill Contractor: BG Drilling    Bore Size: 96 mm    Hole Angle: -90°    Easting: 305189.6    Surface R.L.: 6.85mAHD  
 Drill Model: Hydrapower Scout 300    Drill Fluid: Pac L + CRP60    Bearing: NA    Northing: 6186302.9    Ref. System: GDA94 / MGA56

Method	Casing	Drill Rate (min/m)	RL (mAHD)	Depth (m)	Geological Unit	Graphic Log	Material Description	Moisture Condition	Weathering / Cementation	Consistency / Strength	Defect Spacing (mm)	Core Run No.	TCR / SCR (%)	RQD (%)	Sample / Test	Field Records / Comments and Defect Description	
SOLID AUGER	HWT	NA	6.5	0.5	FILL		FILL: Gravelly SAND: Fine to coarse grained, angular to sub-angular, coal fragments, black to dark grey; gravel, fine to coarse grained, angular to sub-angular, coal; with silt (non-plastic coal fines).	D	Uc	MD	20 60 200 600 2000	NA	NA	NA	SPT 7,11,14 N=25	1.5-3.0 m: Slow augering	
							...gravel is fine to medium grained									SPT 12,11,7 N=18	SPT: Recovered 450 mm
							FILL: Sandy GRAVEL: Fine to coarse grained, angular to sub-angular, slag, pale grey, brown and blue grey; sand, fine to coarse grained, angular to sub-rounded, slag; with silt (non-plastic).										
							Organic CLAY (OL-OI): Low to medium plasticity, black; with fine grained sand; with organics (rootlets).	M-W	VS							SPT 2,0,0 N=0	SPT: Recovered 100 mm
			6.0	1.0													
			5.5	1.5													
			5.0	2.0													
			4.5	2.5													
			4.0	3.0													
			3.5	3.5													
			3.0	4.0													
			2.5	4.5													
			2.0	5.0	ALLUVIUM												
			1.5	5.5													
			1.0	6.0													
			0.5	6.5													

# BOREHOLE LOG



**WorleyParsons**

BOREHOLE: **BH-20**

SHEET: 2 OF 4

CLIENT: **Australian Industrial Energy**  
 PROJECT: **Port Kembla Gas Terminal Project**  
 LOCATION: **Port Kembla, NSW**  
 JOB NUMBER: **401010-01496**

DATE COMMENCED: **4.10.2018**  
 DATE COMPLETED: **5.10.2018**  
 LOGGED BY: **ACE**  
 REVISION: **A**

Drill Contractor: BG Drilling      Bore Size: 96 mm      Hole Angle: -90°      Easting: 305189.6      Surface R.L.: 6.85mAHD  
 Drill Model: Hydapower Scout 300      Drill Fluid: Pac L + CRP60      Bearing: NA      Northing: 6186302.9      Ref. System: GDA94 / MGA56

Method	Casing	Drill Rate (min/m)	RL (mAHD)	Depth (m)	Geological Unit	Graphic Log	Material Description	Moisture Condition	Weathering / Cementation	Consistency / Strength	Defect Spacing (mm)	Core Run No.	TCR / SCR (%)	RQD (%)	Sample / Test	Field Records / Comments and Defect Description	
SOLID AUGER	HWT	NA	1.5	5.5	ALLUVIUM		Organic CLAY (OL-OI): Low to medium plasticity, black; with fine grained sand; with organics (rootlets).	M-W	Uc	VS	20 60 200 600 2000						
			1.0	6.0	SHOALHAVEN GROUP		Sandy CLAY (Cl): Medium plasticity, orange-brown; sand, fine to medium grained, sub-angular to sub-rounded, quartz; trace fine grained gravel, sub-rounded to rounded, lithics; trace mica, weakly cemented to moderately well cemented.	D	RS-XW	Hd-VL							Driller noted change in drilling conditions; Residual clay on auger flights Auger jammed with overlying slag at 6m SPT: HB; Recovered 50 mm
			0.5	6.5										SPT 6/50mm N=R			
			0.0	7.0													
			-0.5	7.5												SPT: HB; Recovered 100 mm	
			-1.0	8.0													
			-1.5	8.5												7.5-9.0 m: Auger cuttings indicate consistent material	
			-2.0	9.0			...pale brown to pale orange-brown mottled grey and black; with black ferricrete nodules and lenses										
			-2.5	9.5												SPT: HB; Recovered 150 mm	
			-3.0	10.0													

# BOREHOLE LOG



**WorleyParsons**

BOREHOLE: **BH-20**

SHEET: 3 OF 4

CLIENT: **Australian Industrial Energy**  
 PROJECT: **Port Kembla Gas Terminal Project**  
 LOCATION: **Port Kembla, NSW**  
 JOB NUMBER: **401010-01496**

DATE COMMENCED: **4.10.2018**  
 DATE COMPLETED: **5.10.2018**  
 LOGGED BY: **ACE**  
 REVISION: **A**

Drill Contractor: BG Drilling    Bore Size: 96 mm    Hole Angle: -90°    Easting: 305189.6    Surface R.L.: 6.85mAHD  
 Drill Model: Hydrapower Scout 300    Drill Fluid: Pac L + CRP60    Bearing: NA    Northing: 6186302.9    Ref. System: GDA94 / MGA56

Method	Casing	Drill Rate (min/m)	RL (mAHD)	Depth (m)	Geological Unit	Graphic Log	Material Description	Moisture Condition	Weathering / Cementation	Consistency / Strength	Defect Spacing (mm)	Core Run No.	TCR / SCR (%)	RQD (%)	Sample / Test	Field Records / Comments and Defect Description	
											20 60 200 600 2000						
SOLID AUGER	HWT	NA	10.5	3.5	SHOALHAVEN GROUP		SILTSTONE (Inferred): Recovered as Sandy CLAY: Medium plasticity, pale grey mottled orange-brown, red-brown and orange; sand, fine to medium grained, sub-angular to sub-rounded, quartz and minor mica, very weakly cemented.	M	XW-HW?	VL-L?						SPT 10/70mm N=R	Soil/rock contact uncertain  SPT: HB; Recovered 100 mm
			11.0	4.0			Sandy CLAY (Cl): Medium plasticity, orange-brown mottled and banded dark-grey; sand, fine to medium grained, sub-angular to sub-rounded, quartz; trace fine to medium grained gravel, angular, lithics. ...12.0-12.16 m and 12.25-12.28 m, gravel and cobbles of highly weathered siltstone, very low strength	NA	XW	Hd-VL							Driller noted same drilling conditions from 10.5-12.0 m; Switch to HQ3; HWT casing advanced to 12m
			12.5	5.5			Sandy SILTSTONE: Dark grey streaked grey, minor orange staining; finely laminated, wavy fabric; with fine to medium gravel sized inclusions, angular to sub-angular, lithics. ...from ~12.86 m, no orange staining		SW	L-M				1	100 / 30	0	12.6-13.0 m: J, 90°, Ir/PI, VR, Co, Cl/Fe, Fi, 2-4 mm XW seam, 0°, 20-25 mm, Cl/Fe XW seam, 0°, 20-25 mm, Cl/Fe J, 0°, healed, iron stained J, 0°, healed, iron stained
HQ3	OPEN HOLE	NR	13.0	6.0				CL	CL							Core Loss (inferred XW clay seam)	
			13.5	6.5				FR	M-H				2	93 / 78	86	J, 40°, PI, VR, Cl, Vn M J, 45°, PI, VR, Cl, Vn	
			14.5	7.5										3	93 / 82	46	M Driller terminated run early as top plug wasn't installed on core-barrel
			15.0	8.0			...14.75-14.83 m, highly fractured zone, intersecting joints									J, 90°, PI, R, Cl, Vn M	

# BOREHOLE LOG



**WorleyParsons**

BOREHOLE: **BH-20**

SHEET: 4 OF 4

CLIENT: **Australian Industrial Energy**  
 PROJECT: **Port Kembla Gas Terminal Project**  
 LOCATION: **Port Kembla, NSW**  
 JOB NUMBER: **401010-01496**

DATE COMMENCED: **4.10.2018**  
 DATE COMPLETED: **5.10.2018**  
 LOGGED BY: **ACE**  
 REVISION: **A**

Drill Contractor: BG Drilling      Bore Size: 96 mm      Hole Angle: -90°      Easting: 305189.6      Surface R.L.: 6.85mAHD  
 Drill Model: Hydrapower Scout 300      Drill Fluid: Pac L + CRP60      Bearing: NA      Northing: 6186302.9      Ref. System: GDA94 / MGA56

Method	Casing	Drill Rate (min/m)	RL (mAHD)	Depth (m)	Geological Unit	Graphic Log	Material Description	Moisture Condition	Weathering / Cementation	Consistency / Strength	Defect Spacing (mm)			Core Run No.	TCR / SCR (%)	RQD (%)	Sample / Test	Field Records / Comments and Defect Description
											20	60	200					
HQ3	OPEN HOLE	NR	-8.5	15.5	SHOALHAVEN GROUP		Sandy SILTSTONE: Dark grey streaked grey, minor orange staining; finely laminated, wavy fabric; with fine to medium gravel sized inclusions, angular to sub-angular, lithics.	NA	FR	M-H		3	93 / 82	46			B, 5-10°, Un-Ir, VR-R, Su B, 5-10°, Un-Ir, VR-R, Su B, 5-10°, Un-Ir, VR-R, Su J, Ir-Un, R, Cl, Fi, 2-3 mm M Core Loss (bit blocked)	
			-9.0	16.0			End of BH-20 at 15.8m											
			-9.5	16.5														
			-10.0	17.0														
			-10.5	17.5														
			-11.0	18.0														
			-11.5	18.5														
			-12.0	19.0														
			-12.5	19.5														
			-13.0	20.0														

# CORE PHOTOGRAPHS



## WorleyParsons

BOREHOLE: **BH-20**

SHEET: 1 OF 1

CLIENT: **Australian Industrial Energy**  
PROJECT: **Port Kembla Gas Terminal Project**  
LOCATION: **Port Kembla, NSW**  
JOB NUMBER: **401010-01496**

DATE COMMENCED: **4.10.2018**  
DATE COMPLETED: **5.10.2018**  
LOGGED BY: **ACE**

Drill Contractor:	BG Drilling	Bore Size:	96 mm	Hole Angle:	-90°	Easting:	305189.6	Surface R.L.:	6.85mAHD
Drill Model:	Hydrapower Scout 300	Drill Fluid:	Pac L + CRP60	Bearing:	NA	Northing:	6186302.9	Ref. System:	GDA94 / MGA56



12.00 to 15.80 m

# BOREHOLE LOG



# WorleyParsons

BOREHOLE: **BH-21**

SHEET: 1 OF 4

CLIENT: **Australian Industrial Energy**  
 PROJECT: **Port Kembla Gas Terminal Project**  
 LOCATION: **Port Kembla, NSW**  
 JOB NUMBER: **401010-01496**

DATE COMMENCED: **10.9.2018**  
 DATE COMPLETED: **11.9.2018**  
 LOGGED BY: **DO**  
 REVISION: **A**

Drill Contractor: BG Drilling      Bore Size: 96 mm      Hole Angle: -90°      Easting: 305022.3      Surface R.L.: 4.42m AHD  
 Drill Model: Hanjin D&B      Drill Fluid: Pac L + CRP60      Bearing: NA      Northing: 6186212.2      Ref. System: GDA94 / MGA56

Method	Casing	Drill Rate (min/m)	RL (mAHD)	Depth (m)	Geological Unit	Graphic Log	Material Description	Moisture Condition	Weathering / Cementation	Consistency / Strength	Defect Spacing (mm)	Core Run No.	TCR / SCR (%)	RQD (%)	Sample / Test	Field Records / Comments and Defect Description		
											20 60 200 600 2000							
SOLID AUGER	HWT	NA		4.0	FILL		FILL: Silty SAND: Fine to coarse grained, sub-angular to sub-rounded, quartz, some lithics, brown-dark brown; non-plastic to low plasticity silt; trace fine to coarse gravel of crushed rock; with clumps of medium plasticity clayey sand and sandy clay.	M	Uc	L								
				3.5			CLAY (CI-O): Medium plasticity, partly organic, black; with fine grained sand.			F						Environmental sample taken at 1.3 m from auger flight		
				3.0												SPT 2.4,10 N=14	SPT: Recovered 120 mm	
				2.5														
				2.0							M-W							
				2.0	ALLUVIUM													
				1.5			CLAYEY SAND (SC): Fine grained, sub-angular to sub-rounded, quartz, grey, some brown patches; low to medium plasticity clay (high fines content, tending to sandy clay).			MD						SPT 3.7,9 N=76	SPT: Recovered 300 mm	
				1.0			...trace fine grained gravel of weakly cemented ferruginous nodules											
				0.5														
				0.0			Sandy CLAY (CI-CH): Medium to high plasticity, dark grey-black; fine grained sand, sub-angular to sub-rounded, quartz, trace fine gravel sized iron cemented nodules.			St								
				0.0												SPT 4.5,7 N=12	SPT: Recovered 370 mm	
				-0.5														
				5.0														

# BOREHOLE LOG



**WorleyParsons**

BOREHOLE: **BH-21**

SHEET: 2 OF 4

CLIENT: **Australian Industrial Energy**  
 PROJECT: **Port Kembla Gas Terminal Project**  
 LOCATION: **Port Kembla, NSW**  
 JOB NUMBER: **401010-01496**

DATE COMMENCED: **10.9.2018**  
 DATE COMPLETED: **11.9.2018**  
 LOGGED BY: **DO**  
 REVISION: **A**

Drill Contractor: BG Drilling      Bore Size: 96 mm      Hole Angle: -90°      Easting: 305022.3      Surface R.L.: 4.42mAH  
 Drill Model: Hanjin D&B      Drill Fluid: Pac L + CRP60      Bearing: NA      Northing: 6186212.2      Ref. System: GDA94 / MGA56

Method	Casing	Drill Rate (min/m)	RL (mAH)	Depth (m)	Geological Unit	Graphic Log	Material Description	Moisture Condition	Weathering / Cementation	Consistency / Strength	Defect Spacing (mm)	Core Run No.	TCR / SCR (%)	RQD (%)	Sample / Test	Field Records / Comments and Defect Description
SOLID AUGER	HWT	NA	-1.0	5.5	ALLUVIUM		Sandy CLAY (CI-CH): Medium to high plasticity, dark grey-black; fine grained sand, sub-angular to sub-rounded, quartz, trace fine grained gravel sized iron oxide cemented nodules.	W	Uc	St	20 60 200 600 2000	NA	NA	NA	SPT 3,5,5 N=70	Water at 5.2 m on 10/09/2018 at 2.15 PM
				-1.5			6.0	...medium plasticity, grey-dark grey; increase in sand content; gravel absent	MD	SPT 5,7,8 N=15	SPT: Recovered 470 mm; Environmental sample taken					
SOLID AUGER	NA	NA	-2.0	6.5	ALLUVIUM		Clayey SAND (SC): Fine to medium grained, sub-angular to sub-rounded, quartz, grey, some brown (iron oxide) patches; low plasticity clay; locally silty sand with clay.	MD			SPT 5,7,8 N=15	SPT: Recovered 400 mm				
				-2.5					7.0	SPT 30/120mm N=R		SPT: HB; Recovered 110 mm; Environmental sample taken				
SOLID AUGER	OPEN HOLE	NA	-3.0	7.5	SHOALHAVEN GROUP		Clayey SANDSTONE: Fine to medium grained, sub-angular to sub-rounded, quartz, brown, iron oxide cemented clayey matrix.	Wk-Mwk	VL-L?		HW?		SPT 30/120mm N=R	NA	NA	SPT 30/120mm N=R
				-3.5			8.0	SPT 30/120mm N=R	SPT: HB; Recovered 110 mm; Environmental sample taken							
SOLID AUGER	OPEN HOLE	NA	-4.0	8.5	SHOALHAVEN GROUP		Sandy SILTSTONE: Grey, fine grained sand, sub-angular to sub-rounded, quartz, with lenticular beds of dark grey; claystone up to 2 mm thick.			HW?	SPT 30/120mm N=R	SPT: HB; Recovered 110 mm; Environmental sample taken				
				-4.5				9.0	SPT 30/120mm N=R				SPT: HB; Recovered 110 mm; Environmental sample taken			
SOLID AUGER	OPEN HOLE	NA	-5.0	9.5	SHOALHAVEN GROUP		Sandy SILTSTONE: Grey, fine grained sand, sub-angular to sub-rounded, quartz, with lenticular beds of dark grey; claystone up to 2 mm thick.	HW?		SPT 30/120mm N=R	SPT: HB; Recovered 110 mm; Environmental sample taken					
				-5.5					10.0			SPT 30/120mm N=R	SPT: HB; Recovered 110 mm; Environmental sample taken			

# BOREHOLE LOG



**WorleyParsons**

BOREHOLE: **BH-21**

SHEET: 3 OF 4

CLIENT: **Australian Industrial Energy**  
 PROJECT: **Port Kembla Gas Terminal Project**  
 LOCATION: **Port Kembla, NSW**  
 JOB NUMBER: **401010-01496**

DATE COMMENCED: **10.9.2018**  
 DATE COMPLETED: **11.9.2018**  
 LOGGED BY: **DO**  
 REVISION: **A**

Drill Contractor: BG Drilling      Bore Size: 96 mm      Hole Angle: -90°      Easting: 305022.3      Surface R.L.: 4.42mAHD  
 Drill Model: Hanjin D&B      Drill Fluid: Pac L + CRP60      Bearing: NA      Northing: 6186212.2      Ref. System: GDA94 / MGA56

Method	Casing	Drill Rate (min/m)	RL (mAHD)	Depth (m)	Geological Unit	Graphic Log	Material Description	Moisture Condition	Weathering / Cementation	Consistency / Strength	Defect Spacing (mm)			Core Run No.	TCR / SCR (%)	RQD (%)	Sample / Test	Field Records / Comments and Defect Description																
											20	60	200																					
HQ3 OPEN HOLE	58	NR	10.5	-6.0	SHOALHAVEN GROUP		Sandy SILTSTONE: Grey, fine grained sand, sub-angular to sub-rounded, quartz, with lenticular beds of dark grey; claystone up to 2 mm thick.	NA	SW	M	200	200	200	1	100 / 100	100	M	10.1 and 10.52 m: Spin																
				-6.5															M	10.3-10.5 m: Healed joint, 75°, Un, Ca, Co														
				-7.0																	M	B, 10°, Un, R, Su												
				-7.5																			M	B/J, 30°, Un, R, Su										
				-8.0																					M	B/J, 35°, Un, R, Su								
				-8.5																							M	M						
				-9.0																									M	M				
				-9.5																											M	M		
				-10.0																													M	B/J, 15°, Un, R, Cn
				-10.5																														
11.0	M	M																																
11.5			M	M																														
12.0					M	M																												
12.5							M	M																										
13.0									M	M																								
13.5											M	M																						
14.0													M	M																				
14.5															M	M																		
15.0																	M	M																



# BOREHOLE LOG



## WorleyParsons

BOREHOLE: **BH-21**

SHEET: 4 OF 4

CLIENT: **Australian Industrial Energy**  
 PROJECT: **Port Kembla Gas Terminal Project**  
 LOCATION: **Port Kembla, NSW**  
 JOB NUMBER: **401010-01496**

DATE COMMENCED: **10.9.2018**  
 DATE COMPLETED: **11.9.2018**  
 LOGGED BY: **DO**  
 REVISION: **A**

Drill Contractor: BG Drilling      Bore Size: 96 mm      Hole Angle: -90°      Easting: 305022.3      Surface R.L.: 4.42mAH  
 Drill Model: Hanjin D&B      Drill Fluid: Pac L + CRP60      Bearing: NA      Northing: 6186212.2      Ref. System: GDA94 / MGA56

Method	Casing	Drill Rate (min/m)	RL (mAH)	Depth (m)	Geological Unit	Graphic Log	Material Description	Moisture Condition	Weathering / Cementation	Consistency / Strength	Defect Spacing (mm)	Core Run No.	TCR / SCR (%)	RQD (%)	Sample / Test	Field Records / Comments and Defect Description		
HQ3	OPEN HOLE	43	-11.0	15.5	SHOALHAVEN GROUP		Sandy SILTSTONE: Grey, fine grained sand, sub-angular to sub-rounded, quartz, with lenticular beds of dark grey claystone up to ~2 mm thick.	NA	SW-FR	H		3	100 / 100	100	M	M	M	M
			-11.5	16.0			...increase in sand content, fine to medium grained; possible tending to sandy siltstone (to 18.5 m)										M	
		38	-12.0	16.5														
			-12.5	17.0														
			-13.0	17.5														
			-13.5	18.0														17.95, 18.95 and 19.3 m: Spin
			-14.0	18.5								4	100 / 100	100				M
			-14.5	19.0														B, 10°, Un, R, Cn
			-15.0	19.5			Silty SANDSTONE: Fine to medium grained, sub-angular to sub-rounded, quartz, some lithics, grey; silty matrix, with lenticular beds of dark grey claystone to ~2 mm thick; trace coarse grained sand and fine grained gravel of quartz.											
			-15.5	20.0			...sandy siltstone; fine grained sand											
				20.0			End of BH-21 at 19.9m											

# CORE PHOTOGRAPHS



## WorleyParsons

BOREHOLE: **BH-21**

SHEET: 1 OF 2

CLIENT: **Australian Industrial Energy**  
PROJECT: **Port Kembla Gas Terminal Project**  
LOCATION: **Port Kembla, NSW**  
JOB NUMBER: **401010-01496**

DATE COMMENCED: **10.9.2018**  
DATE COMPLETED: **11.9.2018**  
LOGGED BY: **DO**

Drill Contractor:	BG Drilling	Bore Size:	96 mm	Hole Angle:	-90°	Easting:	305022.3	Surface R.L.:	4.42mAHD
Drill Model:	Hanjin D&B	Drill Fluid:	Pac L + CRP60	Bearing:	NA	Northing:	6186212.2	Ref. System:	GDA94 / MGA56



10.00 to 14.00 m



14.00 to 17.95 m

# CORE PHOTOGRAPHS



# WorleyParsons

BOREHOLE: **BH-21**

SHEET: 2 OF 2

CLIENT: **Australian Industrial Energy**  
PROJECT: **Port Kembla Gas Terminal Project**  
LOCATION: **Port Kembla, NSW**  
JOB NUMBER: **401010-01496**

DATE COMMENCED: **10.9.2018**  
DATE COMPLETED: **11.9.2018**  
LOGGED BY: **DO**

Drill Contractor:	BG Drilling	Bore Size:	96 mm	Hole Angle:	-90°	Easting:	305022.3	Surface R.L.:	4.42mAHD
Drill Model:	Hanjin D&B	Drill Fluid:	Pac L + CRP60	Bearing:	NA	Northing:	6186212.2	Ref. System:	GDA94 / MGA56



17.95 to 19.90 m

# BOREHOLE LOG



## WorleyParsons

BOREHOLE: **BH-22**

SHEET: 1 OF 4

CLIENT: **Australian Industrial Energy**  
 PROJECT: **Port Kembla Gas Terminal Project**  
 LOCATION: **Port Kembla, NSW**  
 JOB NUMBER: **401010-01496**

DATE COMMENCED: **8.10.2018**  
 DATE COMPLETED: **9.10.2018**  
 LOGGED BY: **AK**  
 REVISION: **A**

Drill Contractor: BG Drilling    Bore Size: 96 mm    Hole Angle: -90°    Easting: 304709.7    Surface R.L.: 9.35mAHD  
 Drill Model: Hydrapower Scout 300    Drill Fluid: Pac L + CRP60    Bearing: NA    Northing: 6186223.5    Ref. System: GDA94 / MGA56

Method	Casing	Drill Rate (min/m)	RL (mAHD)	Depth (m)	Geological Unit	Graphic Log	Material Description	Moisture Condition	Weathering / Cementation	Consistency / Strength	Defect Spacing (mm)			Core Run No.	TCR / SCR (%)	RQD (%)	Sample / Test	Field Records / Comments and Defect Description
											20	60	200					
SOLID AUGER	HWT	NA		9.0	FILL		FILL: Gravelly SAND: Fine to coarse grained, angular to sub-angular, coal, lithics, dark grey; gravel, fine to medium grained, angular to sub-angular, lithics, slag; with coal fines.	D-M	Uc	MD								Environmental jar sample taken at 1.0 m
				8.5														SPT 6,8,6 N=14
				8.0														SPT: Recovered 450 mm
				7.5														
				7.0						VL								
				6.5														
				6.0														SPT 2,1,2 N=3
				5.5														Environmental jar sample taken SPT: Recovered 450 mm
				5.0			FILL: Sandy GRAVEL: Fine to coarse grained, angular to sub-angular, coal, lithics, slag, dark grey; sand, fine to coarse grained, angular to sub-angular, lithics, coal; with coal fines.			L								
				4.5														SPT 2,3,6 N=9
				4.5														SPT: Recovered 450 mm
				5.0														

# BOREHOLE LOG



## WorleyParsons

BOREHOLE: **BH-22**

SHEET: 2 OF 4

CLIENT: **Australian Industrial Energy**  
 PROJECT: **Port Kembla Gas Terminal Project**  
 LOCATION: **Port Kembla, NSW**  
 JOB NUMBER: **401010-01496**

DATE COMMENCED: **8.10.2018**  
 DATE COMPLETED: **9.10.2018**  
 LOGGED BY: **AK**  
 REVISION: **A**

Drill Contractor: BG Drilling      Bore Size: 96 mm      Hole Angle: -90°      Easting: 304709.7      Surface R.L.: 9.35mAHD  
 Drill Model: Hydrapower Scout 300      Drill Fluid: Pac L + CRP60      Bearing: NA      Northing: 6186223.5      Ref. System: GDA94 / MGA56

Method	Casing	Drill Rate (min/m)	RL (mAHD)	Depth (m)	Geological Unit	Graphic Log	Material Description	Moisture Condition	Weathering / Cementation	Consistency / Strength	Defect Spacing (mm)	Core Run No.	TCR / SCR (%)	RQD (%)	Sample / Test	Field Records / Comments and Defect Description					
SOLID AUGER	HWT	NA		4.0	FILL	[Cross-hatched pattern]	FILL: Sandy GRAVEL: As above.	D-M	Uc	L											
				5.5	ALLUVIUM	[Diagonal hatching pattern]	CLAY (CI-CH): Medium to high plasticity; orange-brown mottled grey-brown; trace sand, fine to medium grained, sub-angular, quartz, lithics, some organics (rootlets).	M		St								Water at 5.2 m based on water mark on SPT rods after SPT at 6.0 m (inferred clay contact)			
				6.0			...with zones/patches of brown sandy clay								SPT 3,6,9 N=75	Environmental bag sample taken SPT: Recovered 450 mm					
				7.0																	
				7.5	ALLUVIUM	[Diagonal hatching pattern]	CLAY (CH): High plasticity, pale grey; trace sand, fine grained.												Environmental bag sample taken SPT: Recovered 450 mm		
				8.0																	
				8.5	SHOALHAVEN GROUP	[Diagonal hatching pattern]	Silty CLAY (CI): Medium plasticity, pale grey mottled orange-brown; with sand, fine to medium grained, sub-angular to sub-rounded, quartz, lithics; sandy clay in places; some iron oxide cemented (Wk-Mo) nodules.		RS	Hd											
				9.0																SPT 28,5/50mm N=R	SPT: HB; Recovered 200 mm
				9.5																	
				10.0				Sandy CLAY (CI): See below.					VSt								

# BOREHOLE LOG



**WorleyParsons**

BOREHOLE: **BH-22**

SHEET: 3 OF 4

CLIENT: **Australian Industrial Energy**  
 PROJECT: **Port Kembla Gas Terminal Project**  
 LOCATION: **Port Kembla, NSW**  
 JOB NUMBER: **401010-01496**

DATE COMMENCED: **8.10.2018**  
 DATE COMPLETED: **9.10.2018**  
 LOGGED BY: **AK**  
 REVISION: **A**

Drill Contractor: BG Drilling    Bore Size: 96 mm    Hole Angle: -90°    Easting: 304709.7    Surface R.L.: 9.35mAH  
 Drill Model: Hydrapower Scout 300    Drill Fluid: Pac L + CRP60    Bearing: NA    Northing: 6186223.5    Ref. System: GDA94 / MGA56

Method	Casing	Drill Rate (min/m)	RL (mAH)	Depth (m)	Geological Unit	Graphic Log	Material Description	Moisture Condition	Weathering / Cementation	Consistency / Strength	Defect Spacing (mm)	Core Run No.	TCR / SCR (%)	RQD (%)	Sample / Test	Field Records / Comments and Defect Description
SOLID AUGER	HWT	NA	10.5	10.5	SHOALHAVEN GROUP		Sandy CLAY (Cl): Medium plasticity; pale green-grey mottled orange-brown; sand, fine grained, sub-angular to sub-rounded, quartz; some iron oxide cemented nodules (Wk-Mo) to medium gravel size.	M	RS	VSt	20 60 200 600 2000	NA	NA	NA	SPT 4,9,18 N=27	Iron oxide cemented nodules possibly larger than medium gravel and broken by SPT
			11.0	11.0			...organic matter (bark/roots)	NA	NA	NA	SPT 12,12,18 N=30					Environmental jar sample SPT: Recovered 400 mm Casing advanced from 0-12.5 m after SPT, switch to wash boring
WASH BORE	OPEN HOLE	NA	12.5	12.5	SHOALHAVEN GROUP		...green-grey mottled orange-brown, with zones/patches of pale brown clayey sand (fine grained)	NA	NA	Hd	20 60 200 600 2000	NA	NA	NA	SPT 20,17,13 N=30	SPT: Recovered 350 mm
			14.5	14.5			CLAY (Cl): Medium plasticity, green-grey mottled red-brown and brown; with sand, fine grained, sub-angular to sub-rounded, quartz; with fine to coarse gravel sized iron oxide cemented nodules (Wk-Mo).	NA	NA	NA	NA				Driller noted ground becoming harder from 14.0-15.0 m	
			15.0	15.0												

# BOREHOLE LOG



**WorleyParsons**

BOREHOLE: **BH-22**

SHEET: 4 OF 4

CLIENT: **Australian Industrial Energy**  
 PROJECT: **Port Kembla Gas Terminal Project**  
 LOCATION: **Port Kembla, NSW**  
 JOB NUMBER: **401010-01496**

DATE COMMENCED: **8.10.2018**  
 DATE COMPLETED: **9.10.2018**  
 LOGGED BY: **AK**  
 REVISION: **A**

Drill Contractor: BG Drilling    Bore Size: 96 mm    Hole Angle: -90°    Easting: 304709.7    Surface R.L.: 9.35mAH  
 Drill Model: Hydapower Scout 300    Drill Fluid: Pac L + CRP60    Bearing: NA    Northing: 6186223.5    Ref. System: GDA94 / MGA56

Method	Casing	Drill Rate (min/m)	RL (mAHD)	Depth (m)	Geological Unit	Graphic Log	Material Description	Moisture Condition	Weathering / Cementation	Consistency / Strength	Defect Spacing (mm)	Core Run No.	TCR / SCR (%)	RQD (%)	Sample / Test	Field Records / Comments and Defect Description	
WASH BORE	NA	NA	-6.0	15.5	SHOALHAVEN GROUP		CLAY (Cl): Medium plasticity, green-grey mottled red-brown and brown; with sand, fine grained, sub-angular to sub-rounded, quartz; with fine to coarse gravel sized iron cemented nodules (Wk-Mo).	NA	RS	Hd	20 60 200 600 2000	NA	NA	NA	SPT 15/100mm N=R	SPT: HB; Recovered 80 mm	
			-6.5	16.0			Sandy SILTSTONE: Grey; sand, fine grained, sub-angular to sub-rounded, quartz, minor mafics; trace fine to medium, sub-rounded gravel inclusions; some healed joints/incipient fractures, typically dipping 10-40° and <1 to 2 mm wide with black infill (white infill in places); bedding evident in places, typically dipping 5-15° and <1 to 1 mm wide; granular texture.	HW?	L?		NA				NA	NA	Driller noted hard ground from 15.5 m (inferred as highly weathered / low strength rock), switch to coring at 16.05 m
			-7.0	16.5				SW-FR	H							B, 5°, Un, SR, Fe, Vn J, 60°, Pl, SR, Fe/Cl, Sd, Fi, 3 mm B, 2-10°, Pl-Un, S, Cl, Fi, 15 mm B, 0°, Pl, S, Fe/Cl, Fi, 2 mm	
OPEN HOLE	14	14	-7.5	17.0	SHOALHAVEN GROUP							1	100 / 86	81		M	
			-8.0	17.5				MW	L-M						M		
			-8.5	18.0				SW-FR	H					B, 8°, Un, SR, Ca, Su J, 25°, Pl, S-SR, Cl, Co B, 10°, Pl, SR, Ca/Cl, Vn M			
HQ3	14	14	-9.0	18.5	SHOALHAVEN GROUP							2	100 / 80	89		J, 50°, Pl-Un, SR, Ca, Su B, 15°, Pl-Un, SR, Cl/Fe, Su B, 5-10°, Pl-Un, SR, Fe, Su J, 30°, Pl-Un, S-SR, Fe/Cl, Co B, 20°, Pl-Un, SR, Fe, Vn	
			-9.5	19.0					H-VH						B, 10-20°, Un, SR-Si, Vn M M M		
			-10.0	19.5			...from 18.7 m, texture is less granular, strength is slightly higher								Bit blocked at 19.4 m B, 5-15°, Un, SR, Si, Vn		
		NR	-10.5	19.5							3	100 / 90	92		J, 25, Pl-Un, SR, Fe, Vn		
			-10.5	20.0													

End of BH-22 at 20m

# CORE PHOTOGRAPHS



## WorleyParsons

BOREHOLE: **BH-22**

SHEET: 1 OF 1

CLIENT: **Australian Industrial Energy**  
PROJECT: **Port Kembla Gas Terminal Project**  
LOCATION: **Port Kembla, NSW**  
JOB NUMBER: **401010-01496**

DATE COMMENCED: **8.10.2018**  
DATE COMPLETED: **9.10.2018**  
LOGGED BY: **AK**

Drill Contractor:	BG Drilling	Bore Size:	96 mm	Hole Angle:	-90°	Easting:	304709.7	Surface R.L.:	9.35mAHD
Drill Model:	Hydrapower Scout 300	Drill Fluid:	Pac L + CRP60	Bearing:	NA	Northing:	6186223.5	Ref. System:	GDA94 / MGA56



16.05 to 20.00 m



# BOREHOLE LOG



**WorleyParsons**

BOREHOLE: **BH-23**

SHEET: 1 OF 5

CLIENT: **Australian Industrial Energy**  
 PROJECT: **Port Kembla Gas Terminal Project**  
 LOCATION: **Port Kembla, NSW**  
 JOB NUMBER: **401010-01496**

DATE COMMENCED: **5.10.2018**  
 DATE COMPLETED: **8.10.2018**  
 LOGGED BY: **ACE/AK**  
 REVISION: **A**

Drill Contractor: BG Drilling      Bore Size: 96 mm      Hole Angle: -90°      Easting: 304505.0      Surface R.L.: 5.28mAHD  
 Drill Model: Hydrapower Scout 300      Drill Fluid: Pac L + CRP60      Bearing: NA      Northing: 6184723.9      Ref. System: GDA94 / MGA56

Method	Casing	Drill Rate (min/m)	RL (mAHD)	Depth (m)	Geological Unit	Graphic Log	Material Description	Moisture Condition	Weathering / Cementation	Consistency / Strength	Defect Spacing (mm)	Core Run No.	TCR / SCR (%)	RQD (%)	Sample / Test	Field Records / Comments and Defect Description
SOLID AUGER	HWT	NA		5.0	FILL		FILL: Gravelly CLAY: Medium plasticity, black and dark brown; gravel, fine to coarse grained, angular to sub-rounded, coal, slag, lithics; with sand, fine to coarse grained, angular to sub-rounded, slag, coal, lithics; with organics; clayey gravel in places.	M	Uc	VSt	20	NA	NA	NA	SPT 17,11,18 N=29	SPT: Recovered 450 mm
				60												
				200												
				600												
2000																
				2.5	ALLUVIUM		CLAY (CH): High plasticity, dark grey; with fine to medium grained sand, sub-angular to sub-rounded, quartz and minor shells; trace fine grained gravel, angular, shells; trace rootlets.	M	VS	VS	NA	NA	NA	SPT 0,0,1 N=1	SPT: Recovered 500 mm	
60																
				4.0	ALLUVIUM		CLAY (CH): High plasticity, grey-brown; with fine grained sand.	W			NA	NA	NA	SPT 0,0,0 N=0	SPT: Recovered 0 mm	
60																
				4.5	ALLUVIUM		Water at 4.5 m, inferred from SPT				NA	NA	NA	SPT 0,0,0 N=0	SPT: Recovered 0 mm	
60																
				5.0	ALLUVIUM						NA	NA	NA	SPT 0,0,0 N=0	SPT: Recovered 0 mm	
60																

# BOREHOLE LOG



## WorleyParsons

BOREHOLE: **BH-23**

SHEET: 2 OF 5

CLIENT: **Australian Industrial Energy**  
 PROJECT: **Port Kembla Gas Terminal Project**  
 LOCATION: **Port Kembla, NSW**  
 JOB NUMBER: **401010-01496**

DATE COMMENCED: **5.10.2018**  
 DATE COMPLETED: **8.10.2018**  
 LOGGED BY: **ACE/AK**  
 REVISION: **A**

Drill Contractor: BG Drilling      Bore Size: 96 mm      Hole Angle: -90°      Easting: 304505.0      Surface R.L.: 5.28mAHD  
 Drill Model: Hydrapower Scout 300      Drill Fluid: Pac L + CRP60      Bearing: NA      Northing: 6184723.9      Ref. System: GDA94 / MGA56

Method	Casing	Drill Rate (min/m)	RL (mAHD)	Depth (m)	Geological Unit	Graphic Log	Material Description	Moisture Condition	Weathering / Cementation	Consistency / Strength	Defect Spacing (mm)			Core Run No.	TCR / SCR (%)	RQD (%)	Sample / Test	Field Records / Comments and Defect Description						
											20	60	200											
SOLID AUGER	HWT	NA		0.0	ALLUVIUM		CLAY (CH): High plasticity, grey-brown; with fine grained sand.	W	Uc	VS				NA	NA	NA								
				5.5			CLAY (CH): High plasticity, grey with minor orange-brown mottles; trace fine grained sand.				St													
				-0.5																			SPT 2,4,7 N=11	SPT: Recovered 500 mm
				6.0			...from 6.4 m, trace white speckles of weathered lithics; trace fine grained gravel, sub-rounded to rounded, lithics																	
				-1.0																			SPT 4,5,7 N=12	SPT: Recovered 500 mm
7.5																								
8.0																								
-2.5																								
8.5							Sandy CLAY (CI-CH): Medium to high plasticity, grey mottled orange-brown; sand (~50%), fine to medium grained, sub-angular to sub-rounded, quartz.																	
-3.0																								
9.0																								
-3.5																								
9.5																								
-4.0																								
10.0																								
-4.5																								

# BOREHOLE LOG



**WorleyParsons**

BOREHOLE: **BH-23**

SHEET: 3 OF 5

CLIENT: **Australian Industrial Energy**  
 PROJECT: **Port Kembla Gas Terminal Project**  
 LOCATION: **Port Kembla, NSW**  
 JOB NUMBER: **401010-01496**

DATE COMMENCED: **5.10.2018**  
 DATE COMPLETED: **8.10.2018**  
 LOGGED BY: **ACE/AK**  
 REVISION: **A**

Drill Contractor: BG Drilling    Bore Size: 96 mm    Hole Angle: -90°    Easting: 304505.0    Surface R.L.: 5.28mAHD  
 Drill Model: Hydrapower Scout 300    Drill Fluid: Pac L + CRP60    Bearing: NA    Northing: 6184723.9    Ref. System: GDA94 / MGA56

Method	Casing	Drill Rate (min/m)	RL (mAHD)	Depth (m)	Geological Unit	Graphic Log	Material Description	Moisture Condition	Weathering / Cementation	Consistency / Strength	Defect Spacing (mm)			Core Run No.	TCR / SCR (%)	RQD (%)	Sample / Test	Field Records / Comments and Defect Description	
											20	60	200						
SOLID AUGER	HWT		-5.0	10.5	ALLUVIUM		Sandy CLAY (CI-CH): Medium to high plasticity, grey mottled orange-brown; sand (~50%), fine to medium grained, sub-angular to sub-rounded, quartz and other.	M	Uc	F-St									
			-5.5	11.0			...at ~10.75 m, trace black speckles, coal, organics	NA								SPT 1,4,4 N=8	SPT: Recovered 450 mm		
WASH BORE	OPEN HOLE		-6.0	11.5															
			-6.5	12.0	SAND (SP): Fine to medium grained, sub-angular to rounded, quartz, lithics, coal, brown; with fines.			MD										Contact observed between SAND and Sandy CLAY	
			-7.0	12.5	Gravelly CLAY (CI-CH): Medium to high plasticity, orange-brown mottled brown; gravel (~30%), fine to medium, angular to sub-rounded, lithics, coal; with sand (~30%), fine to coarse grained, angular to subrounded, quartz, lithics, coal.			St										SPT 5,6,7 N=13	SPT: Recovered 400 mm
		-7.5	13.0																
		-8.0	13.5		SHOALHAVEN GROUP		Sandy CLAY (CI): Medium-plasticity, orange-brown, mottled grey, pale grey and pale brown; sand (up to 65%), fine to medium grained, angular to sub-rounded, quartz, mica, lithics; with clayey sand pockets; trace ferricrete gravel, fine to medium grained, angular to sub-angular, weakly cemented.		RS	Hd									
		-8.5	14.0																
		-9.0	14.5																
		-9.5	15.0																

# BOREHOLE LOG



## WorleyParsons

BOREHOLE: **BH-23**

SHEET: 4 OF 5

CLIENT: **Australian Industrial Energy**  
 PROJECT: **Port Kembla Gas Terminal Project**  
 LOCATION: **Port Kembla, NSW**  
 JOB NUMBER: **401010-01496**

DATE COMMENCED: **5.10.2018**  
 DATE COMPLETED: **8.10.2018**  
 LOGGED BY: **ACE/AK**  
 REVISION: **A**

Drill Contractor: BG Drilling      Bore Size: 96 mm      Hole Angle: -90°      Easting: 304505.0      Surface R.L.: 5.28mAHD  
 Drill Model: Hydrapower Scout 300      Drill Fluid: Pac L + CRP60      Bearing: NA      Northing: 6184723.9      Ref. System: GDA94 / MGA56

Method	Casing	Drill Rate (min/m)	RL (mAHD)	Depth (m)	Geological Unit	Graphic Log	Material Description	Moisture Condition	Weathering / Cementation	Consistency / Strength	Defect Spacing (mm)			Core Run No.	TCR / SCR (%)	RQD (%)	Sample / Test	Field Records / Comments and Defect Description
											20	60	200					
WASH BORE	NA	NA	-10.0	15.5	SHOALHAVEN GROUP		Sandy SILTSTONE (inferred): Recovered as Sandy SILT (ML): Low to medium plasticity, dark grey; sand, fine to medium grained, sub-angular to sub-rounded, quartz, mica.	NA	HW?	VL-L?							SPT 5/10mm N=R	SPT: HB; Recovered 10 mm
			-10.5	16.0														
OPEN HOLE	16	16	-11.0	16.5	SHOALHAVEN GROUP		Sandy SILTSTONE: Grey and dark grey; sand, fine grained, sub-rounded, quartz, mafics; healed incipient fractures in places (dark grey/black infill); bedding evident in places, dipping 10-20°, <1 to 2 mm wide; trace fine to medium lithic gravel.	SW-FR	H									J, 35°, Pl, SR, Fe, Vn
			-11.5	17.0														
HQ3	11	11	-12.0	17.5	SHOALHAVEN GROUP													M
			-12.5	18.0														
			-13.0	18.5														M
			-13.5	19.0			18.8-18.92 m: weathered/fractured zone; brown-grey and orange-brown.	HW-MW	VL-L									B, 20°, Pl, SR, Fe, Co
			-14.0	19.5				SW-FR	H									Highly fractured, BJ, ~0-90°, 10-20 mm apart, clay infill
			-14.5	20.0														Pitting in core at 19.13 m, medium gravel sized (rounded)

# BOREHOLE LOG



**WorleyParsons**

BOREHOLE: **BH-23**

SHEET: 5 OF 5

CLIENT: **Australian Industrial Energy**  
 PROJECT: **Port Kembla Gas Terminal Project**  
 LOCATION: **Port Kembla, NSW**  
 JOB NUMBER: **401010-01496**

DATE COMMENCED: **5.10.2018**  
 DATE COMPLETED: **8.10.2018**  
 LOGGED BY: **ACE/AK**  
 REVISION: **A**

Drill Contractor: BG Drilling      Bore Size: 96 mm      Hole Angle: -90°      Easting: 304505.0      Surface R.L.: 5.28mAHD  
 Drill Model: Hydrapower Scout 300      Drill Fluid: Pac L + CRP60      Bearing: NA      Northing: 6184723.9      Ref. System: GDA94 / MGA56

Method	Casing	Drill Rate (min/m)	RL (mAHD)	Depth (m)	Geological Unit	Graphic Log	Material Description	Moisture Condition	Weathering / Cementation	Consistency / Strength	Defect Spacing (mm)	Core Run No.	TCR / SCR (%)	RQD (%)	Sample / Test	Field Records / Comments and Defect Description
HQ3	OPEN HOLE	11	-15.0	20.5	SHOALHAVEN GROUP		Sandy SILTSTONE: Grey and dark grey; sand, fine grained, sub-rounded, quartz, mafics; healed incipient fractures in places (dark grey/black infill); bedding evident in places, dipping 10-20°, <1 to 2 mm wide; trace fine to medium lithic gravel.	NA	SW-FR	H		2	100 / 93	94		M
			-15.5	21.0			Silty SANDSTONE: Fine to medium grained, sub-rounded, quartz, minor mafics and lithics; grey and pale brown, occasional healed incipient fractures; bedding indistinct.		H-VH		3	100 / 92	86		M -Drilling induced fractures B, 8°, Pl, SR, Sd, Su	
		19	-16.0	21.5			End of BH-23 at 21.7m									M
			-16.5	22.0												
			-17.0	22.5												
			-17.5	23.0												
			-18.0	23.5												
			-18.5	24.0												
			-19.0	24.5												
			-19.5	25.0												

# CORE PHOTOGRAPHS



## WorleyParsons

BOREHOLE: **BH-23**

SHEET: 1 OF 1

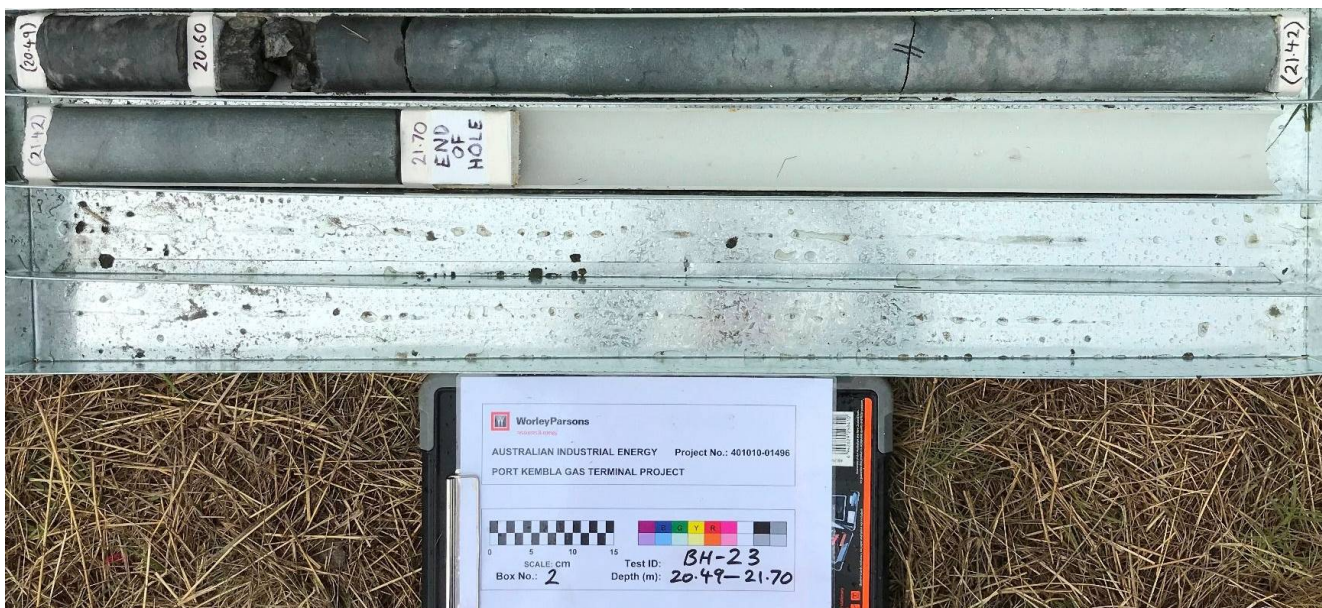
CLIENT: **Australian Industrial Energy**  
PROJECT: **Port Kembla Gas Terminal Project**  
LOCATION: **Port Kembla, NSW**  
JOB NUMBER: **401010-01496**

DATE COMMENCED: **5.10.2018**  
DATE COMPLETED: **8.10.2018**  
LOGGED BY: **ACE/AK**

Drill Contractor:	BG Drilling	Bore Size:	96 mm	Hole Angle:	-90°	Easting:	304505.0	Surface R.L.:	5.28mAHd
Drill Model:	Hydrapower Scout 300	Drill Fluid:	Pac L + CRP60	Bearing:	NA	Northing:	6184723.9	Ref. System:	GDA94 / MGA56



16.60 to 20.49 m



20.49 to 21.70 m

# BOREHOLE LOG



**WorleyParsons**

BOREHOLE: **BH-24**

SHEET: 1 OF 5

CLIENT: **Australian Industrial Energy**  
 PROJECT: **Port Kembla Gas Terminal Project**  
 LOCATION: **Port Kembla, NSW**  
 JOB NUMBER: **401010-01496**

DATE COMMENCED: **9.10.2018**  
 DATE COMPLETED: **11.10.2018**  
 LOGGED BY: **AK**  
 REVISION: **A**

Drill Contractor: BG Drilling      Bore Size: 96 mm      Hole Angle: -90°      Easting: 304510.5      Surface R.L.: 3.42mAHd  
 Drill Model: Hydrapower Scout 300      Drill Fluid: Pac L + CRP60      Bearing: NA      Northing: 6184582.2      Ref. System: GDA94 / MGA56

Method	Casing	Drill Rate (min/m)	RL (mAHd)	Depth (m)	Geological Unit	Graphic Log	Material Description	Moisture Condition	Weathering / Cementation	Consistency / Strength	Defect Spacing (mm)			Core Run No.	TCR / SCR (%)	RQD (%)	Sample / Test	Field Records / Comments and Defect Description
											20	60	200					
HWT	NR	NR	NR	3.0	FILL		FILL: GRAVEL AND COBBLES: Medium to coarse grained gravel and cobbles to 90 mm, sub-angular, slag; grey-brown and blue-grey; with sand, fine to coarse grained, trace fines.	M	Uc	MD?				1	23 / NA	NA		Driller attempted hole using auger from 0.0-3.0 m, but unable to keep hole open due to slag cave-in, moved rig 1.0 m away and cored from surface.  Bit blocked at 0.7 m
				2.5														
HWT	NR	NR	NR	2.0	CLAY (CH)		CLAY (CH): High plasticity, dark grey; trace fine to medium grained sand; trace organic fibres.	M	Uc	F				1	23 / NA	NA		Clay contact inferred from cuttings during initial augering to 3.0 m
				1.5														
WASH BORE	NR	NR	NR	3.0	ALLUVIUM		CLAY (CH): High plasticity, brown; trace fine to medium grained sand.	NA	Uc	St				1	NA	NA		Casing advanced from 0.0-2.5 m after SPT, switch to wash boring
				2.5														
WASH BORE	NR	NR	NR	0.0	ALLUVIUM		CLAY (CI-CH): Medium to high plasticity; grey mottled orange-brown; with sand, fine to medium grained, sub-angular, quartz, minor lithics.	NA	Uc	St				1	NA	NA		2x Environmental jar samples taken (Dup1) SPT: Recovered 430 mm
				3.5														
OPEN HOLE	NR	NR	NR	-0.5	ALLUVIUM		CLAY (CI-CH): Medium to high plasticity; grey mottled orange-brown; with sand, fine to medium grained, sub-angular, quartz, minor lithics.	NA	Uc	St				1	NA	NA		2x Environmental jar samples taken (Dup1) SPT: Recovered 430 mm
				4.0														
OPEN HOLE	NR	NR	NR	-1.0	ALLUVIUM		CLAY (CI-CH): Medium to high plasticity; grey mottled orange-brown; with sand, fine to medium grained, sub-angular, quartz, minor lithics.	NA	Uc	St				1	NA	NA		2x Environmental jar samples taken (Dup1) SPT: Recovered 430 mm
				4.5														
OPEN HOLE	NR	NR	NR	-1.5	ALLUVIUM		CLAY (CI-CH): Medium to high plasticity; grey mottled orange-brown; with sand, fine to medium grained, sub-angular, quartz, minor lithics.	NA	Uc	St				1	NA	NA		2x Environmental jar samples taken (Dup1) SPT: Recovered 430 mm
				5.0														

# BOREHOLE LOG



**WorleyParsons**

BOREHOLE: **BH-24**

SHEET: 2 OF 5

CLIENT: **Australian Industrial Energy**  
 PROJECT: **Port Kembla Gas Terminal Project**  
 LOCATION: **Port Kembla, NSW**  
 JOB NUMBER: **401010-01496**

DATE COMMENCED: **9.10.2018**  
 DATE COMPLETED: **11.10.2018**  
 LOGGED BY: **AK**  
 REVISION: **A**

Drill Contractor: BG Drilling      Bore Size: 96 mm      Hole Angle: -90°      Easting: 304510.5      Surface R.L.: 3.42mAHD  
 Drill Model: Hydrapower Scout 300      Drill Fluid: Pac L + CRP60      Bearing: NA      Northing: 6184582.2      Ref. System: GDA94 / MGA56

Method	Casing	Drill Rate (min/m)	RL (mAHD)	Depth (m)	Geological Unit	Graphic Log	Material Description	Moisture Condition	Weathering / Cementation	Consistency / Strength	Defect Spacing (mm)	Core Run No.	TCR / SCR (%)	RQD (%)	Sample / Test	Field Records / Comments and Defect Description			
WASH BORE OPEN HOLE NA				5.5	ALLUVIUM		CLAY (CI-CH): Medium to high plasticity; grey mottled orange-brown; with sand, fine to medium grained, sub-angular, quartz, minor lithics.	NA	Uc	St							Casing advanced to 4.5 m after SPT		
				6.0			SANDY CLAY (CI): Medium plasticity; grey mottled orange-brown; with sand, fine to medium grained, sub-angular to sub-rounded, quartz; some dark brown zones/patches with iron oxide cemented (VWk) nodules to medium gravel size.			F							SPT 2,3,4 N=7	SPT: Recovered 400 mm	
				7.0			Clayey SAND (SC): Fine to coarse grained, sub-angular to rounded, quartz, lithics; grey-brown with orange-brown mottling; medium plasticity clay; trace gravel, fine to medium grained, sub-angular, coal, lithics; sandy clay in places.			MD							SPT 3,10,10 N=20	Environmental bag sample taken SPT: Recovered 320 mm	
				8.5			Gravelly CLAY (CI): Medium plasticity; brown and red-brown, with some pale green-grey and pink mottling; gravel, fine to coarse grained, sub-angular, extremely weathered to moderately weathered mudstone/sandstone fragments; with sand, fine to coarse grained, sub-angular, quartz, lithics.			RS-XW							Hd	SPT 18,22,24 N=46	SPT: Recovered 220 mm
				9.0			SHOALHAVEN GROUP										9.5		
10.0																			



# BOREHOLE LOG



**WorleyParsons**

BOREHOLE: **BH-24**

SHEET: 3 OF 5

CLIENT: **Australian Industrial Energy**  
 PROJECT: **Port Kembla Gas Terminal Project**  
 LOCATION: **Port Kembla, NSW**  
 JOB NUMBER: **401010-01496**

DATE COMMENCED: **9.10.2018**  
 DATE COMPLETED: **11.10.2018**  
 LOGGED BY: **AK**  
 REVISION: **A**

Drill Contractor: BG Drilling      Bore Size: 96 mm      Hole Angle: -90°      Easting: 304510.5      Surface R.L.: 3.42mAHD  
 Drill Model: Hydrapower Scout 300      Drill Fluid: Pac L + CRP60      Bearing: NA      Northing: 6184582.2      Ref. System: GDA94 / MGA56

Method	Casing	Drill Rate (min/m)	RL (mAHD)	Depth (m)	Geological Unit	Graphic Log	Material Description	Moisture Condition	Weathering / Cementation	Consistency / Strength	Defect Spacing (mm)	Core Run No.	TCR / SCR (%)	RQD (%)	Sample / Test	Field Records / Comments and Defect Description
WASH BORE	NA	NA	-7.0	10.5	SHOALHAVEN GROUP		Clayey GRAVEL (GC): Fine to coarse grained, sub-angular, extremely weathered to moderately weathered mudstone/sandstone fragments; brown and red brown; medium plasticity clay.	NA	XW	Hd	20 60 200 600 2000	NA	NA	NA	SPT 10/100mm N=R	Environmental bag sample taken SPT: HB; Recovered 100 mm
			-7.5	11.0											Soil/rock contact uncertain	
OPEN HOLE	NA	NA	-8.0	11.5	SHOALHAVEN GROUP		Clayey SANDSTONE (inferred): Recovered as Clayey GRAVEL: Fine to medium grained, angular to sub-angular, highly weathered to moderately weathered sandstone fragments; red-brown, medium plasticity clay.	XW-HW?	VL-L?	Hd	20 60 200 600 2000	NA	NA	NA	SPT 5/30mm N=R	SPT: HB; Recovered 30 mm
			-8.5	12.0											Wash bore refusal at 13.3 m, switch to coring	
HQ3	13	13	-9.0	12.5	SHOALHAVEN GROUP		SANDSTONE: Fine to medium grained, sub-angular to sub-rounded, quartz, lithics; red-brown; trace gravel, fine grained, sub-angular to sub-rounded, lithics; bedding indistinct.	SW-FR	H	Hd	20 60 200 600 2000	2	100 / 100	100	M	B, 2°, PI, SR, CI, Vn
			-9.5	13.0												Wash bore refusal at 13.3 m, switch to coring
			-10.0	13.5												Wash bore refusal at 13.3 m, switch to coring
			-10.5	14.0			...gravel is fine to medium grained									
			-11.0	14.5												
			-11.5	15.0												

# BOREHOLE LOG



**WorleyParsons**

BOREHOLE: **BH-24**

SHEET: 4 OF 5

CLIENT: **Australian Industrial Energy**  
 PROJECT: **Port Kembla Gas Terminal Project**  
 LOCATION: **Port Kembla, NSW**  
 JOB NUMBER: **401010-01496**

DATE COMMENCED: **9.10.2018**  
 DATE COMPLETED: **11.10.2018**  
 LOGGED BY: **AK**  
 REVISION: **A**

Drill Contractor: BG Drilling      Bore Size: 96 mm      Hole Angle: -90°      Easting: 304510.5      Surface R.L.: 3.42mAHD  
 Drill Model: Hydapower Scout 300      Drill Fluid: Pac L + CRP60      Bearing: NA      Northing: 6184582.2      Ref. System: GDA94 / MGA56

Method	Casing	Drill Rate (min/m)	RL (mAHD)	Depth (m)	Geological Unit	Graphic Log	Material Description	Moisture Condition	Weathering / Cementation	Consistency / Strength	Defect Spacing (mm)			Core Run No.	TCR / SCR (%)	RQD (%)	Sample / Test	Field Records / Comments and Defect Description									
											20	60	200														
HQ3	OPEN HOLE	12	-12.0	15.5	SHOALHAVEN GROUP		SANDSTONE: Fine to medium grained, sub-angular to sub-rounded, quartz, lithics; red-brown; trace gravel, fine to medium grained, sub-angular to sub-rounded, lithics; bedding slightly evident in places, dipping 5-10°, mostly indistinct. ...from 15.18-15.34 m, with fine to medium gravel ...from 15.34-15.48 m, conglomeratic sandstone; red-brown speckled blue-grey; gravel is fine to medium, sub-angular to sub-rounded lithics ...from 15.48 m, trace fine to medium grained gravel	NA	SW-FR	H				3	100 / 97	98		B, 5-10°, Pl-Un, S-SR, Cl/Gr, Fi, 2 mm									
				16.0			...with fine to medium grained gravel											M									
				16.5																							
				17.0			...brown to red-brown; trace fine grained gravel	FR	H-VH											M							
				17.5																	M						
				18.0																		M					
				18.5																							
				19.0																							M
				19.5																							
				20.0																							

# BOREHOLE LOG



## WorleyParsons

BOREHOLE: **BH-24**

SHEET: 5 OF 5

CLIENT: **Australian Industrial Energy**  
 PROJECT: **Port Kembla Gas Terminal Project**  
 LOCATION: **Port Kembla, NSW**  
 JOB NUMBER: **401010-01496**

DATE COMMENCED: **9.10.2018**  
 DATE COMPLETED: **11.10.2018**  
 LOGGED BY: **AK**  
 REVISION: **A**

Drill Contractor: BG Drilling    Bore Size: 96 mm    Hole Angle: -90°    Easting: 304510.5    Surface R.L.: 3.42mAHD  
 Drill Model: Hydrapower Scout 300    Drill Fluid: Pac L + CRP60    Bearing: NA    Northing: 6184582.2    Ref. System: GDA94 / MGA56

Method	Casing	Drill Rate (min/m)	RL (mAHD)	Depth (m)	Geological Unit	Graphic Log	Material Description	Moisture Condition	Weathering / Cementation	Consistency / Strength	Defect Spacing (mm)			Core Run No.	TCR / SCR (%)	RQD (%)	Sample / Test	Field Records / Comments and Defect Description
											20	60	200					
HQ3	OPEN HOLE	10	-17.0	20.5			SANDSTONE: Fine to medium grained, sub-angular to sub-rounded, quartz, lithics; brown to red-brown; trace gravel, fine grained, sub-angular to sub-rounded, lithics; bedding slightly evident in places, dipping 5-10°, mostly indistinct. ...subvertical healed joint infilled with quartz/calcite (1-2 mm wide) End of BH-24 at 20.5m	NA	FR	H-VH				4	100 / 100	100		M
									SW	H								
			-17.5	21.0														
			-18.0	21.5														
			-18.5	22.0														
			-19.0	22.5														
			-19.5	23.0														
			-20.0	23.5														
			-20.5	24.0														
			-21.0	24.5														
			-21.5	25.0														

# CORE PHOTOGRAPHS



# WorleyParsons

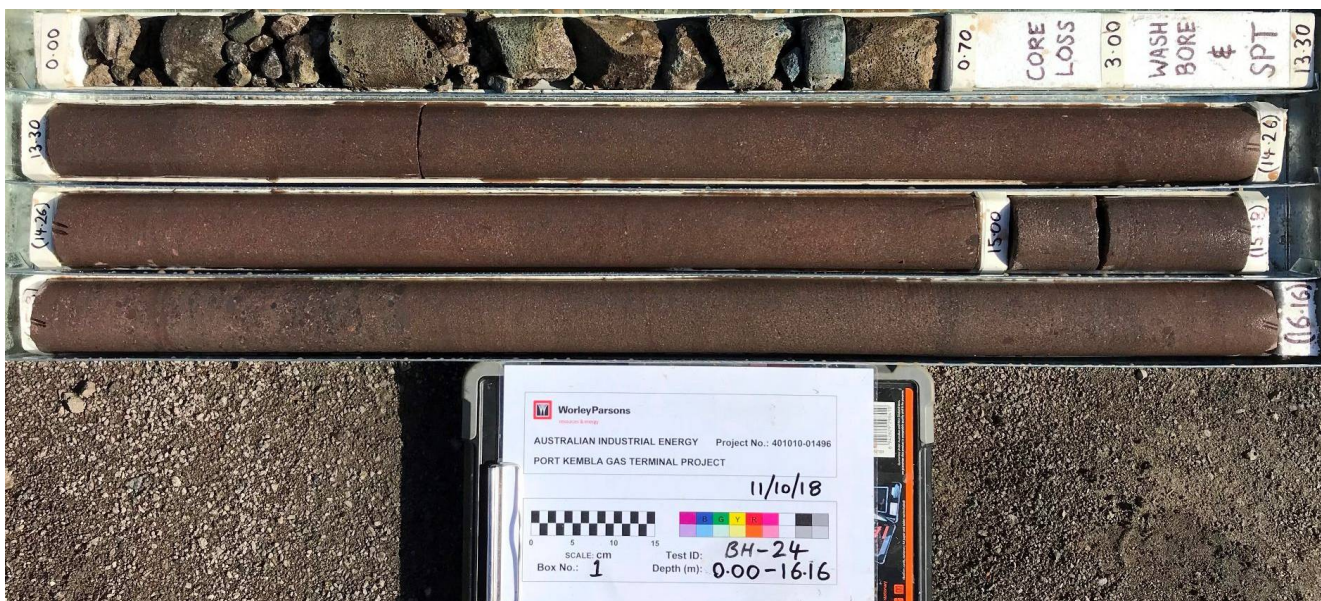
BOREHOLE: **BH-24**

SHEET: 1 OF 2

CLIENT: **Australian Industrial Energy**  
PROJECT: **Port Kembla Gas Terminal Project**  
LOCATION: **Port Kembla, NSW**  
JOB NUMBER: **401010-01496**

DATE COMMENCED: **9.10.2018**  
DATE COMPLETED: **11.10.2018**  
LOGGED BY: **AK**

Drill Contractor:	BG Drilling	Bore Size:	96 mm	Hole Angle:	-90°	Easting:	304510.5	Surface R.L.:	3.42mAHD
Drill Model:	Hydrapower Scout 300	Drill Fluid:	Pac L + CRP60	Bearing:	NA	Northing:	6184582.2	Ref. System:	GDA94 / MGA56



0.00 to 16.16 m



16.16 to 19.91 m

# CORE PHOTOGRAPHS



# WorleyParsons

BOREHOLE: **BH-24**

SHEET: 2 OF 2

CLIENT: **Australian Industrial Energy**  
PROJECT: **Port Kembla Gas Terminal Project**  
LOCATION: **Port Kembla, NSW**  
JOB NUMBER: **401010-01496**

DATE COMMENCED: **9.10.2018**  
DATE COMPLETED: **11.10.2018**  
LOGGED BY: **AK**

Drill Contractor:	BG Drilling	Bore Size:	96 mm	Hole Angle:	-90°	Easting:	304510.5	Surface R.L.:	3.42mAHD
Drill Model:	Hydrapower Scout 300	Drill Fluid:	Pac L + CRP60	Bearing:	NA	Northing:	6184582.2	Ref. System:	GDA94 / MGA56



19.91 to 20.50 m

# BOREHOLE LOG



**WorleyParsons**

BOREHOLE: **BH-25**

SHEET: 1 OF 3

CLIENT: <b>Australian Industrial Energy</b>	DATE COMMENCED: <b>11.10.2018</b>
PROJECT: <b>Port Kembla Gas Terminal Project</b>	DATE COMPLETED: <b>11.10.2018</b>
LOCATION: <b>Port Kembla, NSW</b>	LOGGED BY: <b>AK</b>
JOB NUMBER: <b>401010-01496</b>	REVISION: <b>A</b>

Drill Contractor: BG Drilling	Bore Size: 96 mm	Hole Angle: -90°	Eastings: 304492.7	Surface R.L.: 9.76mAHD
Drill Model: Hydrapower Scout 300	Drill Fluid: Pac L + CRP60	Bearing: NA	Northing: 6184358.9	Ref. System: GDA94 / MGA56

Method	Casing	Drill Rate (min/m)	RL (mAHD)	Depth (m)	Geological Unit	Graphic Log	Material Description	Moisture Condition	Weathering / Cementation	Consistency / Strength	Defect Spacing (mm)			Core Run No.	TCR / SCR (%)	RQD (%)	Sample / Test	Field Records / Comments and Defect Description	
											20	60	200						
SOLID AUGER	HWT NA	NA	9.5	0.5	FILL		TOPSOIL: Sandy SILT: Low plasticity; brown; sand, fine to coarse grained, quartz, lithics; organics/rootlets.	M	Uc	L									
							FILL: Sandy GRAVEL: Fine to coarse grained, angular to sub-angular, coal/lithics; dark grey-black; sand, fine to coarse grained, sub-angular, coal/lithics; with coal fines.	D-M		MD									
							...dark grey and blue-grey; gravel includes slag												
							FILL: Gravelly CLAY: Medium plasticity; dark grey-brown; gravel, fine to coarse grained, sub-angular, coal, slag, lithics.			St									
							Silty/Clayey SAND (SM-SC): Fine to coarse grained, sub-angular, extremely weathered to highly weathered siltstone/sandstone fragments, pale yellow-grey and orange-brown, low plasticity, fines; rock fabric evident.	D	XW	VD									
			9.0	1.0															Driller noted slag from ~1.0 m
			8.5	1.5															SPT 10,16,10 N=26 Environmental jar sample taken SPT: Recovered 400 mm
			8.0	2.0															Driller noted change in ground conditions between 2.0 and 2.5 m
			7.5	2.5															SPT 7,7/30mm N=R Environmental bag sample taken from 3.0-3.1 m SPT: HB; Recovered 200 mm
			7.0	3.0															
			6.5	3.5															
			6.0	4.0	SHOALHAVEN GROUP														
			5.5	4.5															
			5.0	5.0															
			5.0	5.0															

# BOREHOLE LOG



## WorleyParsons

BOREHOLE: **BH-25**

SHEET: 2 OF 3

CLIENT: **Australian Industrial Energy**  
 PROJECT: **Port Kembla Gas Terminal Project**  
 LOCATION: **Port Kembla, NSW**  
 JOB NUMBER: **401010-01496**

DATE COMMENCED: **11.10.2018**  
 DATE COMPLETED: **11.10.2018**  
 LOGGED BY: **AK**  
 REVISION: **A**

Drill Contractor: BG Drilling    Bore Size: 96 mm    Hole Angle: -90°    Easting: 304492.7    Surface R.L.: 9.76mAHD  
 Drill Model: Hydapower Scout 300    Drill Fluid: Pac L + CRP60    Bearing: NA    Northing: 6184358.9    Ref. System: GDA94 / MGA56

Method	Casing	Drill Rate (min/m)	RL (mAHD)	Depth (m)	Geological Unit	Graphic Log	Material Description	Moisture Condition	Weathering / Cementation	Consistency / Strength	Defect Spacing (mm)			Core Run No.	TCR / SCR (%)	RQD (%)	Sample / Test	Field Records / Comments and Defect Description
											20	60	200					
SOLID AUGER	HWT	NA	4.5	5.5	SHOALHAVEN GROUP		Silty/Clayey SAND (SM-SC): Fine to coarse grained, sub-angular, extremely weathered to highly weathered siltstone/sandstone fragments, pale yellow-grey and orange-brown, low plasticity, fines; rock fabric evident.	D	XW	VD								Soil/rock contact uncertain
								HW?	VL?									
SOLID AUGER	HWT	NA	3.5	6.0	SHOALHAVEN GROUP		SILTSTONE (inferred): Recovered as sand and gravel sized fragments of highly weathered siltstone with low plasticity silt/clay.											SPT: Recovered 30 mm
SOLID AUGER	HWT	NA	6.5	7.0	SHOALHAVEN GROUP		SILTSTONE: Grey; with sand, fine grained, sub-angular, quartz, minor mafics/lithics/mica, bedding indistinct.	NA	HW-MW?	VL-L?								Driller noted hard augering from 7.0 m; refusal at 7.35 m, switch to coring, advanced casing from 0.0-7.0 m
SOLID AUGER	HWT	NA	7.0	7.5	SHOALHAVEN GROUP		...from 8.52-9.75 m, grey and brown; numerous cross-cutting joints healed/partially healed joints, subhorizontal to subvertical, 1-5 mm wide; iron infill/staining	SW-FR	H									Drilling induced fracture by auger
SOLID AUGER	HWT	NA	7.5	8.0	SHOALHAVEN GROUP		...from 8.52-9.75 m, grey and brown; numerous cross-cutting joints healed/partially healed joints, subhorizontal to subvertical, 1-5 mm wide; iron infill/staining											B, 3°, Pl, SR, Fe, Su
SOLID AUGER	HWT	NA	8.0	8.5	SHOALHAVEN GROUP		...from 8.52-9.75 m, grey and brown; numerous cross-cutting joints healed/partially healed joints, subhorizontal to subvertical, 1-5 mm wide; iron infill/staining	MW	L-M									M
SOLID AUGER	HWT	NA	8.5	9.0	SHOALHAVEN GROUP		...from 8.52-9.75 m, grey and brown; numerous cross-cutting joints healed/partially healed joints, subhorizontal to subvertical, 1-5 mm wide; iron infill/staining											M
SOLID AUGER	HWT	NA	9.0	9.5	SHOALHAVEN GROUP		...from 8.52-9.75 m, grey and brown; numerous cross-cutting joints healed/partially healed joints, subhorizontal to subvertical, 1-5 mm wide; iron infill/staining											
SOLID AUGER	HWT	NA	9.5	10.0	SHOALHAVEN GROUP		Silty SANDSTONE: Fine grained, sub-angular, quartz, lithics, mafics; grey; trace gravel, fine grained, sub-angular to sub-rounded, lithics; bedding indistinct.	SW-FR	H									M

# BOREHOLE LOG



**WorleyParsons**

BOREHOLE: **BH-25**

SHEET: 3 OF 3

CLIENT: **Australian Industrial Energy**  
 PROJECT: **Port Kembla Gas Terminal Project**  
 LOCATION: **Port Kembla, NSW**  
 JOB NUMBER: **401010-01496**

DATE COMMENCED: **11.10.2018**  
 DATE COMPLETED: **11.10.2018**  
 LOGGED BY: **AK**  
 REVISION: **A**

Drill Contractor: BG Drilling    Bore Size: 96 mm    Hole Angle: -90°    Easting: 304492.7    Surface R.L.: 9.76mAHD  
 Drill Model: Hydrapower Scout 300    Drill Fluid: Pac L + CRP60    Bearing: NA    Northing: 6184358.9    Ref. System: GDA94 / MGA56

Method	Casing	Drill Rate (min/m)	RL (mAHD)	Depth (m)	Geological Unit	Graphic Log	Material Description	Moisture Condition	Weathering / Cementation	Consistency / Strength	Defect Spacing (mm)			Core Run No.	TCR / SCR (%)	RQD (%)	Sample / Test	Field Records / Comments and Defect Description					
											20	60	200										
HQ3 OPEN HOLE		8	-0.5	10.5	SHOALHAVEN GROUP		Silty SANDSTONE: Fine grained, sub-angular, quartz, lithics, mafics; grey; trace gravel, fine grained, sub-angular to sub-rounded, lithics; bedding indistinct.	NA	SW-FR	H				2	100 / 71	71	M						
								-1.0	11.0	...fine to medium grained; red-grey													
								-1.5	11.5	...fine grained		MW	L-M									Highly fractured, B, 10-15°, PI-Un, SR, Fe/Cl/Sd, Co-Fi, 2 mm, spaced 3-35 mm	
								-2.0	12.0			SW-FR	H									M	
								-2.5	12.5													M	
								-3.0	13.0													J, 30°, PI, SR, Fe/Si, Vn	
								-3.5	13.5	...fine to medium grained												B, 10°, Un, SR, Fe, Su	
								-4.0	14.0	...grey													
								-4.5	14.5	...fine grained													M
								-5.0	15.0														B, 10°, PI-Un, SR, Fe/Cl, Co B, 5°, PI-Un, SR, Fe/Cl, Co B, 5°, PI-Un, SR, Fe/Cl, Co
																		3	100 / 96	98		M	

End of BH-25 at 15m



# CORE PHOTOGRAPHS



## WorleyParsons

BOREHOLE: **BH-25**

SHEET: 1 OF 1

CLIENT: **Australian Industrial Energy**  
PROJECT: **Port Kembla Gas Terminal Project**  
LOCATION: **Port Kembla, NSW**  
JOB NUMBER: **401010-01496**

DATE COMMENCED: **11.10.2018**  
DATE COMPLETED: **11.10.2018**  
LOGGED BY: **AK**

Drill Contractor:	BG Drilling	Bore Size:	96 mm	Hole Angle:	-90°	Easting:	304492.7	Surface R.L.:	9.76mAHD
Drill Model:	Hydrapower Scout 300	Drill Fluid:	Pac L + CRP60	Bearing:	NA	Northing:	6184358.9	Ref. System:	GDA94 / MGA56



7.35 to 11.19 m



11.19 to 15.00 m

# BOREHOLE LOG



**WorleyParsons**

BOREHOLE: **BH-26**

SHEET: 1 OF 3

CLIENT: **Australian Industrial Energy**  
 PROJECT: **Port Kembla Gas Terminal Project**  
 LOCATION: **Port Kembla, NSW**  
 JOB NUMBER: **401010-01496**

DATE COMMENCED: **12.10.2018**  
 DATE COMPLETED: **12.10.2018**  
 LOGGED BY: **AK**  
 REVISION: **A**

Drill Contractor: BG Drilling    Bore Size: 96 mm    Hole Angle: -90°    Easting: 304565.8    Surface R.L.: 9.54mAHD  
 Drill Model: Hydrapower Scout 300    Drill Fluid: Pac L + CRP60    Bearing: NA    Northing: 6184311.5    Ref. System: GDA94 / MGA56

Method	Casing	Drill Rate (min/m)	RL (mAHD)	Depth (m)	Geological Unit	Graphic Log	Material Description	Moisture Condition	Weathering / Cementation	Consistency / Strength	Defect Spacing (mm)			Core Run No.	TCR / SCR (%)	RQD (%)	Sample / Test	Field Records / Comments and Defect Description						
											20	60	200											
SOLID AUGER	HWT	NA		9.5	FILL		TOPSOIL: Silty SAND: Fine to medium grained, sub-angular, quartz, lithics; dark brown; low plasticity silt; organics/rootlets.	M	Uc	MD?								Environmental jar sample taken from surface, 0.0-0.1 m						
				9.0			FILL: Sandy GRAVEL: Fine to medium grained, angular to sub-angular, coal, lithics; dark grey-black; sand, fine to coarse grained, angular to sub-angular, coal, lithics; with coal fines.																	
				8.5				CLAY (CH): High plasticity; dark grey-brown; trace sand, fine to medium grained; trace organics (rootlets).			S										SPT 0,1,2 N=3	SPT: Initial 150 mm fell under hammer weight; Recovered 400 mm		
				8.0																				
				7.5																				
				7.0																			3x Environmental jar samples taken from auger flight from 2.5-3.0 m (Dup4, Trip3)	
				6.5																			Borehole dipped after auger refusal at 7.5 m, water at 3.0 m (Note: no sign of water in any of the SPT samples)	
				6.0																			SPT 2,5,5 N=10	SPT: Recovered 500 mm
				5.5																				
				5.0																				SPT 3,5,7 N=12

# BOREHOLE LOG



**WorleyParsons**

BOREHOLE: **BH-26**

SHEET: 2 OF 3

CLIENT: **Australian Industrial Energy**  
 PROJECT: **Port Kembla Gas Terminal Project**  
 LOCATION: **Port Kembla, NSW**  
 JOB NUMBER: **401010-01496**

DATE COMMENCED: **12.10.2018**  
 DATE COMPLETED: **12.10.2018**  
 LOGGED BY: **AK**  
 REVISION: **A**

Drill Contractor: BG Drilling      Bore Size: 96 mm      Hole Angle: -90°      Easting: 304565.8      Surface R.L.: 9.54mAHD  
 Drill Model: Hydrapower Scout 300      Drill Fluid: Pac L + CRP60      Bearing: NA      Northing: 6184311.5      Ref. System: GDA94 / MGA56

Method	Casing	Drill Rate (min/m)	RL (mAHD)	Depth (m)	Geological Unit	Graphic Log	Material Description	Moisture Condition	Weathering / Cementation	Consistency / Strength	Defect Spacing (mm)	Core Run No.	TCR / SCR (%)	RQD (%)	Sample / Test	Field Records / Comments and Defect Description
											20 60 200 600 2000					
SOLID AUGER	HWT	NA		4.5	SHOALHAVEN GROUP		Clayey GRAVEL (GC): Fine to coarse grained, angular to sub-angular, extremely weathered to moderately weathered siltstone fragments; pale green-grey and orange-brown; medium plasticity clay; rock fabric evident.	D-M	XW	VD						Driller noted harder ground from approximately 5.0 m
				5.5												SPT: HB; Recovered 70 mm Soil/rock contact uncertain
				6.0												
OPEN HOLE	12			6.5	SHOALHAVEN GROUP		SILTSTONE: Grey; with sand, fine grained, sub-angular, quartz; bedding indistinct; some healed joints, dipping 20-80°, <1 to 2 mm wide, iron stained.	NA	XW-HW?	VL-L?					Driller noted ground gradually becoming harder with depth; auger refusal at 7.5 m, switch to coring, casing advanced 0.0-7.0 m	
				7.0												
				7.5												
				8.0											...orange-brown and grey; numerous joints and healed joints, subhorizontal to subvertical, iron stained throughout	
				8.5											...increased sand content from 8.36 m	
				9.0												
				9.5												
				9.5											Silty SANDSTONE: Fine grained, sub-angular, quartz, mafics; grey; bedding indistinct.	
				9.5												
				9.5												
HQ3	19			8.5	SHOALHAVEN GROUP		Silty SANDSTONE: Fine grained, sub-angular, quartz, mafics; grey; bedding indistinct.	MW-SW	M	H					M B, 5-10°, Un, SR, Fe, Fi, 2 mm Highly fractured B, 12°, Pl-Un, SR, Fe, Co B, 15°, Pl-Un, SR, Fe, Co	
				8.5											Highly fractured, J/B, 5-70°, Pl-Un, S-SR, Fe/Cl, Vn-Fi, 10 mm, spaced 5-80 mm apart	
				8.5											J, 25-30°, SR, Fe, Su	
HQ3	10			9.0	SHOALHAVEN GROUP		Silty SANDSTONE: Fine grained, sub-angular, quartz, mafics; grey; bedding indistinct.	HW	L	M					J, 45°, Pl, SR, Fe, Vn Bit blocked at 8.8 m M Highly fractured, B/J, 15-60°, Pl-Un, S-SR, Fe/Cl, Vn-Fi, 3 mm, spaced 5-40 mm apart B, 10°, Pl, SR, Fe, Vn J, 25°, Pl, SR, Fe, Vn J, 30°, Pl, SR, Fe/Sd/Gr Fi, 30 mm M Bit blocked at 9.6 m	
				9.0												
				9.0												
HQ3	10			9.5	SHOALHAVEN GROUP		Silty SANDSTONE: Fine grained, sub-angular, quartz, mafics; grey; bedding indistinct.	SW-FR	H	M					Highly fractured	
				9.5												
				9.5												

# BOREHOLE LOG



**WorleyParsons**

BOREHOLE: **BH-26**

SHEET: 3 OF 3

CLIENT: **Australian Industrial Energy**  
 PROJECT: **Port Kembla Gas Terminal Project**  
 LOCATION: **Port Kembla, NSW**  
 JOB NUMBER: **401010-01496**

DATE COMMENCED: **12.10.2018**  
 DATE COMPLETED: **12.10.2018**  
 LOGGED BY: **AK**  
 REVISION: **A**

Drill Contractor: BG Drilling      Bore Size: 96 mm      Hole Angle: -90°      Easting: 304565.8      Surface R.L.: 9.54mAHD  
 Drill Model: Hydapower Scout 300      Drill Fluid: Pac L + CRP60      Bearing: NA      Northing: 6184311.5      Ref. System: GDA94 / MGA56

Method	Casing	Drill Rate (min/m)	RL (mAHD)	Depth (m)	Geological Unit	Graphic Log	Material Description	Moisture Condition	Weathering / Cementation		Consistency / Strength	Defect Spacing (mm)	Core Run No.	TCR / SCR (%)	RQD (%)	Sample / Test	Field Records / Comments and Defect Description			
									SW	HW								H	VL	
HQ3 OPEN HOLE	SHOALHAVEN GROUP		9.5				Silty SANDSTONE: Fine to medium grained, sub-angular, quartz, mafics; grey, red-grey in places; trace fine grained lithic gravel; trace mica; bedding indistinct. ...from 10.06-10.13 m, orange-brown	NA	SW	HW	H	VL						Highly fractured, B, 15°, Pl, SR, Fe, Vn-Fi, 7 mm, spaced 3-10 mm apart J, 75°, Un, SR, Fe, Co		
			10.5																B, 8°, Pl, SR, Fe, Co B, 15°, Pl, SR, Fe/Gr, Fi, 10 mm	
			11.0	10					...fine to medium grained, red-grey										B, 5-10°, Pl-Un, SR, Fe, Vn J, 20°, Pl-Un, SR, Fe, Su B, 10°, Pl SR, Fe/Cl, Vn	
			11.5						...fine grained										B, 15°, Pl-Un, SR, Ca, Su	
			12.0																M	
			12.5																	J, 40°, Un, SR, Fe, Vn J, 50°, Pl-Un, SR, Fe, Co
			13.0																	M
			13.5	12					...from 13.24-13.8 m, healed joint, dipping 80-90°, <1 mm wide, white infill											M
			14.0						...grey											J, 65°, Pl-Un, SR, Si, Vn
			14.5																	M M M J, 75°, Un, SR, Si, Vn M
			15.0																	J, 25°, Un, SR, Fe, Su  M

End of BH-26 at 15m

# CORE PHOTOGRAPHS



# WorleyParsons

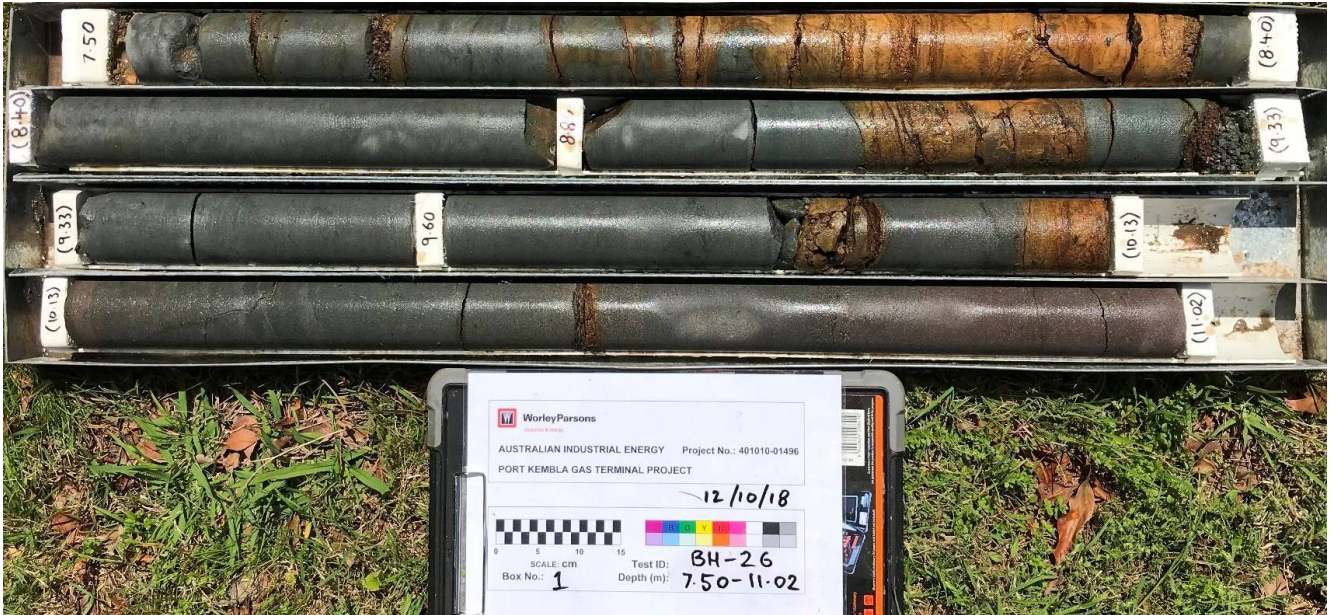
BOREHOLE: **BH-26**

SHEET: 1 OF 1

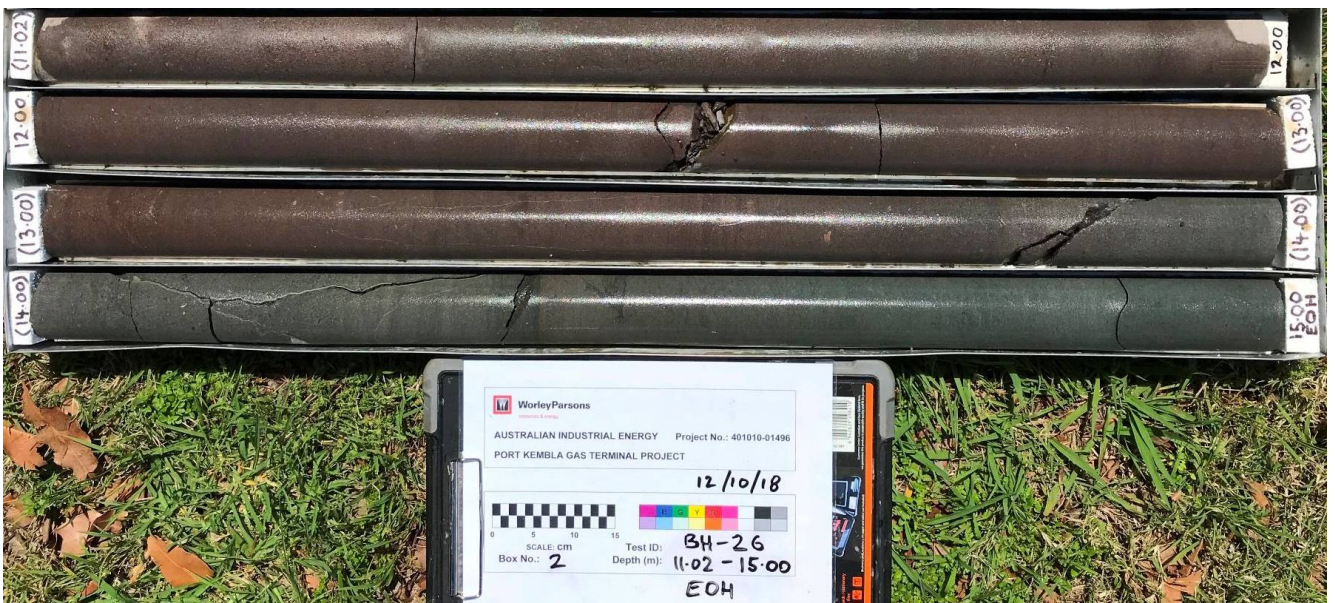
CLIENT: **Australian Industrial Energy**  
 PROJECT: **Port Kembla Gas Terminal Project**  
 LOCATION: **Port Kembla, NSW**  
 JOB NUMBER: **401010-01496**

DATE COMMENCED: **12.10.2018**  
 DATE COMPLETED: **12.10.2018**  
 LOGGED BY: **AK**

Drill Contractor:	BG Drilling	Bore Size:	96 mm	Hole Angle:	-90°	Easting:	304565.8	Surface R.L.:	9.54mAH
Drill Model:	Hydrapower Scout 300	Drill Fluid:	Pac L + CRP60	Bearing:	NA	Northing:	6184311.5	Ref. System:	GDA94 / MGA56



7.50 to 11.02 m



11.02 to 15.00 m