APPENDIX D: DETAILS OF MONITORING BORES

1. Piezometer Installation

Previous site investigations have included the drilling of an extensive network of investigation bores that have supported the detailed understanding of the local geology. Selected investigation bores have been completed as groundwater monitoring piezometers and test bores. A total of 136 piezometers have now been installed across the Ashton Coal Project area. This includes 87 standpipe piezometers and 19 multi-level vibrating wire piezometers. The locations of all monitoring and test bores are indicated on **Figure D1**. The multi-level vibrating wire piezometers were primarily installed in coal exploration drillholes by placing two or more vibrating wire piezometers at specific coal seam or interburden horizons, followed by fully grouting the borehole.

The standpipe piezometers were installed in some coal exploration drill holes and some purpose-drilled boreholes, drilled at diameters of 100 or 125mm. Each borehole was cased with 50mm diameter PVC casing and screened adjacent to the target monitoring interval. The bore annulus was gravel packed over the target monitoring interval and a bentonite seal set above and below the screened zone to ensure that the screened section was isolated. The remainder of the annulus above the bentonite seal was then backfilled with cement grout. All piezometers were completed at surface with a concrete block, to prevent ingress of surface runoff or contamination, and secured within a padlocked steel monument.

A summary of the locations and monitored horizons for all of the monitoring bores is shown in **Table D1**.

Table D1: Summary of groundwater monitoring piezometers

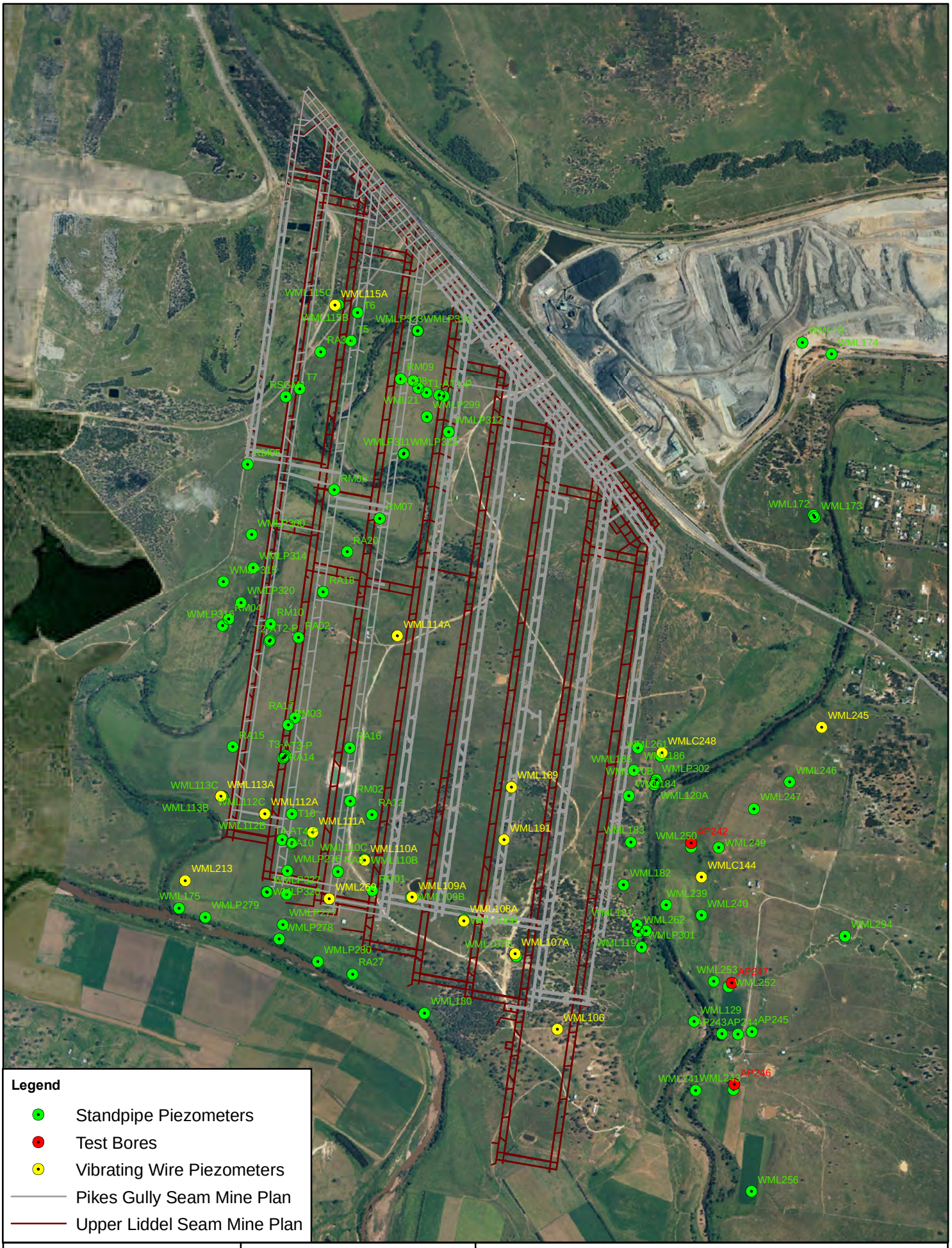
Piezometer	Location	Aquifer	Installation Date
WML189-49	Located in chain pillars between LW1 and LW2	Lem15	-
WML189-93		Arties	
WML189-101		Pikes Gully	
WML191-52		Lem15	-
WML191-100		Pikes Gully	
WML191-132		Upper Liddell	
WML191-155		Upper Lower Lower Liddell	
WML191-200		Lower Barrett	
WML106-32	Located outside southern end of LW1	Lem15	July-06
WML106-68		Lem19	
WML106-84		PG	
WML107A-38	Located outside southern end of LW2	Lem11	May-06
WML107A-69		Lem15	
WML107A-98		Lem19	
WML107B		Lem8-9	Sep-06
WML108A-53	Located outside southern end of LW3	Lem11-12	Apr-06
WML108A-80		Lem15	
WML108B		Lem8-9	

Piezometer	Location	Aquifer	Installation Date
WML109A-36	Located inside southern end of LW4	Lem8-9	Apr-06
WML109A-65		Lem11-12	Apr-06
WML109A-84		Lem15	
WML109B		Lem7	
WML110A-36	Located inside southern end of LW5	Lem6	May-06
WML110A-64		Lem8-9	
WML110A-90		Lem10-12	
WML110A-110		Lem15	
WML110B		Lem6 OB	
WML110C		BC Colluvium/Alluvium	
WML111B	Located inside southern end of LW6A	CM Overburden	May-06
WML111A-24*		Lem4	
WML111A-54*		Lem7	
WML111A-90*		Lem11-12	
WML111A-118*		Lem15	
WML269-24*	Located in main gate chain pillars close to LW5 start line	Lem5	-
WML269-56*		Lem7	
WML269-64*		Lem8-9	
WML269-92*		Lem11-12	
WML269-122*		Lem15	
WML269-142*		Lem19	
WML112C	Located near start line of LW7A	BC Alluvium	July-06
WML112B		Bayswater 1-2	
WML112A-43*		Lem2-3	
WML112A-72*		Lem6-7	
WML112A-101*		Lem8	
WML112A-130*		Lem15	
WML113C	Located just west of southern end of LW7A	BC Alluvium	May-06
WML113B-18*		Bayswater 1	
WML113A-40*		Bayswater 2	
WML113A-65*		Lem9	
WML113A-95*		Lem10-12	
WML113A-124*		Lem15	
WML114A-68	Located south of the Bowmans Creek oxbow inside LW5	Lem10-12	May-06
WML114A-88		Lem15	
WML114A-108		Lem19	
WML114B		Lem6-9	
WML115A-40	Located inside northern part of LW7B	Lem7	-

Piezometer	Location	Aquifer	Installation Date
WML115A-72		Lem8-9	
WML115A-93		Lem15	
WML115A-120		Lem19	
WML115A-144		Pikes Gully	
WML115B		CMOB & Lem3-4	-
WML115C		BCA	
WML213-48	Located south west of LW7A	Bayswater	-
WML213-110.5		Lem8-9	
WML213-169.5		Lem15	
WML213-185.5		Lem19	
WML213-205		PG	
WML213-247		Upper Liddell	
WML213-276		Upper Lower Lower Liddell	
WML213-300		Lower Barrett	
RA8	Located within main gate chain pillars of LW5	Colluvium	-
RA9	Located within the southern part of LW6A	Colluvium	-
RA10	Located above main gate chain pillar of LW7A	BC Alluvium	-
RA11	Located at southwest corner of LW7A	BC Alluvium	-
RA14	Located above LW7A	BC Alluvium	-
RA15	Located west of LW7A	BC Alluvium	-
RA16	Located within main gate chain pillars of LW5	Colluvium	-
RA18	Located just outside northern end of LW6A	BC Alluvium	-
RM02	Located within main gate chain pillars of LW5	Colluvium/CM	-
RM04	West side of Bowmans Creek, west of mid-point of LW7A	BC Alluvium	-
RM06	Located in oxbow between LW7A and LW7B	BC Alluvium/CM	-
RM07	Located in oxbow between LW6A and LW6B	BC Alluvium/CM	-
RM09	Located in the northern section of Bowmans Creek	BC Alluvium	-
T5	Located above northern part of LW7B	BC Alluvium	-
T6		BC Alluvium	-
T7		BC Alluvium	-
RA30		BC Alluvium	-
WMLP299	Located between LW4 and LW6B, adjacent to proposed eastern diversion of Bowmans Creek	BC Alluvium	Jun-10
WMLP308		BC Alluvium	Feb-10
WMLP300	Located west of LW7A, adjacent to proposed western diversion of Bowmans Creek	BC Alluvium	Jun-10
WMLP314		BC Alluvium	Feb-11
WMLP315		BC Alluvium	Feb-11
WMLP320		BC Alluvium	Feb-11
WMLP320		BC Alluvium	Feb-11

Piezometer	Location	Aquifer	Installation Date
WMLP311	Located between LW4 and LW6B, adjacent to proposed eastern diversion of Bowmans Creek	BC Alluvium	Feb-11
WMLP323	Located between LW4 and LW6B, adjacent to proposed eastern diversion of Bowmans Creek	BC Alluvium	Feb-11
WMLP324	Located between LW4 and LW6B, adjacent to proposed eastern diversion of Bowmans Creek	CM Overburden	Feb-11
WMLP325	Located between LW4 and LW6B, adjacent to proposed eastern diversion of Bowmans Creek	CM Overburden	Feb-11
WMLP326	Located southwest of LW6A	BC Alluvium	Feb-11
WMLP327	Located southwest of LW6A	CM Overburden	Feb-11
T8	Located within / near main gate pillars between LW6A and LW7A	BC Alluvium	-
T9		BC Alluvium	-
T10		BC Alluvium	-
WML275	Located within/close to southern end of LW6A	BC Alluvium	-
WML276		BC Alluvium	-
RA27	Located to the south of LW5-LW7A, along the bank of Hunter River	HR Alluvium	-
WML277		HR Alluvium	-
WML278		HR Alluvium	-
WML279		HR Alluvium	-
WML280		HR Alluvium	-
T1-A	Located between LW4 and LW6B, adjacent to proposed east diversion of Bowmans Creek	BC Alluvium	-
T1-P		CM Overburden	-
T2-A	located within LW7A, 200m from LW6A goaf edge, and 440m from LW5 goaf edge	BC Alluvium	-
T2-P		CM Overburden	-
T3-A	located within southern part of LW7A, 65m from LW6A goaf edge	BC Alluvium	-
T3-P		CM Overburden	-
T4-A	located within the southern part of LW6A, about 155m from the start line	BC Alluvium	-
T4-P		CM Overburden	-
RA12	Located mid-panel within LW5	Colluvium	-
WML110C	Located inside southern end of LW5	Colluvium	May-06
WML119	Located in the barrier east of LW1	Pikes Gully	Jun-06
WML120A		Pikes Gully	Jun-06
WML120B		GC Alluvium	Jun-06
WML129		GC Alluvium	-
WML181		Pikes Gully	Mar-07
WML182		Pikes Gully	Mar-07
WML183		Pikes Gully	Mar-07
WML184		Pikes Gully	Mar-07
WML185		Pikes Gully	Mar-07
WML186		Pikes Gully	Mar-07

Piezometer	Location	Aquifer	Installation Date
WML187		Pikes Gully	Mar-07
WMLP301		Arties	Jul-10
WMLP302		Arties	Jul-10
WML261		Upper Liddell	Oct-09
WML262		Upper Liddell	Oct-09
WML239	Located to the east of Glennies Creek	GC alluvium	Oct-08
WML240		GC alluvium	Oct-08
WML241		GC alluvium	Oct-08
WML243		GC alluvium	Oct-08
WML247		GC alluvium	Oct-08
WML249		GC alluvium	Oct-08
WML252		GC alluvium	Oct-08
WML253		GC alluvium	Oct-08
WML256		GC alluvium	Oct-08
WML294		GC colluvium	Oct-08
AP243		GC alluvium	Apr-10
AP244		GC alluvium	Apr-10
AP245		GC alluvium	Apr-10
WMLC144		ULD	Oct-08
		MLD1	
		MLD2	
		ULLD	
		LLLD	
		UB	
		LB	
WMLC245		ULD	Oct-08
		MLD	
		LB	
		LB-Heb interburden	



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RPS Aquaterra

Ashton Coal Operations Ltd

Monitoring Bore Location Plan

Figure D1