Works Approval W6468 Havieron Project

Construction Compliance Report

Non-critical containment infrastructure and monitoring bores

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1. INTRODUCTION

Compliance reporting of infrastructure and monitoring equipment is required by Conditions 9 – 11 of Department of Water and Environmental Regulation (DWER) Works Approval W6468/2020/1.

1.1 SCOPE

The scope of this compliance audit report relates specifically to infrastructure and equipment required under Conditions 3 and 4 of the Works Approval, as listed below:

- Dewatering pipelines
- Stormwater Management System
- Water Cart
- Monitoring Bores.

2. COMPLIANCE REPORTING (NON-CRITICAL CONTAINMENT INFRASTRUCTURE)

2.1 REQUIREMENTS

In relation to non-critical containment infrastructure, the Works Approval requirements are:

9. The works approval holder must within 30 calendar days of an item of infrastructure required by condition 3 being constructed and/or installed:
   a) undertake an audit of their compliance with the requirements of condition 3; and
   b) prepare and submit to the CEO an Environmental Compliance Report on that compliance.

10. The Environmental Compliance Report required by condition 9, must include as a minimum the following:
   a) certification by a qualified engineer that the items of infrastructure or component(s) thereof, as specified in condition 3, have been constructed in accordance with the relevant requirements specified in condition 3;
   b) as constructed plans and a detailed site plan for each item of infrastructure or component of infrastructure specified in condition 3; and
   c) be signed by a person authorised to represent the works approval holder and contains the printed name and position of that person.

2.2 AUDIT SCHEDULE AND FINDINGS

The compliance audit schedule for the infrastructure required by Condition 3 is provided in Table 1.

The compliance audit identified the following:

- The ‘as-constructed’ location of the dewatering pipeline (Figure 1) is different to the location of the pipeline shown in Figure 1 of the Works Approval. The change is considered a net benefit to environmental outcomes, as identified in Table 1.

- All other elements have been fully complied with.

Accordingly it is considered that the requirements of Condition 9 have been fulfilled. The certifications provided in Section 4 and the as constructed site plan shown in Figure 1 are considered to satisfy the requirements of Condition 10.

Table 1: Audit of compliance with requirements of Condition 3

#	Requirement	Inspection Result/Evidence	Compliance Status
Table 2: Design and construction/installation requirements (Infrastructure and equipment)			
T2.1	**Dewatering Pipeline**		
	To be constructed of HDPE pipeline.	Dewatering pipelines (x2) are 150 mm HDPE with welded joints. Installation and construction meet the specifications of AS 2033 *Installation of Polyethylene Pipe Systems* and applicable Newcrest standards.	**Compliant**
	Flow meters to be installed on dewatering pipelines from the box-cut to the evaporation ponds.	Flow meters have been installed on both dewatering pipelines as below and are located at the decline tag board (Figure 2).	**Compliant**
	Must be located within a V drain of sufficient capacity to completely contain any spills from pipeline leakage or breach for a period equal to the time between routine inspections.	Pipes are located within a v-drain (Figure 3), measuring 1.5m at base and a minimum of 0.3m deep. The base of the drain is sand over clayey material. Any water, including stormwater, that collects in the v-drain empties into lined holding sumps (Figure 4) for evaporation or pumping out. The capacity of the v-drain and the sumps is approximately 700 m^3, which is equivalent to 1 day's dewatering. The pipelines are inspected during each shift, i.e. twice every 24 hrs.	**Compliant**
	Located as shown in Schedule 1, Figure 1	To limit clearing of native vegetation, remain outside of the 1:100 year flood zone and facilitate frequent inspections, the pipes are instead aligned alongside the haul road between the boxcut and the waste rock landform (Figure 1).	**Change**
T2.2	**Stormwater Management System**		

#	Requirement	Inspection Result/Evidence	Compliance Status
	Stormwater diversion bunds to be constructed to divert surface water flows around the construction area.	Stormwater capture/diversion bunds installed around all working areas. Captured stormwater from disturbed areas is directed to the internal stormwater system or captured in sumps. Work has been conducted in dry season so stormwater surface flows have been minimal.	**Compliant**
	Suitable pond mitigation measures to be constructed where required, around the base of evaporation ponds embankment to avoid stormwater ponding.	The base around the ponds is graded away from the ponds and towards low embankments and sumps for the collection of stormwater and protection of the ponds.	**Compliant**
	Must take all reasonable and practicable measures to prevent stormwater run-off becoming contaminated by the activities and operations undertaken at the premises.	The above measures are considered sufficient to prevent contamination. In addition, there are no surface water features present in the flat, sandy landscape surrounding the ponds and site generally.	**Compliant**
T2.3	**Water Cart**		
	Available at all times at the premises during construction phase to suppress dust generated via earthworks, construction of the evaporation ponds, and vehicle and machinery movements.	Two to three watercarts are on site for the purpose of dust suppression along roads, construction areas and other open areas, including laydown areas. Refer Figure 5.	**Compliant**

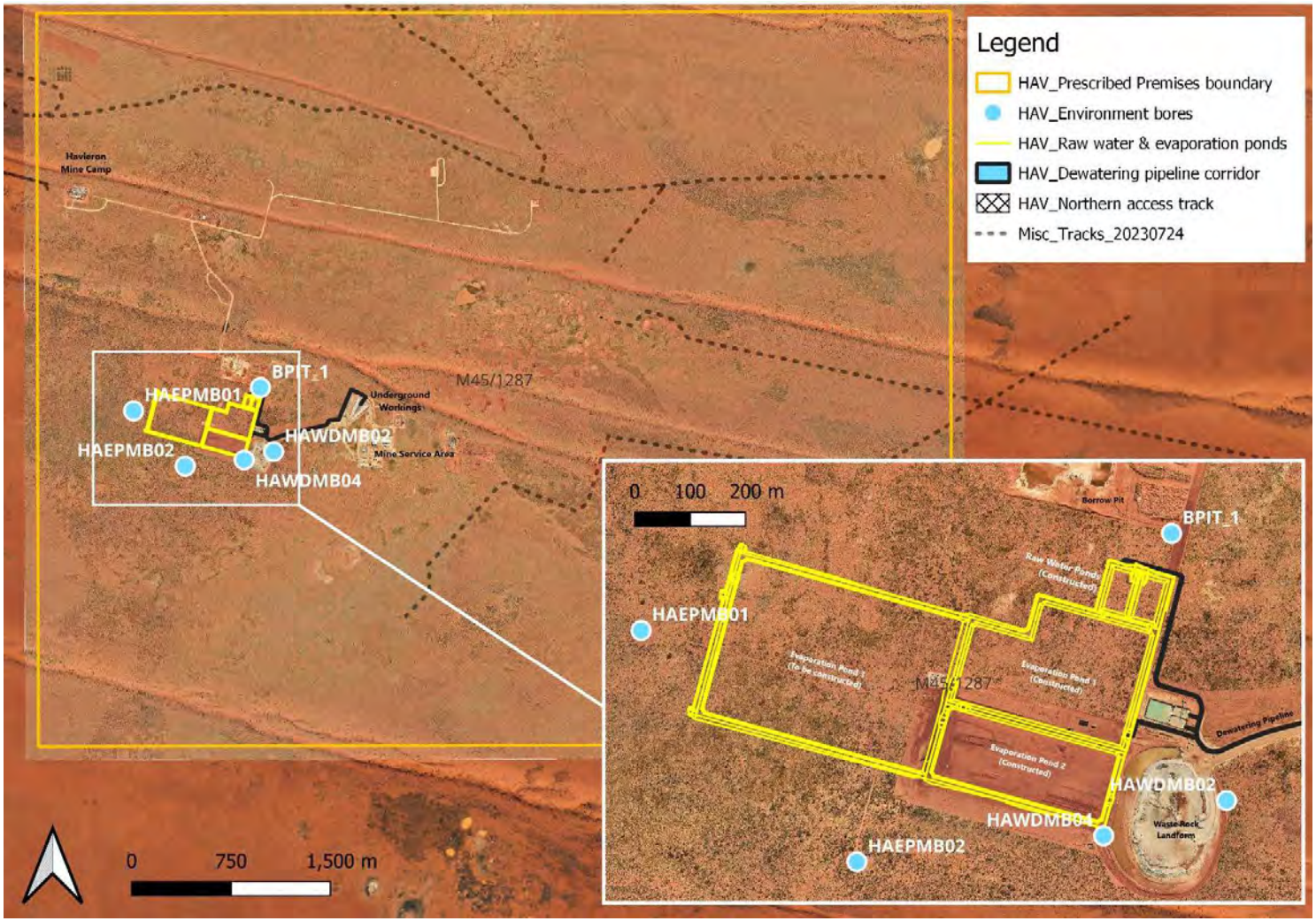


Figure 1: As constructed layout of ponds, pipeline and monitoring bores

Figure 2: Photo of dewatering flowmeters at tag board

Figure 3: Photo showing pipelines (including dewatering) in v-drain (other pipelines carry water from supply bores)

Figure 4: Photo showing pipelines (including dewatering), v-drain and lined overflow sump

Figure 5: One of the several Havieron water trucks used for dust suppression

3. COMPLIANCE REPORTING (GROUNDWATER MONITORING WELLS)

3.1 REQUIREMENTS

In relation to monitoring wells, the Works Approval compliance reporting requirements are:

11. The works approval holder must within 30 calendar days of the monitoring wells being constructed, submit to the CEO a well construction report and baseline groundwater monitoring data evidencing compliance with the requirements of conditions 4 to 6.

3.2 AUDIT SCHEDULE AND FINDINGS

The compliance audit schedule for the infrastructure required by Condition 3 is provided in Table 2.

The compliance audit identified the following:

- The two monitoring wells HAEPMB01 and HAEPMB02 both largely and materially satisfy the requirements of conditions 4 of the Works Approval.

The baseline ambient groundwater monitoring results as required by Condition 5 are provided in Appendix B.

Table 2: Audit of compliance with requirements of Condition 4

#	Requirement	Inspection Result/Evidence	Compliance Status
Table 3: Groundwater monitoring well construction requirements			
T3.1	**Well Construction**		
	To be designed and constructed in accordance with ASTM D5092/D5092M-16: Standard practice for design and installation of groundwater monitoring bores.	The two monitoring wells were designed by an expert hydrogeologist familiar with the Havieron groundwater environment. The two wells were installed by an experienced and suitably qualified drilling crew under the supervision of the hydrogeologist. Both phases satisfied the core requirements of the cited Standard Practice, ensuring representative groundwater quality information will be provided by the two wells.	**Compliant.**
	Well screens must target the part, or parts, of the aquifer most likely to be affected by contamination. Where temporary/seasonal perched features are present, wells must be nested, and the perched features individually screened.	The two bores are screened within saturated soils located above the base of the unconfined aquifer, as identified by various hydrogeological studies of the site e.g. Rockwater 2021. Refer to Appendix A.	**Compliant.**
T3.2	**Logging of Borehole**		
	Soil samples must be collected and logged during the installation of the monitoring wells.	Samples were collected and described at 1 m intervals, for interpretation by the overseeing hydrogeologist and to inform detailed bore design.	**Compliant.**
	A record of the geology encountered during drilling must be described and classified in accordance with the Australian Standard Geotechnical Site Investigations AS1726.	The borehole was logged using methodology consistent with "Minimum Construction Requirements for Water Bores in Australia, 4th Edition" (NUDLC 2020), which is very similar to the methodology described in AS1726.	**Partially Compliant.**

#	Requirement	Inspection Result/Evidence	Compliance Status
	Any observations of staining / odours or other indications of contamination must be included in the bore log.	No indicators of contamination (including ASS) were noted in the logs, noting the both bores are in natural soils previously undisturbed by human activity.	**Compliant.**
T3.3	**Well Construction Log**		
	Well construction details must be documented within a well construction log to demonstrate compliance with ASTM D5092/D5092M-16. The construction logs shall include elevations of the top of casing position to be used as the reference point for water-level measurements, and the elevations of the ground surface protective installations.	The well construction logs are provided in Appendix A.	**Compliant.**
T3.4	**Well Development**		
	Installed monitoring wells must be developed after drilling to remove fine sand, silt, clay and any drilling mud residues from around the well screen to ensure the hydraulic functioning of the well. A detailed record should be kept of well development activities and included in the well construction log.	The wells were flushed over several days to remove silts etc and any drilling fluids; however details of the development activities were not incorporated into the well log. Note that the bores were installed some time ago and have been sampled on numerous occasions (bore logs were submitted at the time to Water Licensing Branch of DWER and not to Part V Licensing)	**Partially Compliant.**
T3.5	**Installation Survey**		
	The vertical (top of casing) and horizontal position of each monitoring well must be surveyed and subsequently mapped by a suitably qualified surveyor.	Refer to borelogs in Appendix A.	**Compliant.**
T3.6	**Well Network Map**		

#	Requirement	Inspection Result/Evidence	Compliance Status
	A well location map (using aerial image overlay) must be prepared and include the location of the monitoring and their respective identification numbers.	Refer to Figure 1	**Compliant.**

4. WORKS APPROVAL HOLDER CERTIFICATION

The above deliverables are compliant with that of condition 1 of Works Approval W6468/2020/1. The certifications provided have been audited and are correct.

5. REFERENCES

National Uniform Drillers Licensing Committee (NUDLC) 2020. *Minimum Construction Requirements for Water Bores in Australia.* 4th Edition.

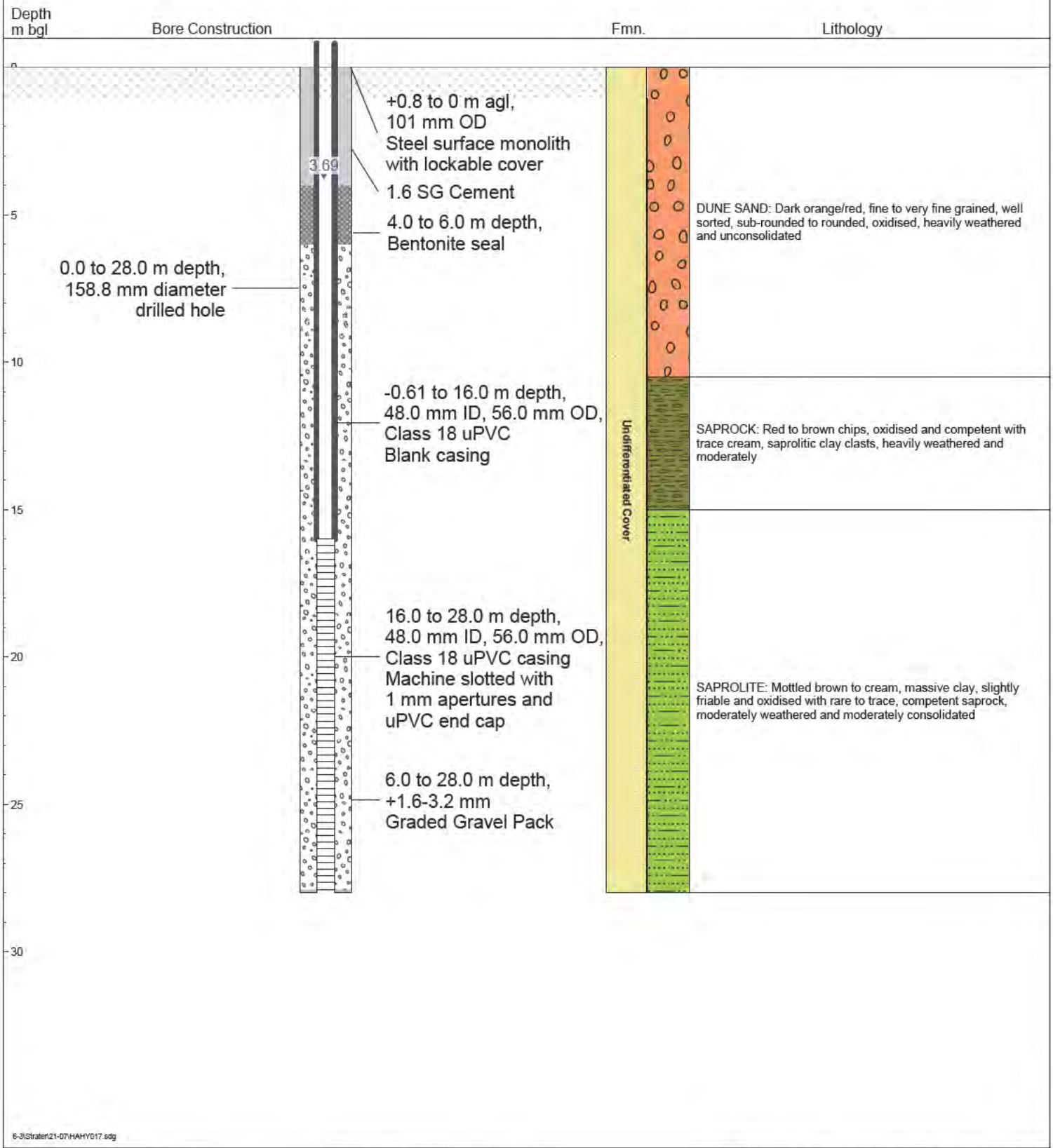
Rockwater 20201. *H-3 Level Hydrogeological Assessment of the Havieron Project*. Unpublished report prepared for Newcrest Australia. December 2021. Available at https://www.epa.wa.gov.au/proposals/havieron-underground-mine-project

6. APPENDIX

A. APPENDIX A – BORE LOGS

B. APPENDIX B – GROUNDWATER MONITORING RESULTS

Rockwater
CONSULTANT HYDROGEOLOGISTS



6-3\Strater\21-07\HAHY017.sdg

Construction Date:	15-08-2021	Depth Drilled (m bgl):	28.0	SWL m bgl (m RL):	3.69 (241.246 m RL)
Easting:	461,081.520	Top of Casing (m agl):	0.61	Water Chemistry:	~17.4 mS/cm 7.86 pH
Northing:	7,597,331.749	Cased Depth (m bgl):	16.0	Final Airlift Yield (L/s):	~0.1
Elevation (m AHD):	244.936	Slotted Casing (m bgl):	16.0 to 28.0		

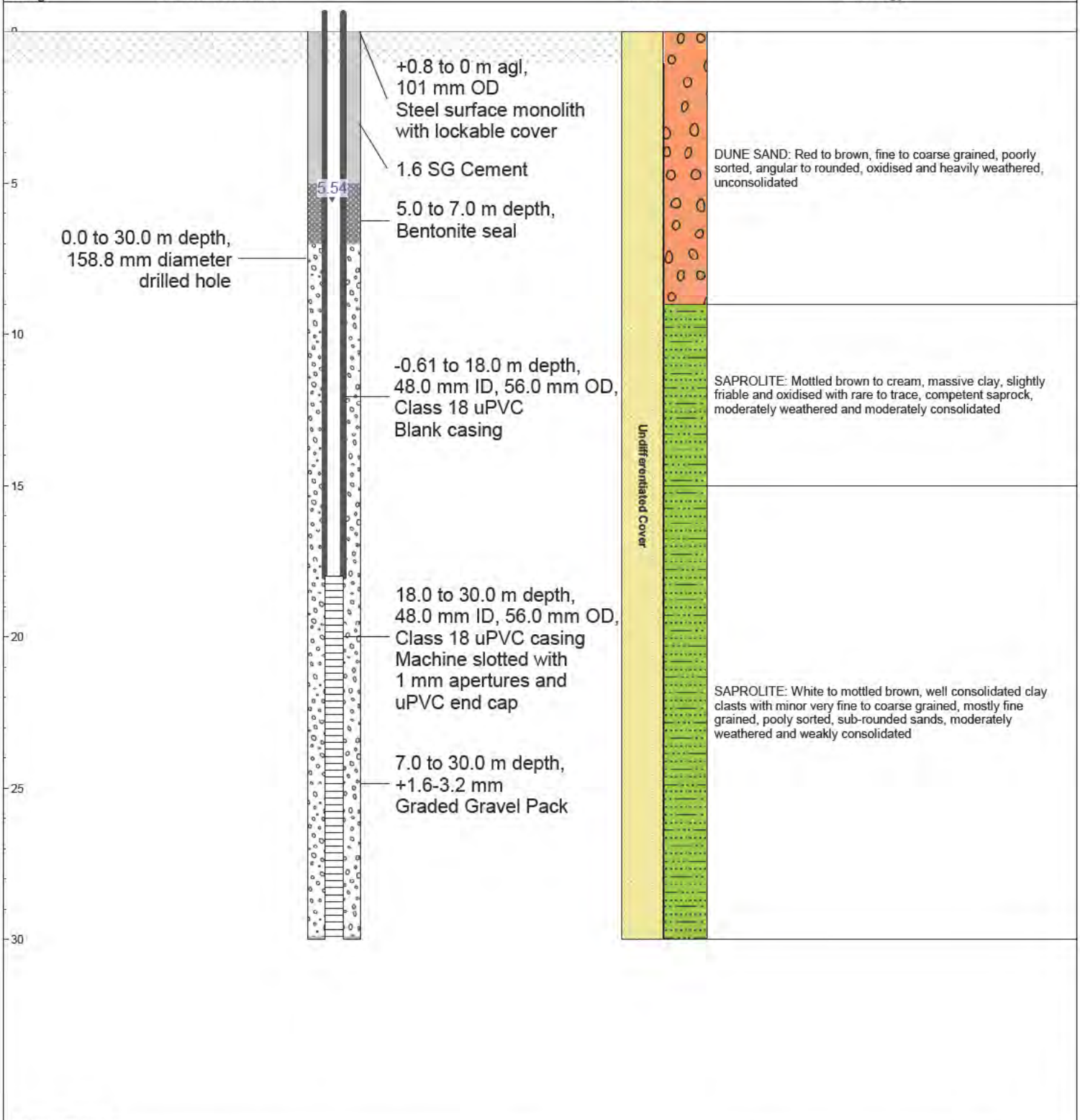
Client:	Newcrest Mining
Project:	Havieron Groundwater Investigation
Date:	October 2021
Dwg. No:	6-3/21/7-X

HAEPMB01

HAHY017
COMPOSITE BORE LOG

Rockwater
PROPRIETARY LIMITED

Rockwater
CONSULTANT HYDROGEOLOGISTS



6-3\Strater\21-07\HAHY018.sdg

Construction Date:	16-08-2021 to 17-08-2021	Depth Drilled (m bgl):	30.0	SWL m bgl (m RL):	5.54 (241.99 m AHD)
Easting:	461,469.66	Top of Casing (m agl):	0.61	Water Chemistry:	~6.13 mS/cm 8.09 pH
Northing:	7,596,912.74	Cased Depth (m bgl):	18.0	Final Airlift Yield (L/s):	~0.1
Elevation (m AHD):	247.53	Slotted Casing (m bgl):	18.0 to 30.0		

Client:	Newcrest Mining
Project:	Havieron Groundwater Investigation
Date:	November 2021
Dwg. No:	6-3/21/7-App II-VII

HAHY023a
COMPOSITE BORE LOG

Rockwater
PROPRIETARY LIMITED

Appendix B: Baseline Groundwater Quality HAEPMB01 and 02

BORE	DATE	SWL (mbgl)	pH	EC (uS/cm)	TDS (mg/L)	Hardness (mg/L	Alkalinity (mg/L	Ca (mg/L	Mg (mg/L	Na (mg/L	K (mg/L	NH4 (mg/L	PO4 (mg/L	CO3 (mg/L	SO4 (mg/L	NO3 (mg/L	Si (mg/L	Al (mg/L	Fe (mg/L	Mn (mg/L
HAEPMB01	15/03/2023	5.35	7.54	17000	11700	2420	264	366	367	3130	127	0.04	0.20	<1	2500	5.65	65.7	<0.01	<0.05	0.01
HAEPMB02	15/03/2023	4.88	7.93	12885	8374	4410	101	1100	404	2370	51	0.07	0.14	<1	2000	0.64	20.4	<0.05	0.90	0.46

	HAVIERON PROJECT Civil Discipline Surface Pipework – Low Pressure **C3.T018**	NEWCREST MINING LIMITED

Sub System:		Sub System Description:	
		System Designation:	

1. Reference Data			
Pipeline	DEWATERING PIPELINE		
Pipeline Material:	HDPE / METAL FLANGE		
Pipe Diameter	90	Number of Lines	4
Operating Pressure	1 Bar	Test Pressure	1.5 Bar

2. Signal Tests

Enter either your 'initial' for YES, a 'X' for NO or 'N/A' in the box and quantify any deficiencies (X) in the 'Comments' section

	Preliminary	
2.1	Confirm all threaded joints have thread sealing tape or sealing compound, unless specified otherwise.	✓
2.2	Confirm all threaded joints are tight.	✓
2.3	Confirm all flanges have been visually inspected for proper fitment.	✓
2.4	Confirm all welds have been inspected as per 700-810-PP-SPE-0003	✓
2.5	Confirm all pipe supports are installed as per Contractor drawings.	✓
	Pre-test	
2.6	Confirm that Test Gauges cover the required test range	✓
.7	Confirm that piping is full of water and all air has been bled from system	✓
2.8	Confirm that there is no flow through piping	✓
2.9	Confirm that the line to be pressure tested has at least one pressure relief or on/off valve fitted.	✓
	Hydrostatic Tests	
2.10	Test limit valves closed and system pressurised to test pressure.	✓
2.11	Confirm that test pressure has been maintained (and not exceeded) for a minimum of one hour.	✓
2.12	Whilst under test pressure, the entire pipe system has been inspected for signs of leaks around flanges, connections, welds, etc.	✓
2.13	All leaks have been noted, repaired and retested.	N/A
2.14	At the completion of successful hydrostatic testing, the pipeline has been confirmed as empty.	✓
2.15	Confirm that all valves and blanking flanges at the extremities of the successfully tested system have been suitably tagged to ensure that accidental opening does not occur.	✓

3. Comments / Remedial Action Required

Sign Off	**Name**	**Signature**	**Date**
Submitted by: (Contractor)	[redacted]	[redacted]	9.11.2023
Verified by: (Contractor)	[redacted]	[redacted]	
Accepted by: (Client)	[redacted]	[redacted]	9/11/23