Government of Western Australia
Department of Water and Environmental Regulation

Works Approval

Works approval number	W6882/2024/1
Works approval holder	BHP Nickel West Pty Ltd
ACN	004 184 598
Registered business address	125 St Georges Terrace PERTH WA 6000
DWER file number	DER2024/000002 INS-0002720
Duration	12/06/2024 to 11/06/2029
Date of amendment	28/01/2026

Premises details

1. Kwinana Nickel Refinery
   Lot 89 on Deposited Plan 411084
   Patterson Road KWINANA BEACH WA 6167
   Certificate of Title Volume 2958 Folio 292

2. Baldivis Facility
   Lot 820 on Plan 77252
   Miller Road BALDIVIS WA 6171
   Certificate of Title Volume 2841 Folio 582
   As depicted in Schedule 1 Figure 1.

Prescribed premises category description (Schedule 1, *Environmental Protection Regulations 1987*)	Assessed production capacity
Category 31: Chemical manufacturing	2,701 tonnes per year of Hydrogen Sulphide Gas 100,000 tonnes per year of Nickel Sulphate
Category 34: Oil or gas refining	6,150 tonnes per year of Hydrogen Gas
Category 44: Metal smelting or refining	90,000 tonnes per year of Nickel Metal

This works approval is granted to the works approval holder, subject to the attached conditions, on 28 January 2026, by:

Caron Goodbourn
Digitally signed by Caron Goodbourn
Date: 2026.01.28 15:37:17 +08'00'

Manager, Process Industries
an officer delegated under section 20 of the *Environmental Protection Act 1986* (WA)

Interpretation

In this works approval:

(a) the words 'including', 'includes' and 'include' in conditions mean "including but not limited to", and similar, as appropriate;

(b) where any word or phrase is given a defined meaning, any other part of speech or other grammatical form of that word or phrase has a corresponding meaning;

(c) where tables are used in a condition, each row in a table constitutes a separate condition;

(d) any reference to an Australian or other standard, guideline, or code of practice in this works approval:

(i) if dated, refers to that particular version; and

(ii) if not dated, refers to the latest version and therefore may be subject to change over time;

(e) unless specified otherwise, any reference to a section of an Act refers to that section of the EP Act; and

(f) unless specified otherwise, all definitions are in accordance with the EP Act.

NOTE: This works approval requires specific conditions to be met but does not provide any implied authorisation for other emissions, discharges, or activities not specified in this works approval.

Works approval conditions

The works approval holder must ensure that the following conditions are complied with:

Decommissioning and enabling works.

Infrastructure and equipment

1. The works approval holder must construct and/or install the infrastructure listed in Table 1, prior to commencing relining works for Evaporation Cell 1, Evaporation Cell 2 or Evaporation Cell 3, in accordance with;

(a) the corresponding design and construction requirement / installation requirement; and

(b) at the corresponding infrastructure location as set out in Table 1.

Table 1: Design and construction requirements

	Infrastructure	Design and deconstruction requirements	Infrastructure location and specifications
1.	Laydown area construction	*Subgrade:* (a) The top of the laydown area level must be more than 3 m above the highest seasonal groundwater level at the lowest point;	As shown in Figure 4 of Schedule 1

	Infrastructure	Design and deconstruction requirements	Infrastructure location and specifications
		(b) Material beneath the liner layer must be composed of inert fill/aggregate as defined in the *Landfill Waste Classification and Waste Definitions 1996* (as amended 2019); (c) Aggregate layer below the liner to be a minimum depth of 50mm, Aggregate layer above the liner to be a minimum depth of 150mm; (d) Aggregate must be size graded before use so as to not cause damage to the liner or sedimentation within the subgrade; (e) Unsuitable material from below the formation level must be removed and filled with suitable material; (f) Damage or deterioration of the subgrade must be repaired using suitable material; (g) The subgrade must be compacted to greater than 95% MMDD and within ±2% OMC; (h) Laydown area floor to be constructed with a minimum fall of 1% towards evaporation cell 1 or evaporation cell 2; (i) To be constructed with a 500mm earth bund along the north, east and south outer perimeters of the laydown area; (j) Must be designed and constructed to prevent a run on- run off of surface water from the laydown area except into evaporation cell 1 or evaporation 2 during a 1 in 100 year storm event of 24 hours duration; and (k) Water truck/cart available at all times to wet down areas prior to planned dust generating activities and when dust is visible. *High Density Polyethylene liner (HDPE)* (l) HDPE liner must extend over the entire laydown area base and the side bund embankments; (m) lined and to have a permeability of 1 x 10^{-9}m/s or less across the base and perimeter bunds of the laydown area; (n) Must be uniform and free of pin holes, blisters, blemishes, striations, bubbles, roughness, contaminants and permanently attached raw materials; (o) Completely sealed and waterproof along all joins and seams with heat welded joints; (p) All seams and joins made on site should be continuous; (q) Panels of the liner should be overlapped by a minimum of 75mm prior to heat welding; (r) Engineered and constructed so as to be capable	

	Infrastructure	Design and deconstruction requirements	Infrastructure location and specifications
		of accommodating the weight and movement of materials, vehicles and equipment used in the screening, drying, storage and handling of solids without compromising the integrity of the laydown area or altering the permeability standard; (s) The liner must extend into evaporation cell 1 or evaporation cell 2 to allow run off to flow into these cells; and (t) All drainage infrastructure including bunds, pipes, berms, valves and pumps operated on the laydown area are subject to daily visual monitoring.	

2.

The works approval holder must undertake the following decommissioning works prior to commencing relining works for Evaporation Cell 1, Evaporation Cell 2 and Evaporation Cell 3:

(a) either deconstruct, remove and/or isolate, the following infrastructure;

(b) in accordance with the corresponding design and removal requirements; and

(c) at the corresponding infrastructure location as set out in Table 2.

Table 2: Design and construction requirements

	Infrastructure	Design and removal requirements	Infrastructure location
1.	Pit boss units and evaporation sprinklers and associated pipe work, pumps and electrical equipment	(a) All items to be flushed, cleaned of all solids and emptied within the existing evaporation cells prior to being transported to the existing unlined laydown area.	Shown as EC1, EC2 and EC3 in Figure 2 of Schedule 1
2.	Conveyance pipework, valves and pumps	(a) Prior to removal, conveyance pipework, valves and pumps are pumped until they are empty of liquor and ~~or~~ evaporation cell residue; (b) Isolated from inflow/outflow conveyance infrastructure; and (c) All items to be flushed, cleaned of all solids and emptied within the existing evaporation cells prior to being transported to the existing unlined laydown area.	Not applicable
3.	Solids removal	(a) Removed from each pond via a robotic dredge or with mobile earth moving equipment; (b) The robotic dredge shall be designed to avoid	Not applicable

	Infrastructure	Design and removal requirements	Infrastructure location
		damage of the existing liner; (c) Dredging will be monitored using CCTV and ultrasonic viewing systems; (d) All dredge hoses and connection points shall float to avoid contact with liner; (e) Robotic dredge to be deployed via crane, access ramp or protective geotextile mat to reduce tension on the existing liner; (f) The robotic dredge to be fitted with emergency air bag, causing the dredge to float where it can be retrieved using ropes; (g) Solids removed by the robotic dredge to be conveyed to the laydown area where they are screened using a belt screen and the salts separated into a sealed containment unit (h) Following the removal of crystalline nickel salts, the residual solids will be pumped to an adjacent evaporation cell, or collected on the laydown area, for future offsite disposal. (i) Non-friable solids removed via mobile earth moving equipment	
4.	Removal of effluent/liquor	(a) All pipelines, valves and pumps are subject to daily visual monitoring; (b) Pipelines transferring liquid between the evaporation ponds and the staging pond containing automatic leak detection shut off valves (c) Pipelines associated with the evaporation cell subject to relining drain back towards the evaporation cell being relined, or back to the staging pond. (d) Any uncontrolled releases of liquor from pipes, valves and pumps will be managed in accordance with BHP Nickel West Spill Procedure (HSE-PRO-0025). (e) A pumping system shall be available for use as required to manage effluent levels between the cells and prevent overtopping.	Not applicable

3. The works approval holder must design, construct, and install groundwater monitoring wells in accordance with the requirements specified in Table 3.

Table 3: Infrastructure requirements – groundwater monitoring wells

	Infrastructure	Design and deconstruction requirements	Infrastructure location
1.	New groundwater monitoring/ leachate recovery well(s)	(a) Must be located down gradient of evaporation cell 1, evaporation cell 2 and evaporation cell 3	Shown as BAL-DPR-09A, BAL-DPR-10 and BAL-DPR-11 in Figure 20 of Schedule 1
		Well design and construction: (b) Designed and constructed in accordance with ASTM D5092/D5092M-16: Standard practice for design and installation of groundwater monitoring bores. (c) 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.	
		Logging of borehole (d) Soil samples must be collected and logged during the installation of the monitoring wells. (e) A record of the geology encountered during drilling must be described and classified in accordance with the Australian Standard Geotechnical Site Investigations AS1726. (f) Any observations of staining / odours or other indications of contamination must be included in the bore log.	
		Well construction log: (g) 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.	
		Well development: (h) All 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.	
		Installation survey: (i) the vertical (top of casing) and horizontal position of each monitoring well must be surveyed and subsequently mapped by a suitably qualified surveyor.	

	Infrastructure	Design and deconstruction requirements	Infrastructure location
		Well network map: (j) a well location map (using aerial image overlay) must be prepared and include the location of all monitoring wells in the monitoring network and their respective identification numbers.	

Note 1: refer to Section 8 of Schedule B2 of the *Assessment of Site Contamination NEPM* for guidance on well screen depth and length.

Environmental monitoring

4. The works approval holder must monitor groundwater during this works approval for the concentrations of the identified parameters in accordance with Table 4.

Table 4: Groundwater monitoring requirements

Monitoring location	Parameter	Unit	Averaging period	Frequency	Sampling methodology
BAL-2209-08 BAL-2209-07 BAL-2209-06 BAL-2209-05 BAL-288 01	pH[1]	pH units	Spot sample	Weekly during solids removal and re filling of the evaporation cells	AS/NZS 5667.1 and
	Electrical conductivity	µS/cm			
	Standing water level (SWL)[2]	m AHD (and mbgl)			
	Total Nitrogen		Spot sample	At least one sample monthly for the duration of the works approval	AS/NZS 5667.11
	Nitrate- nitrogen	µS/cm			
	Ammonia-nitrogen	m AHD (and mbgl)			
	Hexavalent chromium				
	Total chromium				
	Cadmium				
	Cobalt				
	Copper				
	Mercury				
	Molybdenum				
	Nickel				

Monitoring location	Parameter	Unit	Averaging period	Frequency	Sampling methodology
	Lead				
	Zinc				

Note 1: In-field non-NATA accredited analysis permitted.

Note 2: SWL shall be determined prior to collection of other water samples.

Evaporation cell relining construction works

Infrastructure and equipment

5. The works approval holder must:

(a) construct and/or install the critical containment infrastructure;

(b) in accordance with the corresponding design, construction and installation requirements; and

(c) at the corresponding infrastructure location as set out in Table 5;

Table 5: Design and construction requirements

	Infrastructure	Design and construction requirements	Infrastructure location and specifications
1.	Relining of Evaporation Cell 1, Evaporation Cell 2 and Evaporation Cell 3	*Subgrade:* (a) The top of the cells formation level must be more than 3 m above the highest seasonal groundwater level at the lowest point of the cell; (b) The subgrade must be compacted to greater than 95% MMDD and within ±2% OMC; (c) The subgrade surface must be smooth, free of debris, roots, sticks and sharp rocks so that it supplies a firm platform and bonding surface for the two layers of a polypropylene or polyester cushion/protection geotextile layer; (d) Unsuitable material from below the formation level must be removed and filled with suitable material; (e) Damage or deterioration of the subgrade must be repaired using suitable material; and (f) Floors to be maintained with gradient of 2% towards the two center valley's of each evaporation cell floor, with a 1% gradient down slope towards the western internal toe embankments as specified in Figures 4, 5, 6, 7 and 8 of Schedule 1. *Secondary liner: Geosynthetic Composite Liner (GCL), polyethylene geo membrane and two cushion geotextile cushion layers;* (g) The cells must be lined with an engineered composite lining system that includes the	Shown as EC1, EC2 and EC3 in Figure 2 of Schedule 1 Floor of evaporation cells Figures 4, 5, 6, 7, 8 and 9 of Schedule 1; Liner layers shown in Figures 10, 11, 14, 15, 16 and 19 of Schedule

	Infrastructure	Design and construction requirements	Infrastructure location and specifications
		following components, installed in ascending order: a. a 2 mm thick double textured polyethylene geomembrane; b. a minimum 6 mm thick GCL that has a permeability of less than 3 x 10^{-11} m/s or equivalent; and	1
		(h) There must be no transverse jointing/overlapping of GCL panels on side slopes and all side slope panels must extend from the anchor trench down to a minimum of 2 m onto the cell base; (i) GCL panel seams must have a minimum overlap of 300 mm and be joined by the addition of bentonite paste; (j) Polyethylene geo-membrane panel seams must have a minimum overlap of 75 mm and, as far as practicable, be orientated so that the seam is in the down sloping direction; (k) A leak detection survey must be undertaken following construction of the liner and prior to placement of the leachate collection layer.	Liner Panel arrangement shown in Figures 10, 11 and 12 of Schedule 1
		Leakage/leachate collection layer (l) A cushion Geotextile layer to be installed above the secondary liner and beneath the primary liner at locations where panel drains are present; (m) The leakage outlet pipe to be below the floor level at the internal embankment toe; (n) The cushion/protection geotextile must be sufficient to protect the polyethylene geo-membrane liner such that it achieves a maximum allowable global strain of 4%; (o) New leachate outlet pipe to be installed through the existing outlet pipe within the existing outlet pits and shall include a 45 degree Y-junction orientation for access upstream (or similar); (p) Leakage pipe at liner connection to be concrete cased and welded to the HDPE plate to ensure a permeability of less than 1 x 10^{-9}m/s; (q) The HDPE plate is of at least 4mm thickness; (r) Mesh plate is 5mm thick with wires of 20mm spacing to be welded to the HDPE plate to hold it in place until the drains are covered; (s) Leakage drain to have direct contact with the valley panel drains; and (t) The leachate management system must be connected to the external leachate main to convey extracted seepage to the existing leachate	Liner geotextile cushion later arrangement Figure 15 of Schedule 1 Leakage outlet pipe locations Figures 4, 5, 6 and 7 of Schedule 1 Leakage outlet arrangement Figures 18 and 19 of Schedule 1

	Infrastructure	Design and construction requirements	Infrastructure location and specifications
		evaporation ponds. *Conductive geotextile layer* (u) Installed to support leak detection survey of the Primary Liner. *High Density Polyethylene liners (HDPE) (Primary liner)* (v) Primary liner comprised of 2 mm thick HDPE based geomembrane liner; (w) To extend over the entire pond base and up the side embankments; (x) Must be uniform and free of pin holes, blisters, blemishes, striations, bubbles, roughness, contaminants and permanently attached raw materials; (y) Completely sealed and waterproof along all joins and seams with heat welded joints; (z) All seams and joins made on site should be continuous; (aa) Panels of the liner should be overlapped by a minimum of 75mm, prior to heat welding; and (bb) Leak detection survey to be carried out following installation. *Anchor Trench* (cc) The liners must be fixed within anchor trenches in accordance with Figure 12 for internal embankments and 13 for external embankments; (dd) Anchor trenches must be excavated straight and parallel to embankment centerline and backfilled and suitably compacted in horizontal layers not exceeding 150 mm in thickness; (ee) Anchor trench size is 0.6 m deep by 0.5 m wide; (ff) Anchor trenches on shared embankments to be capped with gravel and a geotextile and moisture barrier; (gg) The geotextile and moisture barrier to extend 100mm beyond the capping gravel on internal embankments; (hh) Existing surface materials reinstated to a minimum of 150mm thick above liners (ii) Reinstated surface material shall be free draining with no low spots that could lead to ponding; (jj) Shall have a minimum operational dead storage level of 500mm above the highest floor level of each cell; and (kk) Designed to withstand wind speed of 86km/hr and with a suction factor of 0.54 for 1V in 3H batter	Liner layers shown in Figures 10, 11, 12, 15, 16 and 19 of Schedule Anchor trench configuration Figure 13, 14 and 16 of Schedule 1 Anchor trench with capping and moisture batter Figure 10, 11 and 12 of Schedule 1

	Infrastructure	Design and construction requirements	Infrastructure location and specifications
		slopes. *Sealing balance pipes* (ll) During temporary suspension the balance pipes shall be mechanically blocked by a HDPE plate on both ends;; (mm) HDPE plate of at least 4mm shall be used; (nn) Balance pipes shall be mechanically blocked at both ends *General* (oo) repairs are to be undertaken for any leaking or damaged section of the liners (once and if identified; (pp) Resources to patch and repair liners kept on site in case they are required; (qq) Visual inspection of leak detection system and flow rates to assist with early detection of faults; and (rr) Access ramps into the ponds shall be covered with a cushion geotextile and a 300mm wearing course	Balance pipe specifications Figure 3 and 17 of Schedule 1

6. The works approval holder must undertake construction quality assurance, including visual inspection and materials testing for the subgrade, cushion and separation geotextiles, geosynthetic clay liner and HDPE membrane specified in condition 5 in accordance with the requirements set out in Schedule 2.

Critical containment infrastructure reporting

7. The works approval holder must within 60 calendar days of completion of the relining of each cell identified by condition 5 being constructed:

(a) undertake an audit of their compliance with the requirements of conditions 5 and 6; and

(b) prepare and submit to the CEO a Critical Containment Infrastructure Report on that compliance.

8. The Critical Containment Infrastructure Report required by condition 7 must include as a minimum the following:

(a) certification by the Quality Control / Quality Assurance Consultant that each item, or component thereof, of the critical containment infrastructure meets the requirements of condition 5 and 6 the relevant Technical Specification and that the works have been carried out in accordance with the relevant Quality Control / Quality Assurance Plan;

(b) as-constructed plans and a detailed site plan showing the location and dimensions for each item, or component thereof, of the critical containment infrastructure, as specified in condition 5.

(c) an assessment of construction quality assurance test results as required by condition 6, including a summary of failures, corrective measures, and retest results;

(d) photographic evidence of the installation and any repairs undertaken of the infrastructure;

(e) a copy of the approvals by the Quality Control / Quality Assurance Consultant for each of the hold points listed in the relevant Technical Specification for that evaporation cell;

(f) a copy of the Quality Control / Quality Assurance Validation Report required by the relevant Quality Control / Quality Assurance Plan; and

(g) be signed by a person authorised to represent the works approval holder and contains the printed name and position of that person.

Compliance reporting

9. The works approval holder must, within 60 calendar days of the monitoring wells being constructed, submit to the CEO a well construction report evidencing compliance with the requirements of condition 3.

10. The works approval holder must within 60 calendar days of an item of infrastructure or equipment required by conditions 1, 2 and 3 being constructed/deconstructed, remove/installed and/or isolated :

(a) undertake an audit of their compliance with the requirements of condition 1, 2 and 3; and

(b) prepare and submit to the CEO an Environmental Compliance Report on that compliance audit.

11. The works approval holder must submit to the CEO a summary of groundwater monitoring required by condition 4 60 days after the end of each quarterly reporting period. The summary/report should include as a minimum:

(i) a clear statement of the scope of work carried out;
(ii) a description of the field methodologies employed;
(iii) a diagram with aerial image overlay showing all monitoring locations and depicting groundwater level contours and flow direction. Relevant site features and other potential sources of contamination must also be shown;
(iv) an interpretive summary and assessment of the results against relevant assessment levels for water, as published in the Assessment and management of contaminated sites guideline;
(v) an interpretive summary and assessment of results against previous monitoring results; and
(vi) trend graphs to provide a graphical representation of historical results and to support the interpretive summary.
(vii) Be signed by a person authorised to represent the works approval holder and contains the printed name and position of that person.

Records and reporting (general)

12. The works approval holder must record the following information in relation to complaints received by the works approval holder (whether received directly from a complainant or forwarded to them by the Department or another party) about any alleged emissions from the premises:

(a) the name and contact details of the complainant, (if provided);

(b) the time and date of the complaint;

(c) the complete details of the complaint and any other concerns or other issues raised; and

(d) the complete details and dates of any action taken by the works approval holder to investigate or respond to any complaint.

13. The works approval holder must maintain accurate and auditable books including the following records, information, reports, and data required by this works approval:

(a) the works conducted in accordance with conditions 1,2 3,4, 6, 7;

(b) any maintenance of infrastructure that is performed in the course of complying with condition 1, 2, 3, 4, 6 and 7

(c) monitoring programmes undertaken in accordance with conditions 1,3 5; and 6

(d) complaints received under condition 13.

14. The books specified under condition 14 must:

(a) be legible;

(b) if amended, be amended in such a way that the original version(s) and any subsequent amendments remain legible and are capable of retrieval;

(c) be retained by the works approval holder for the duration of the works approval; and

(d) be available to be produced to an inspector or the CEO as required.

Definitions

In this works approval, the terms in Table 6 have the meanings defined.

Table 6: Definitions

Term	Definition
AS 1289	means the Australian Standard 1289 Methods of testing soils for engineering purposes
AS 1289.3.6.2	means the Australian Standard 1289.3.6.2 Soil classification tests Determination of the particle size distribution of a soil Analysis by sieving in combination with hydrometer analysis (subsidiary method)
AS1726	means the Australian Standard AS1762 Geotechnical site investigations, as amended from time to time;
AS/NZS 5667.1	means the Australian Standard AS/NZS 5667.1 Water quality - Sampling - Guidance on the design of sampling programs, sampling techniques and the preservation and handling of samples
AS/NZS 5667.11	means the Australian Standard AS/NZS 5667.11 Water quality - sampling - guidance on sampling groundwater.
AS 2001.2.3	means the Australian Standard AS 2001.2.3 Methods of test for textiles - Physical tests - Determination of breaking force and extension of

Term	Definition
	textile fabrics
AS 3704	means the Australian Standard AS 3704 Geosynthetics-Glossary of Terms
AS 3705	means the Australian Standard AS 3705 Geotextiles-Identification, marking and general data
AS 3706.1	means the Australian Standard AS 3706.1 Geotextiles - Methods of test - General requirements, sampling, conditioning, basic physical properties and statistical analysis
AS 3706.3	means the Australian Standard AS 3706.3 Determination of tearing strength - Trapezoidal method.
AS 3706.4	means the Australian Standard AS 3706.4 Determination of burst strength - California bearing ratio (CBR) - Plunger method
AS 3706.7	means the Australian Standard AS 3706.7 Determination of pore-size distribution - Dry-sieving method.
AS 3706.9	means the Australian Standard AS 3706.9 Determination of permittivity, permeability and flow rate
Assessment of Site Contamination NEPM	means the National Environment Protection (Assessment of Site Contamination) Measure 1999, as amended from time to time;
ASTM D4354	means the American Society for Testing and Material (ASTM) Standard Practice for Sampling of Geosynthetics and Rolled Erosion Control Products (RECPs) for Testing
ASTM D4355	means the American Society for Testing and Material (ASTM) Standard Test Method for Deterioration of Geotextiles from Exposure to Ultraviolet Light and Water
ASTM D4491	means the American Society for Testing and Material (ASTM) Standard Test Methods for Water Permeability of Geotextiles by Permittivity
ASTM D4533	means the American Society for Testing and Material (ASTM) Standard Test Method for Trapezoid Tearing Strength of Geotextiles
ASTM D4632	means the American Society for Testing and Material (ASTM) Standard Test Method for Grab Breaking Load and Elongation of Geotextiles
ASTM D4751	means the American Society for Testing and Material (ASTM) Standard Test Method for Determining Apparent Opening Size of a Geotextile
ASTM D4833	means the American Society for Testing and Material (ASTM) Standard Test Method for Index Puncture Resistance of Geotextiles, Geomembranes, and Related Products
ASTM D4873	means the American Society for Testing and Material (ASTM) Standard Guide for Identification, Storage, and Handling of Geosynthetic Rolls and Samples

Term	Definition
ASTM D5199	means the American Society for Testing and Material (ASTM) Standard Test Method for Measuring the Nominal Thickness of Geosynthetics
ASTM D5514	means the American Society for Testing and Material (ASTM) Standard Test Method for Large Scale Hydrostatic Puncture Testing of Geosynthetics
ASTM D5888	means the American Society for Testing and Material (ASTM) Standard Guide for Storage and Handling of Geosynthetic Clay Liners
ASTM D5889	means the American Society for Testing and Material (ASTM) Standard Practice for Quality Control of Geosynthetic Clay Liners
ASTM D6072	means the American Society for Testing and Material (ASTM) Standard Practice for Obtaining Samples of Geosynthetic Clay Liners
ASTM D6102	means the American Society for Testing and Material (ASTM) Standard Guide for Installation of Geosynthetic Clay Liners
ASTM D6495	means the American Society for Testing and Material (ASTM) Guide for Acceptance Testing Requirements for Geosynthetic Clay Liners
ASTM D7007	means the ASTM International Standard ASTM D7007 Standard Practices for Electrical Methods for Locating Leaks in Geomembranes Covered with Water or Earth Materials
ASTM D 7703 –16	means the ASTM International Standard Practice for Electrical Leak Location on Exposed Geomembranes Using the Water Lance Method
ASTM D 7953 – 20	means the ASTM International Standard Practice for Electrical Leak Location on Exposed Geomembranes Using the Arc Testing Method
ASTM D5092/D5092M-16	means the ASTM international standard for Standard practice for design and installation of groundwater monitoring wells (Designation: ASTM D5092/D5092M-16), as amended from time to time.
books	has the same meaning given to that term under the EP Act.
CCTV	Means closed circuit television network
CEO	means Chief Executive Officer. CEO for the purposes of notification means: Director General Department administering the *Environmental Protection Act 1986* Locked Bag 10 Joondalup DC WA 6919 info@dwer.wa.gov.au
critical containment infrastructure	means the items of infrastructure listed in condition 1 and 7.
Critical Containment Infrastructure Report	means a report to satisfy the CEO that works of critical containment infrastructure have been constructed in accordance with the works approval.

Term	Definition
Department	means the department established under section 35 of the *Public Sector Management Act 1994* and designated as responsible for the administration of Part V Division 3 of the EP Act.
discharge	has the same meaning given to that term under the EP Act.
emission	has the same meaning given to that term under the EP Act.
Environmental Compliance Report	means a report to satisfy the CEO that the conditioned infrastructure and/or equipment has been constructed and/or installed in accordance with the works approval.
EP Act	Environmental Protection Act 1986 (WA).
EP Regulations	Environmental Protection Regulations 1987 (WA).
GCL3	Means the Geosynthetic Research Institute (GRI) standard Specification for Test Methods, Required Properties, and Testing Frequencies of Geosynthetic Clay Liners
mobile earth moving equipment	Means equipment, such as an excavator, that is used to remove crystalline salts from the embankments of Evaporation Cells 1, 2 and 3.
monthly period	means a one-month period commencing from day 2 of a month until day 1 of the immediately following month. e.g. “means a one-month period commencing from the second day of a month until the first day of the immediately following month.”
premises	the premises to which this works approval applies, as specified at the front of this works approval and as shown on the premises map (Figure 1 and 2) in Schedule 1 to this works approval.
prescribed premises	has the same meaning given to that term under the EP Act.
quarterly reporting period	Quarterly reporting period means 1 January – 31 March, 1 April – 30 June, 1 July – 30 September and 1 October – 31 December of each calendar year
works approval	refers to this document, which evidences the grant of the works approval by the CEO under section 54 of the EP Act, subject to the conditions.
works approval holder	refers to the occupier of the premises being the person to whom this works approval has been granted, as specified at the front of this works approval.

END OF CONDITIONS

Schedule 1: Maps

Premises map

The boundary of the prescribed premises is shown in Figure 1 below.

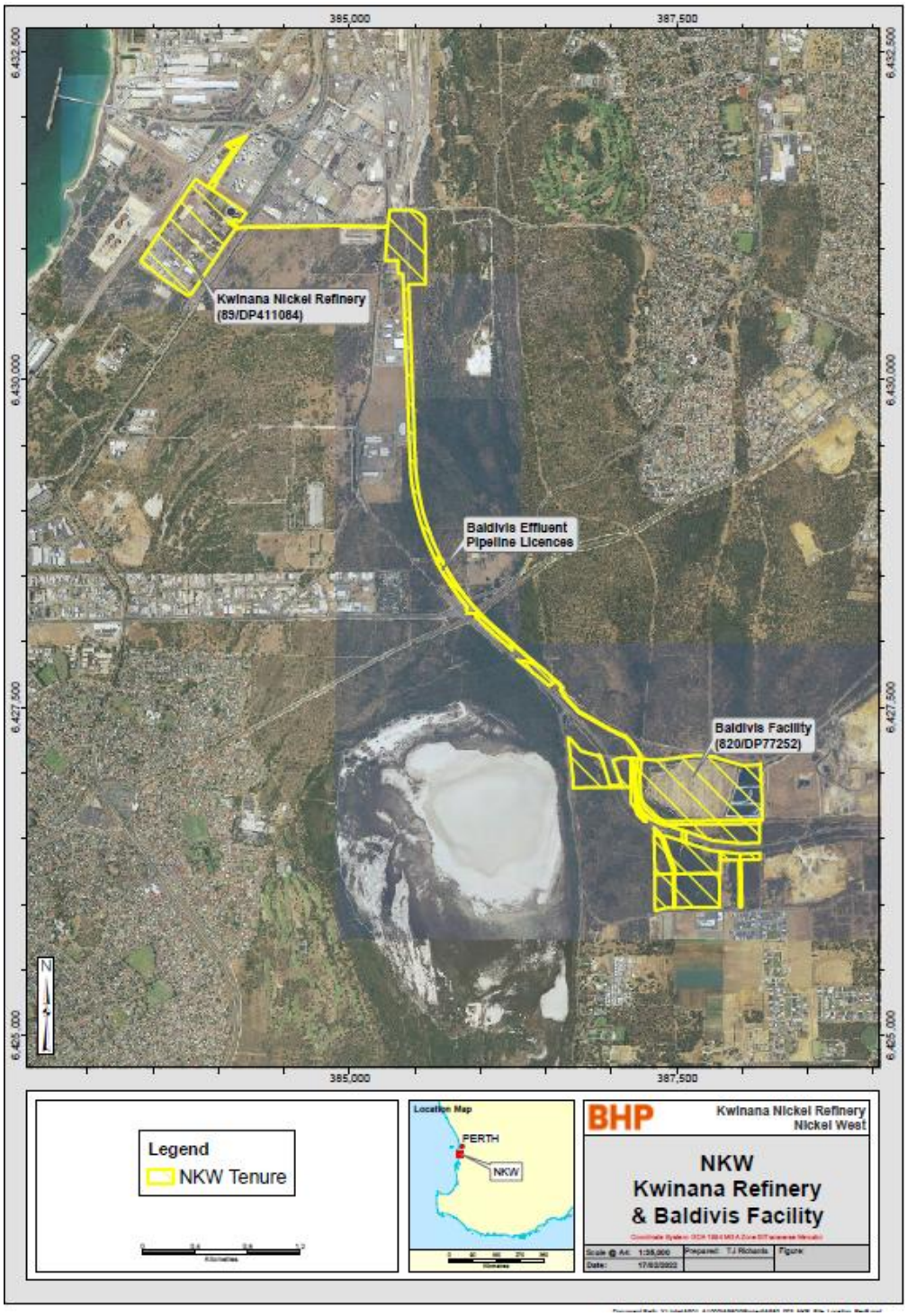
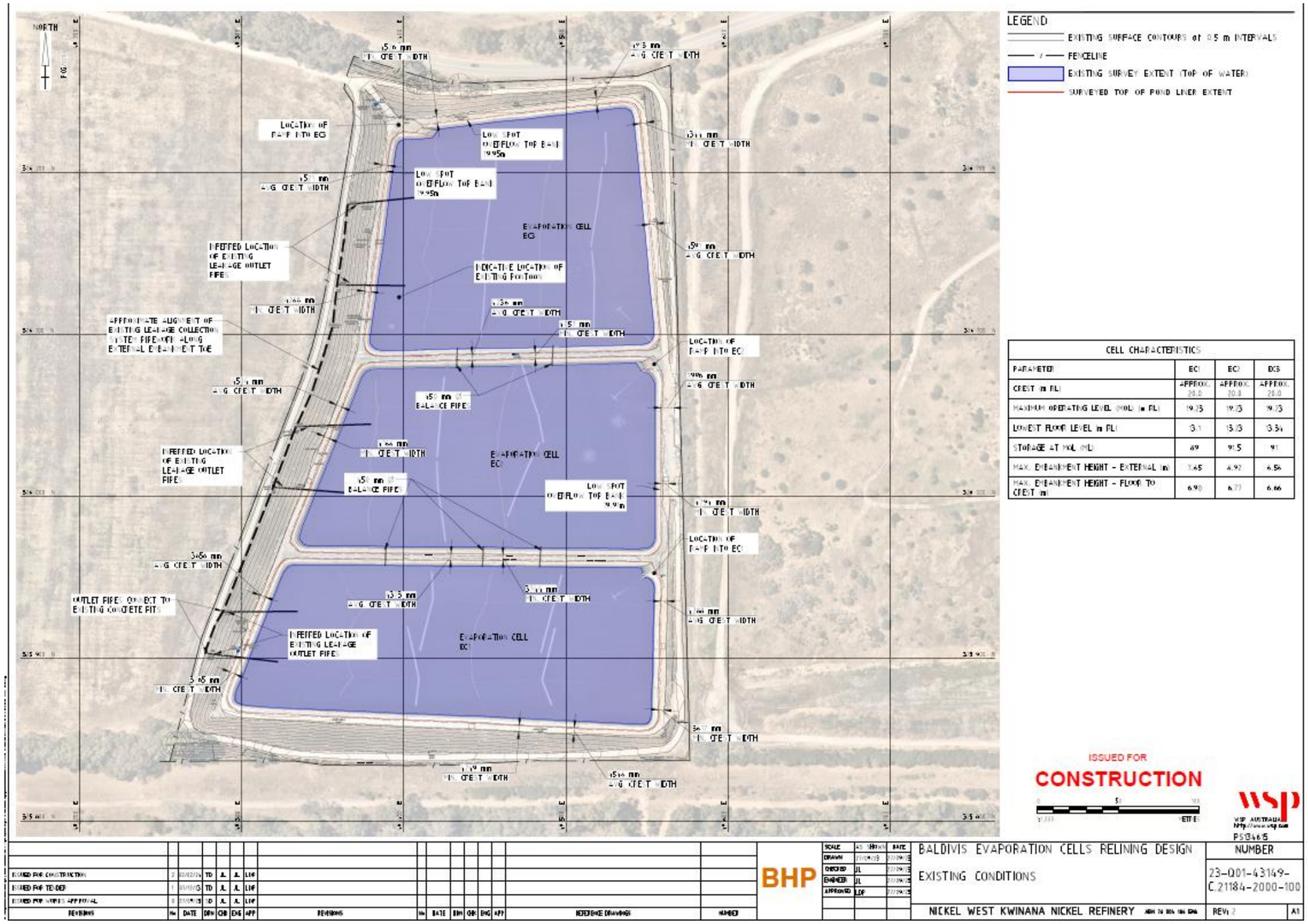


Figure 1: prescribed premises boundary

Figure 2: **Baldivis Facility boundary in relation to the evaporation cells**



CELL CHARACTERISTICS			
PARAMETER	EC5	EC4	EC3
CREST m RL	APPROX. 20.0	APPROX. 20.0	APPROX. 20.0
MAXIMUM OPERATING LEVEL (MOL) m RL	19.35	19.35	19.35
LOWEST FLOOR LEVEL m RL	13.1	13.03	13.34
STORAGE AT MOL ML	69	91.5	91
MAX. EMBANKMENT HEIGHT – EXTERNAL m	7.45	6.92	6.56
MAX. EMBANKMENT HEIGHT – FLOOR TO CREST m	6.90	6.77	6.66

Figure 3: Diagram of evaporation cells showing the location of leakage outlet pipes and balance pipes

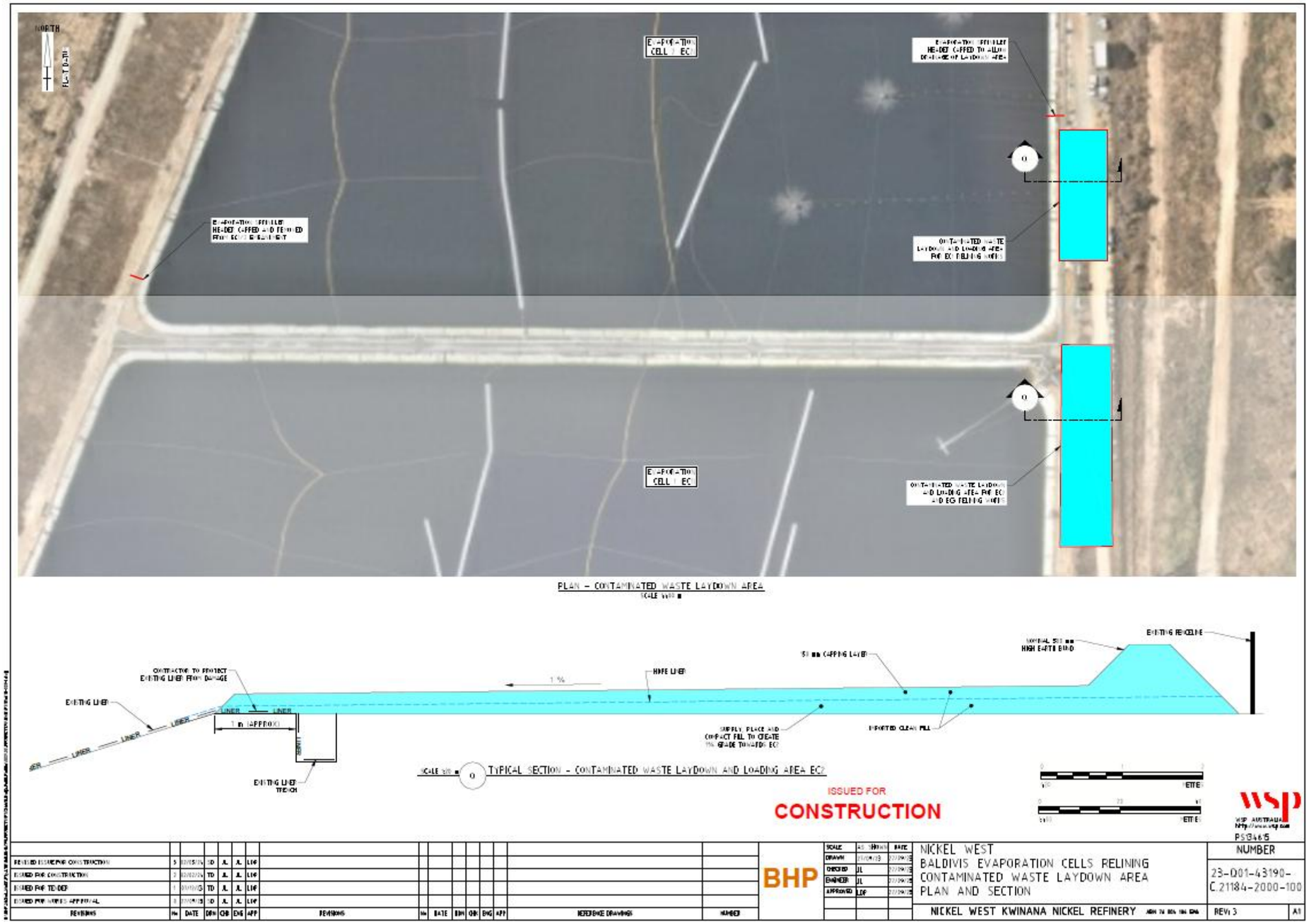


Figure 4: Location of laydown areas with construction cross section

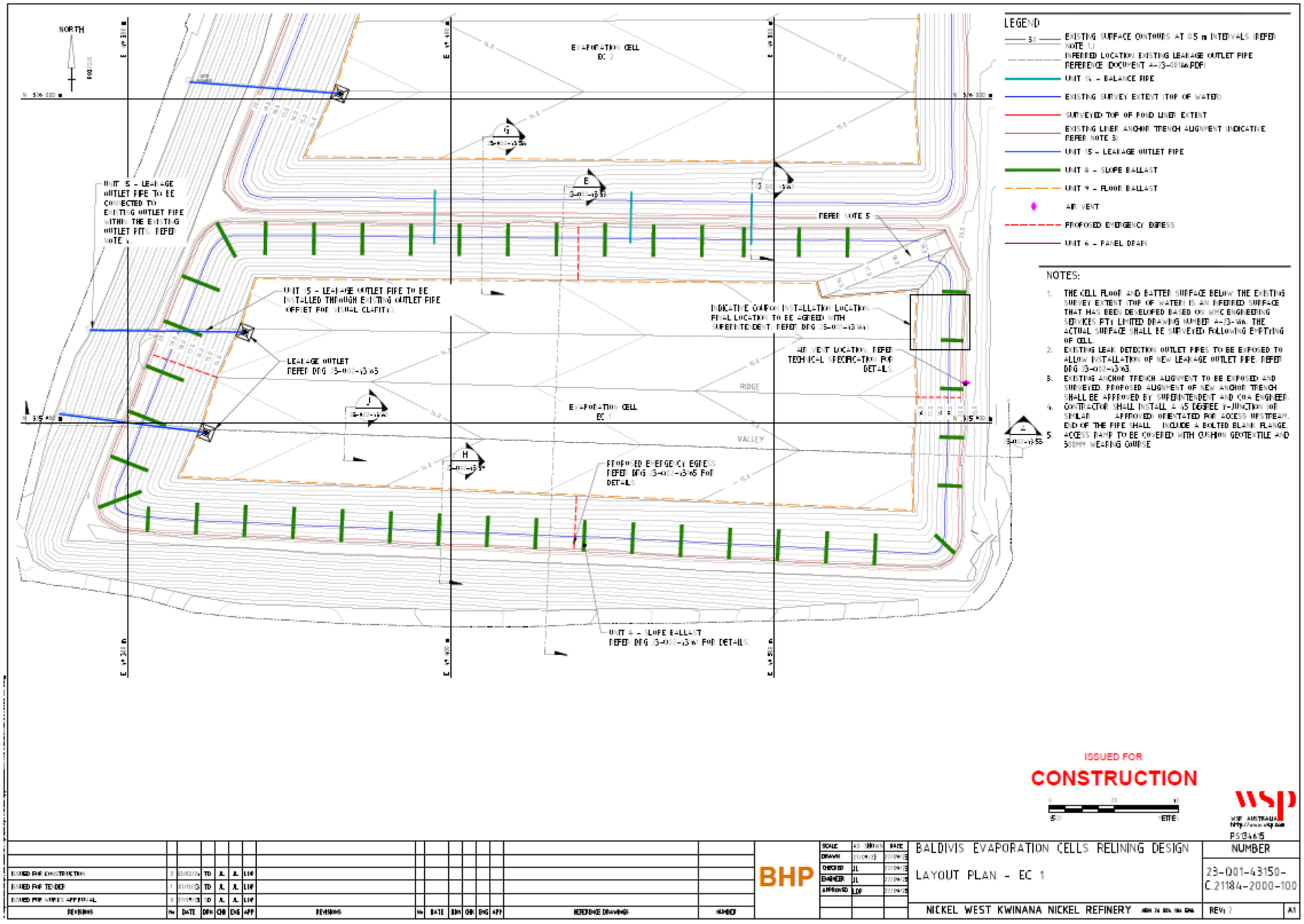


Figure 5: Layout plan for evaporation cell 1 showing access ramp and floor gradient valleys towards leakage outlet pipes

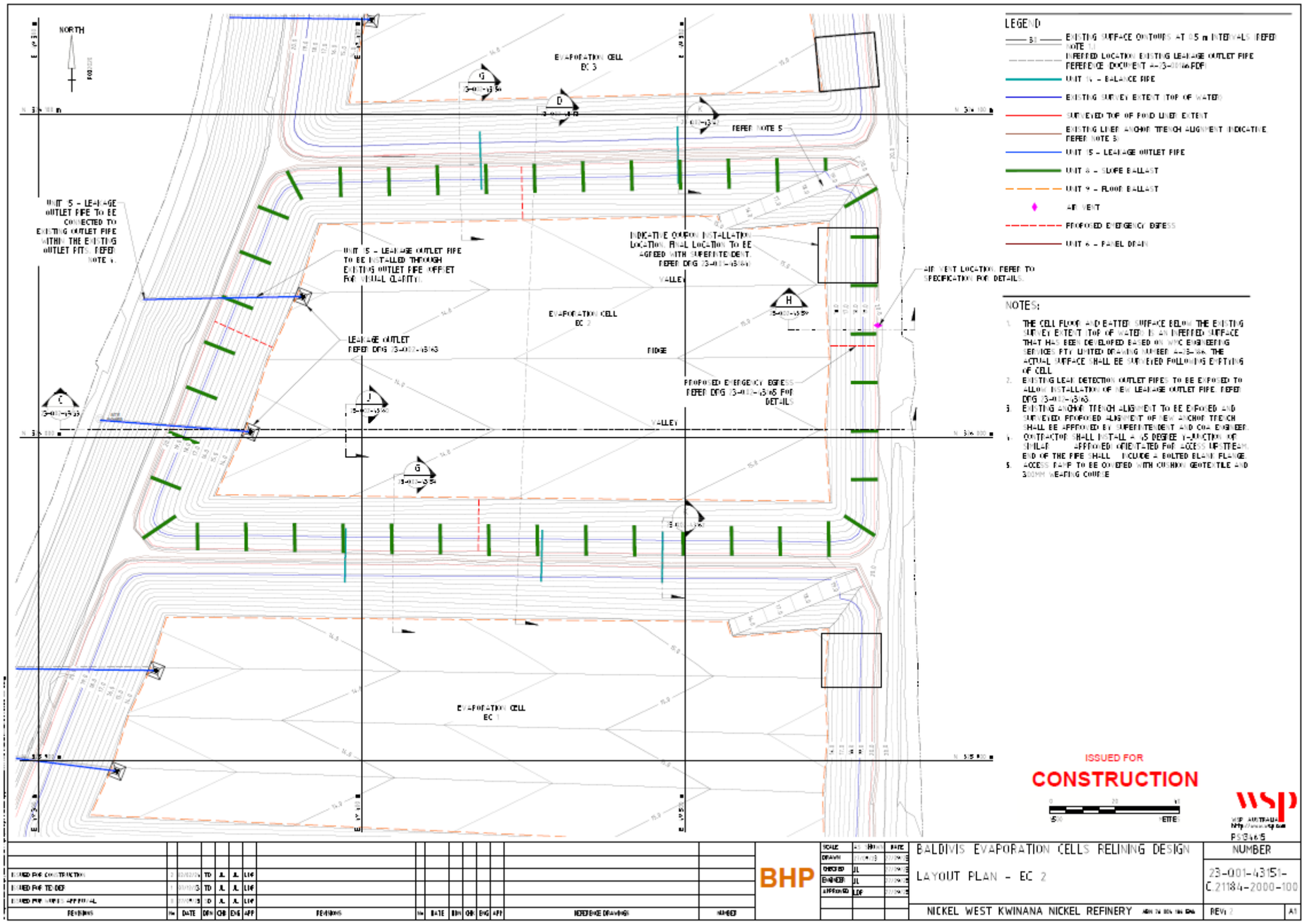


Figure 6: Layout plan for evaporation cell 2 showing access ramp and floor gradient valleys towards leakage outlet pipes

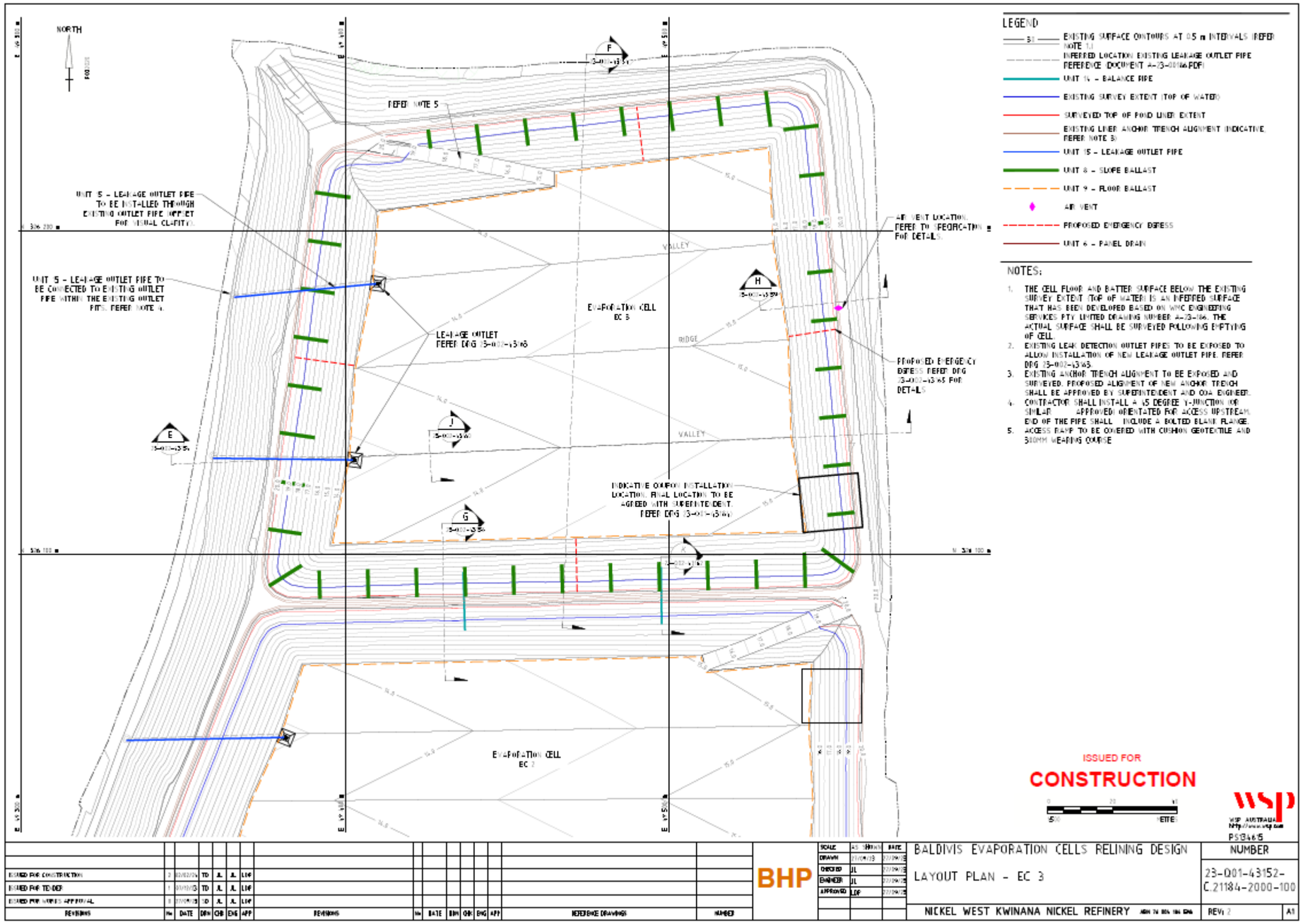


Figure 7: Layout plan for evaporation cell 3 showing access ramp and floor gradient valleys towards leakage outlet pipes

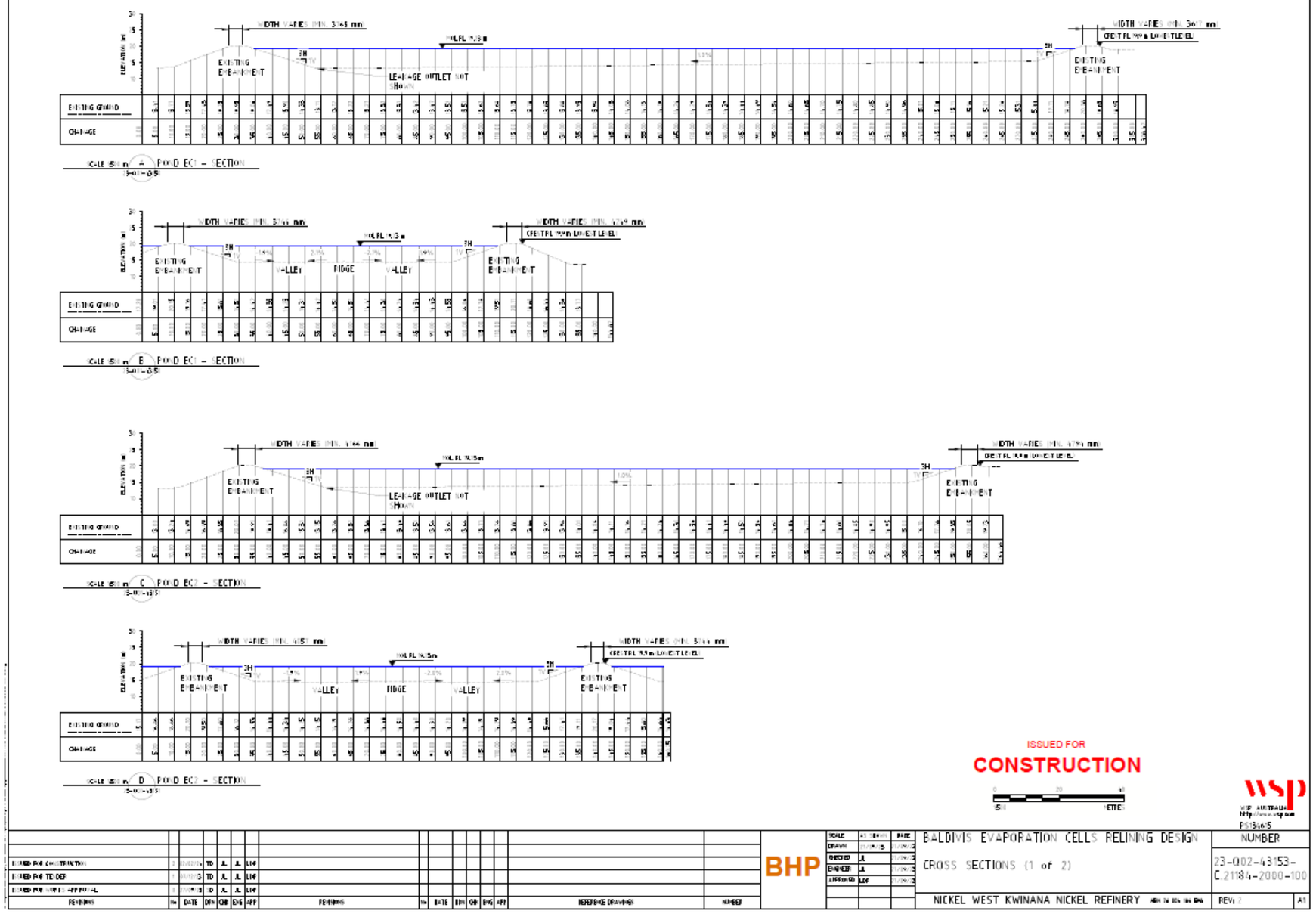
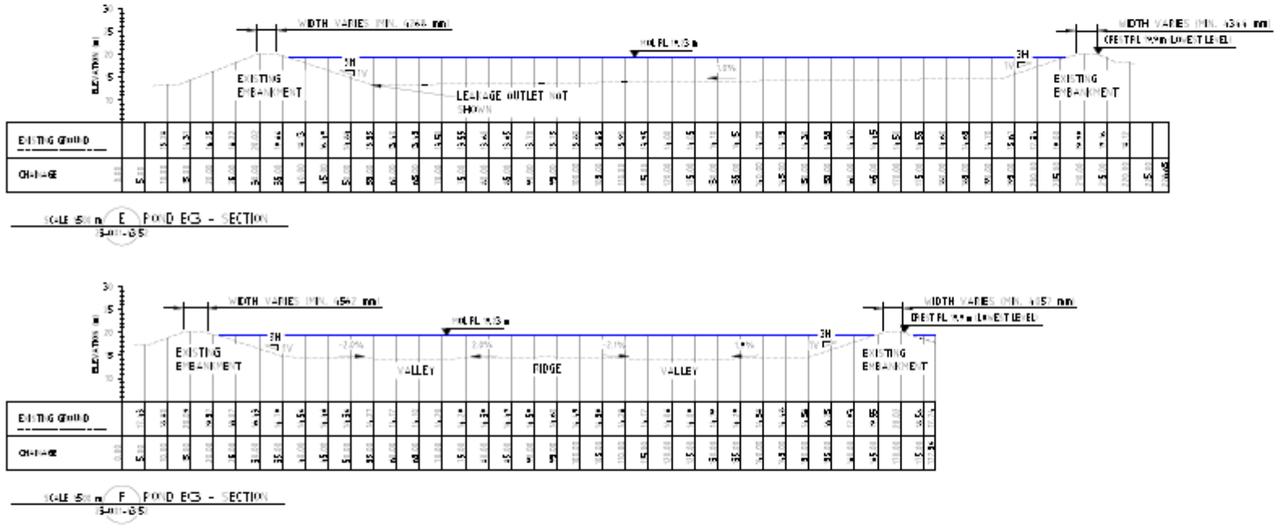


Figure 8: Cross section of evaporation cells 1 and 2 showing access ramp and floor gradient valleys towards leakage outlet pipes



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BALDIVIS EVAPORATION CELLS RELINING DESIGN

CROSS SECTIONS (2 of 2)

NICKEL WEST KWINANA NICKEL REFINERY

NUMBER 23-002-43154-C 21184-2000-100

REV: 2 A1

Figure 9: Cross section of evaporation cell 3 showing access ramp and floor gradient valleys towards leakage outlet pipes

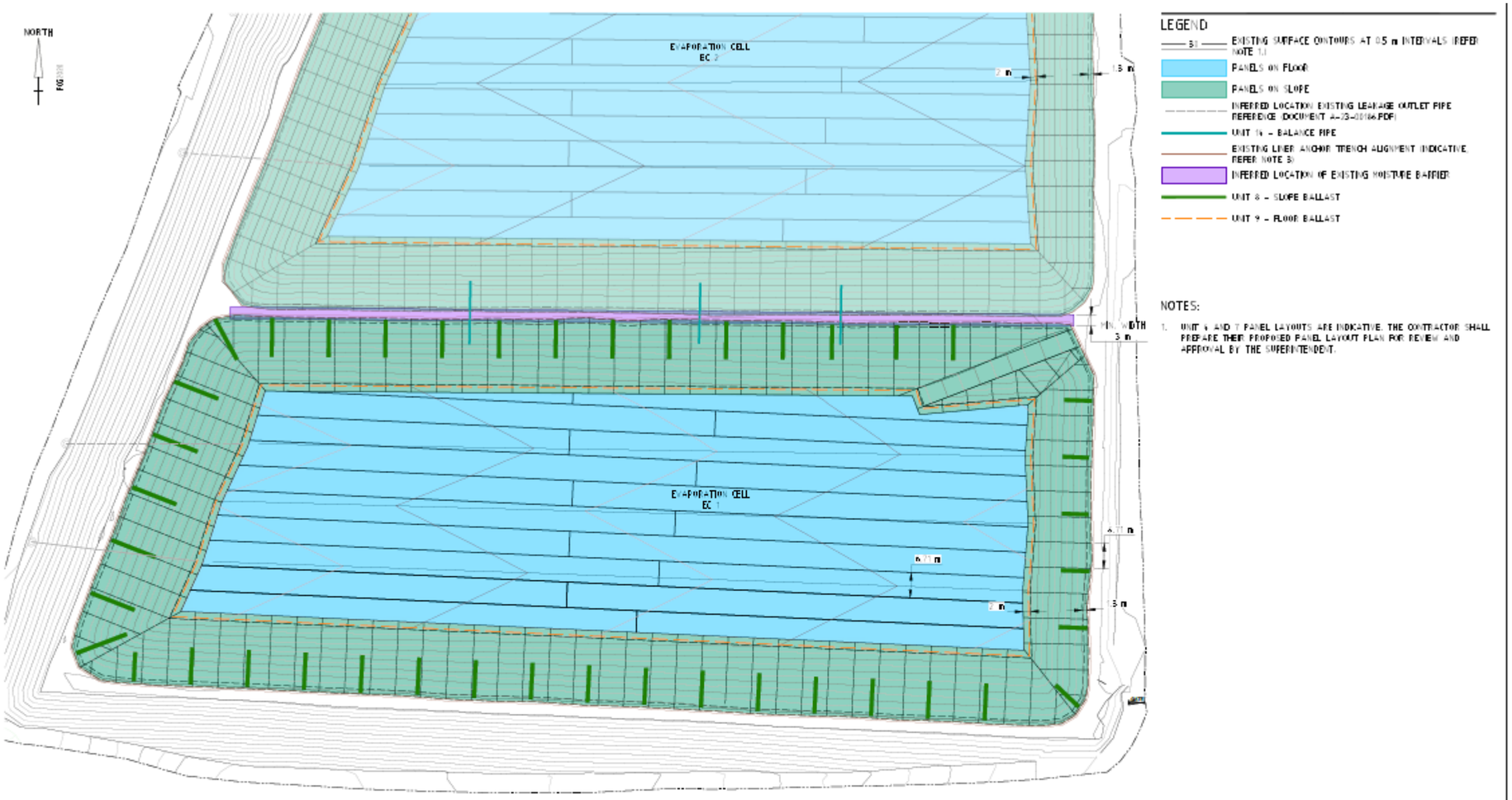


Figure 10: Layout of primary and secondary . panels for evaporation cell 1

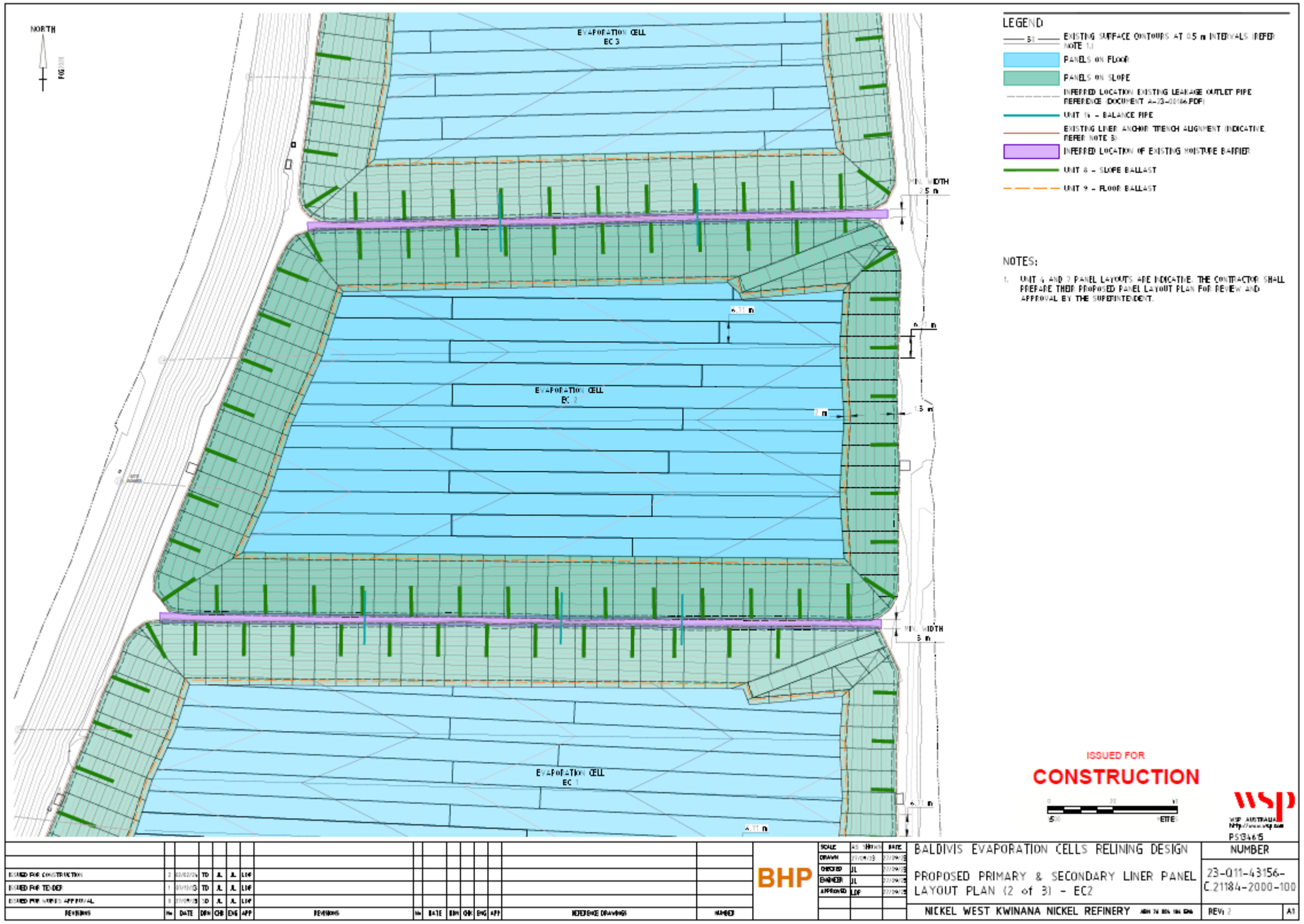


Figure 11: Layout of primary and secondary liner panels for evaporation cell 2

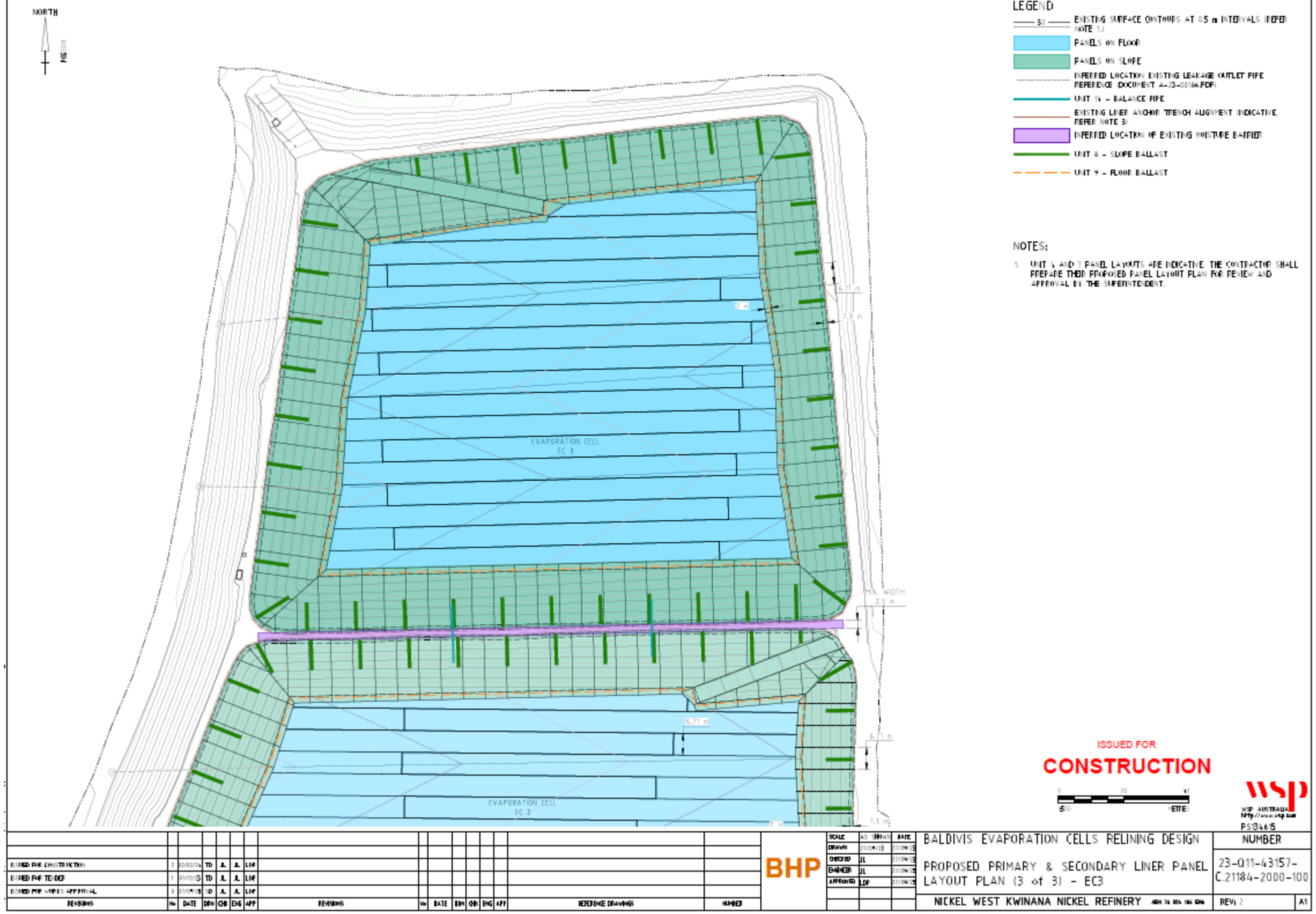


Figure 12: Layout of primary and secondary liner panels for evaporation cell 3

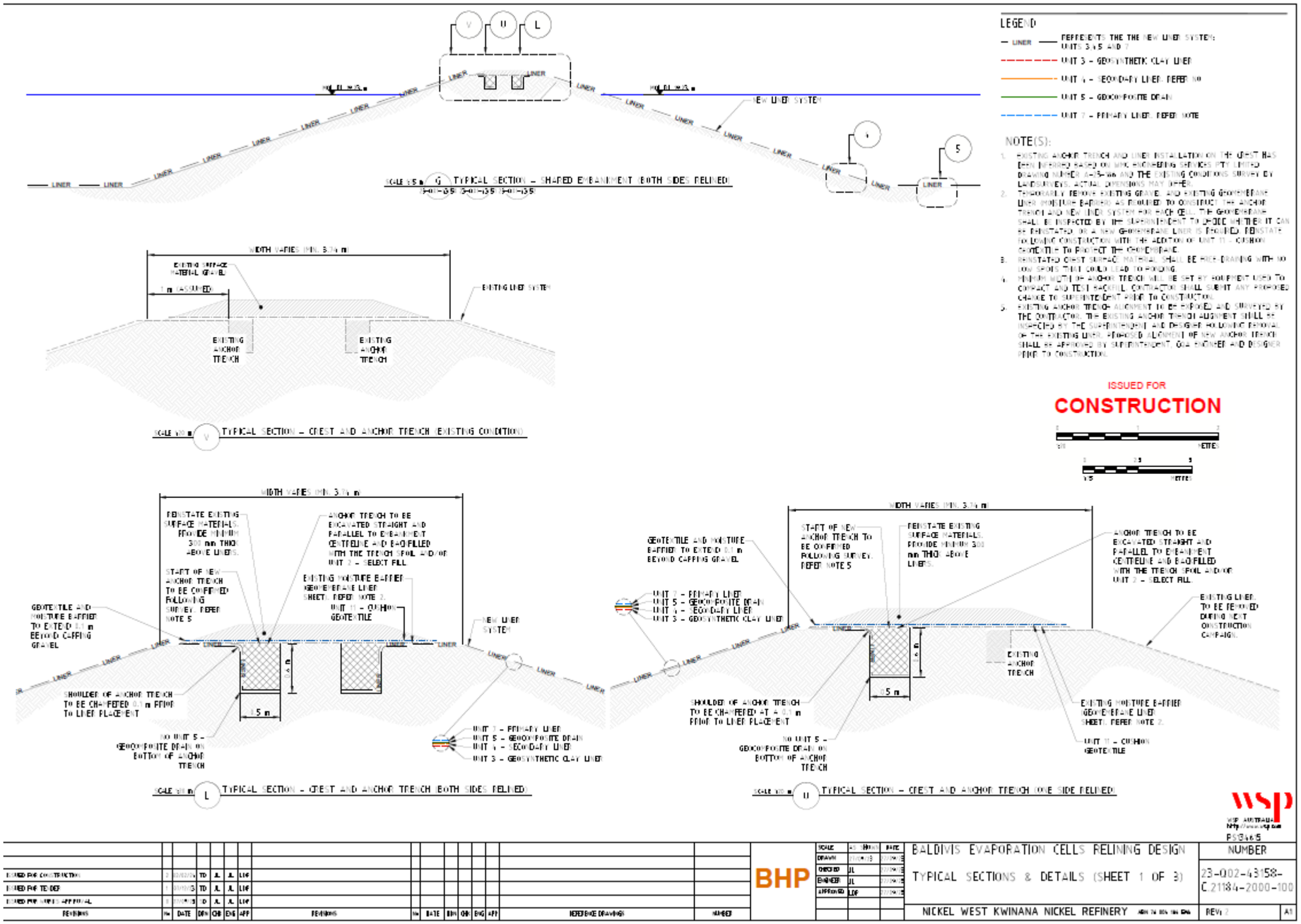


Figure 13: Shared embankment anchor trench design specifications

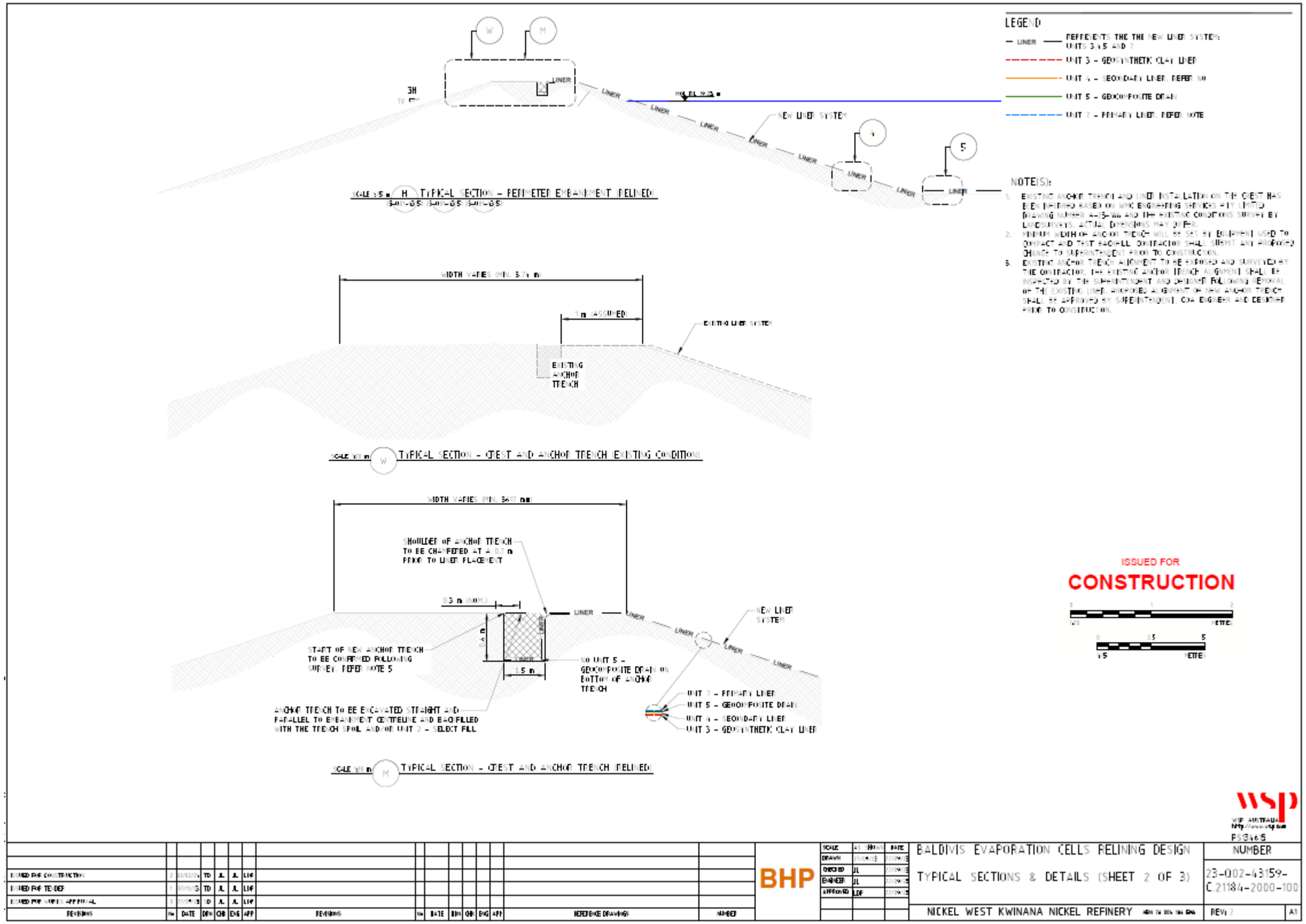
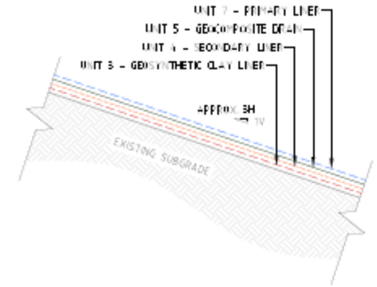
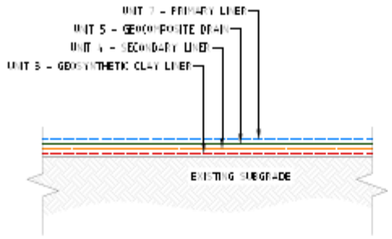


Figure 14: External perimeter embankment anchor trench design specifications



SCALE 1:25 @ A1 4 CELL BATTER LINER ARRANGEMENT



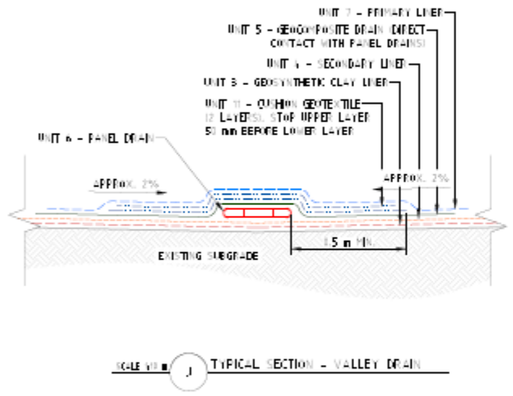
SCALE 1:25 @ A1 5 CELL FLOOR LINER ARRANGEMENT

LEGEND

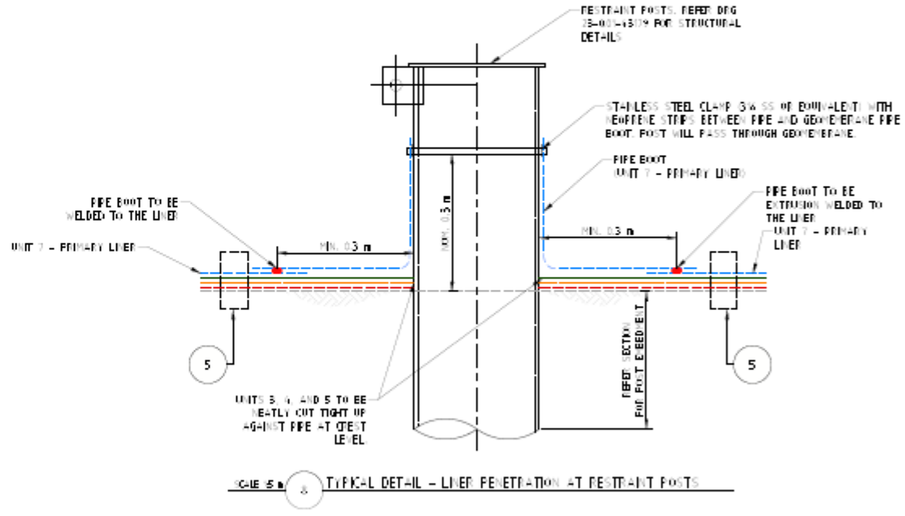
- LINER — REPRESENTS THE THE NEW LINER SYSTEM: UNITS 3, 4, 5 AND 7
- UNIT 3 – GEOSYNTHETIC CLAY LINER
- UNIT 4 – SECONDARY LINER, REFER NOTE
- UNIT 5 – GEOCOMPOSITE DRAIN
- UNIT 7 – PRIMARY LINER, REFER NOTE

NOTES:

1. UNIT 4 AND 7 GEOMEMBRANE LINER SHALL BE LAYED IN A TRIANGULAR 60 (2.0 mm THICK) SMOOTH BLACK GEOMEMBRANE LINER.



SCALE 1:10 @ A1 J TYPICAL SECTION – VALLEY DRAIN



SCALE 1:5 @ A1 A TYPICAL DETAIL – LINER PENETRATION AT RESTRAINT POSTS

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REVISIONS	No	DATE	DRN	CHK	ENG	APP	REVISIONS	No	DATE	DRN	CHK	ENG	APP	REFERENCE DRAWINGS	NUMBER
ISSUED FOR CONSTRUCTION	2	[illegible]	TD	JL	JL	LHF									
ISSUED FOR TENDER	1	[illegible]	TD	JL	JL	LHF									
ISSUED FOR INTERNAL APPROVAL	0	[illegible]	TD	JL	JL	LHF									

BHP

SCALE	AS SHOWN	DATE
DRAWN	[illegible]	[illegible]
CHECKED	JL	[illegible]
ENGINEER	JL	[illegible]
APPROVED	LDF	[illegible]

BALDIVIS EVAPORATION CELLS RELINING DESIGN

TYPICAL SECTIONS & DETAILS (SHEET 3 OF 3)

NICKEL WEST KWINANA NICKEL REFINERY

NUMBER: 23-002-43160-C.21184-2000-100

REV: 2 A1

PS8665

Figure 15: Liner floor, batter, valley drain and restraint points specifications

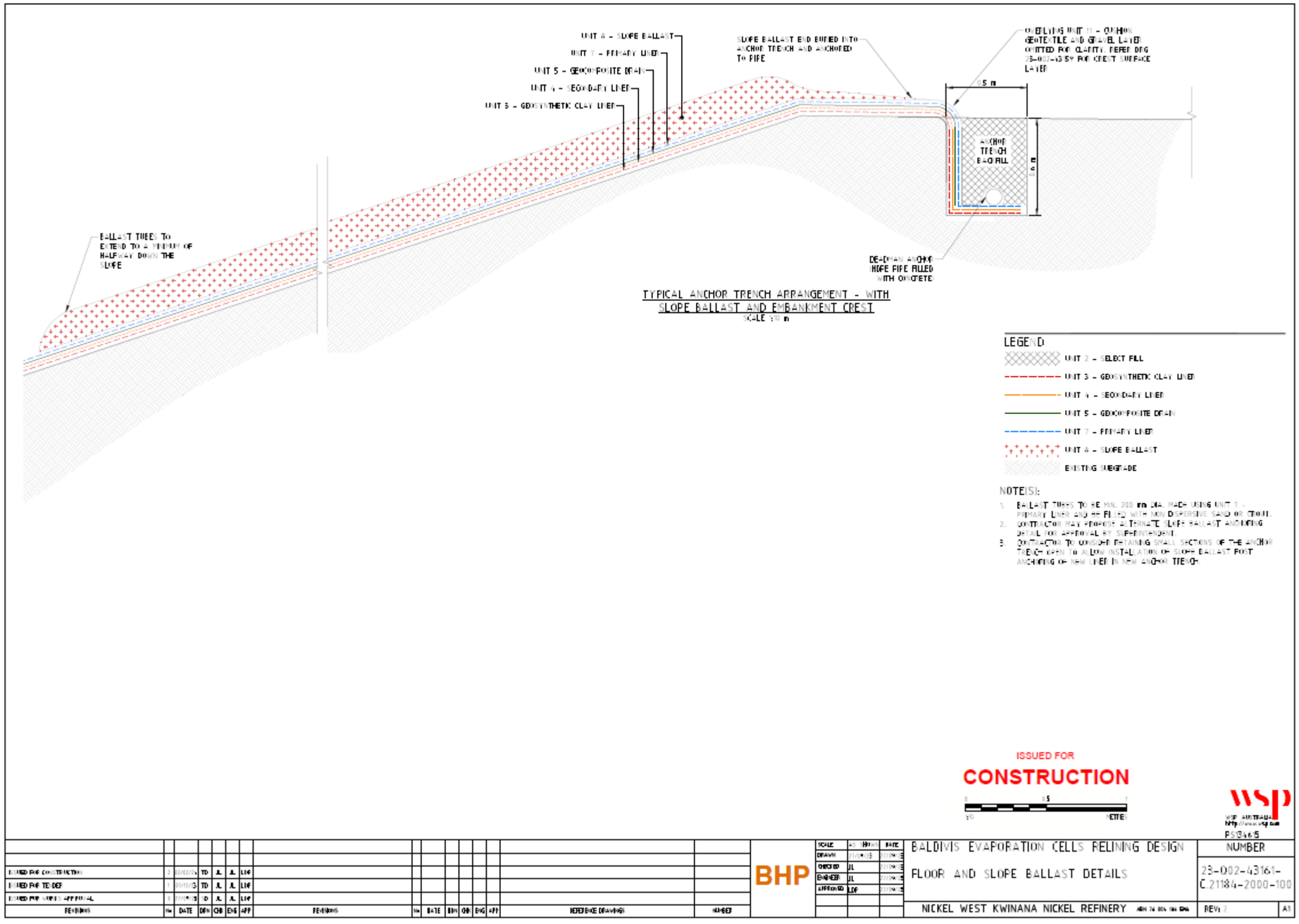


Figure 16: Specifications for anchor trench with slope ballast and embankment crest

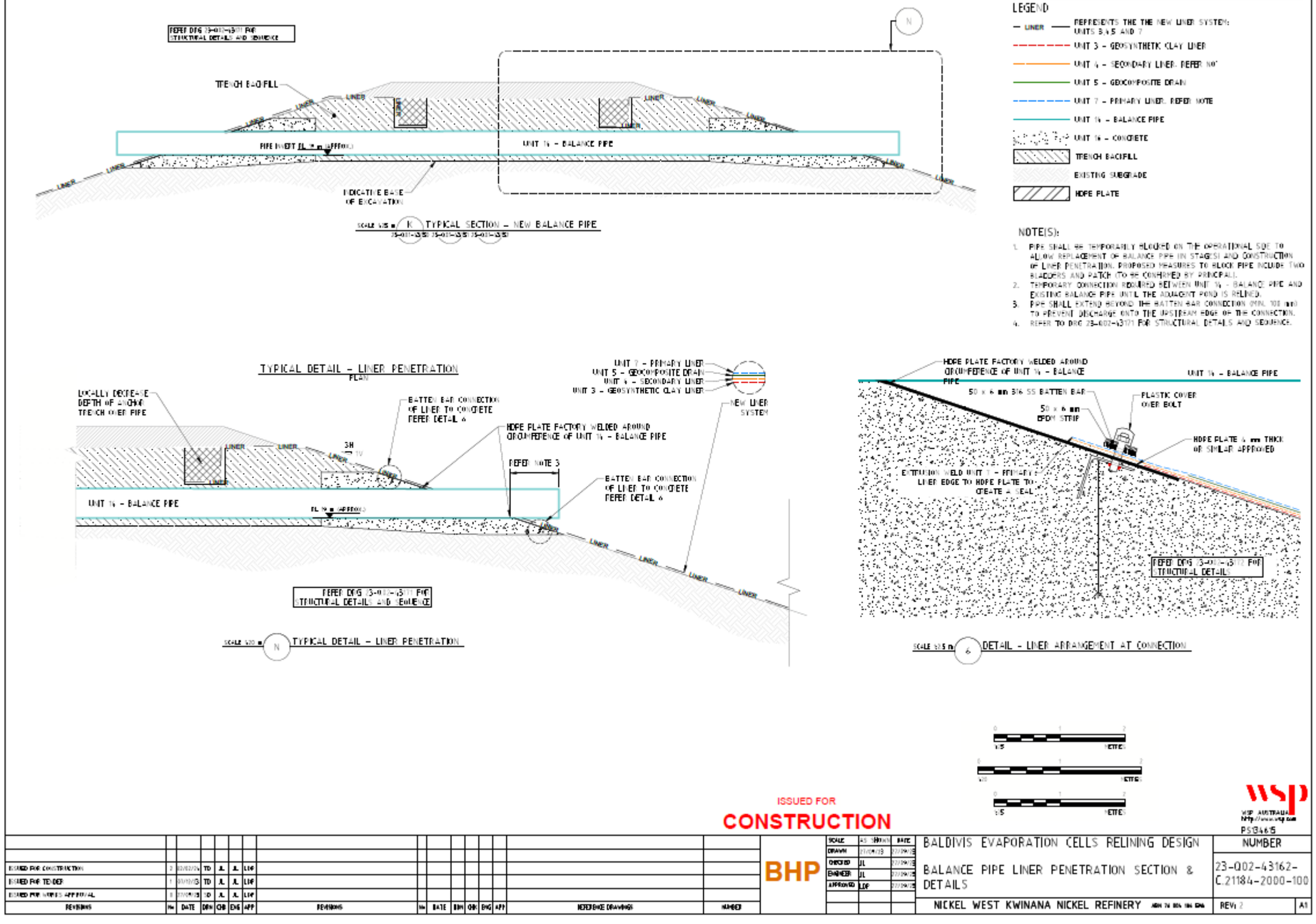
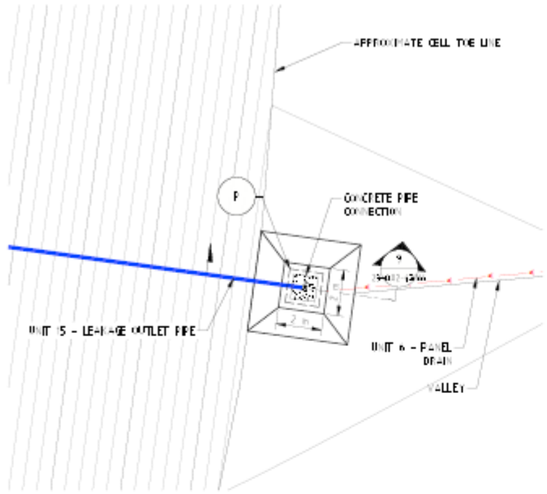
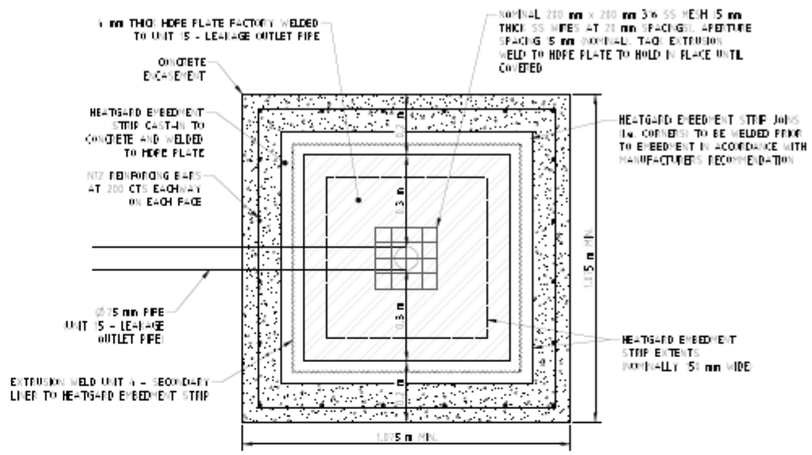


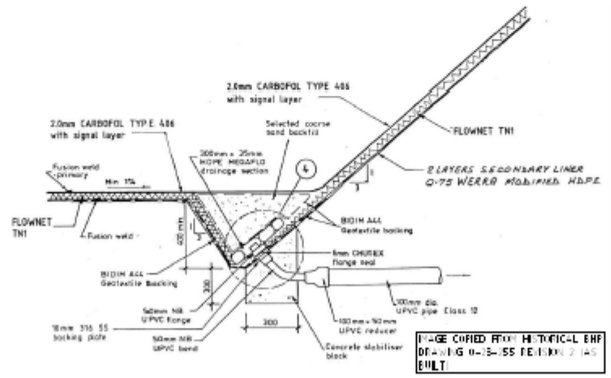
Figure 17: Balance pipe liner penetration, welding configuration and extrusion specifications



PLAN - NEW LEAKAGE OUTLET



F PLAN - LEAKAGE OUTLET CONCRETE ENCASEMENT AND LINER CONNECTION



TYPICAL SECTION - EXISTING LEAKAGE OUTLET (ASSUMED)

NOTE(S)

1. CONCRETE EDGES IN CONTACT WITH GCL TO BE FORMED WITH 20 mm CHAMFER.
2. 40 MPa CONCRETE.
3. REINFORCEMENT COVER 50 mm.
4. EXPOSURE OF EXISTING OUTLET PIPE FORMS A HOLD POINT. SUPERINTENDENT AND DESIGNER TO REVIEW CONNECTION DETAILS BASED ON EXPOSED PIPE.

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CONSTRUCTION

REVISIONS	No	DATE	DRN	CHK	ENG	APP
ISSUED FOR CONSTRUCTION	2	22/01/26	TD	JL	JL	LDF
ISSUED FOR TENDER	1	27/11/25	TD	JL	JL	LDF
ISSUED FOR INTERNAL APPROVAL	0	10/11/25	TD	JL	JL	LDF

BHP

SCALE	AS SHOWN
DRAWN	TD 27/11/25
CHECKED	JL 27/11/25
ENGINEER	JL 27/11/25
APPROVED	LDF 27/11/25

BALDIVIS EVAPORATION CELLS RELINING DESIGN

TYPICAL SECTIONS & DETAILS - LEAKAGE OUTLET (SHEET 1 OF 2)

NICKEL WEST KWINANA NICKEL REFINERY

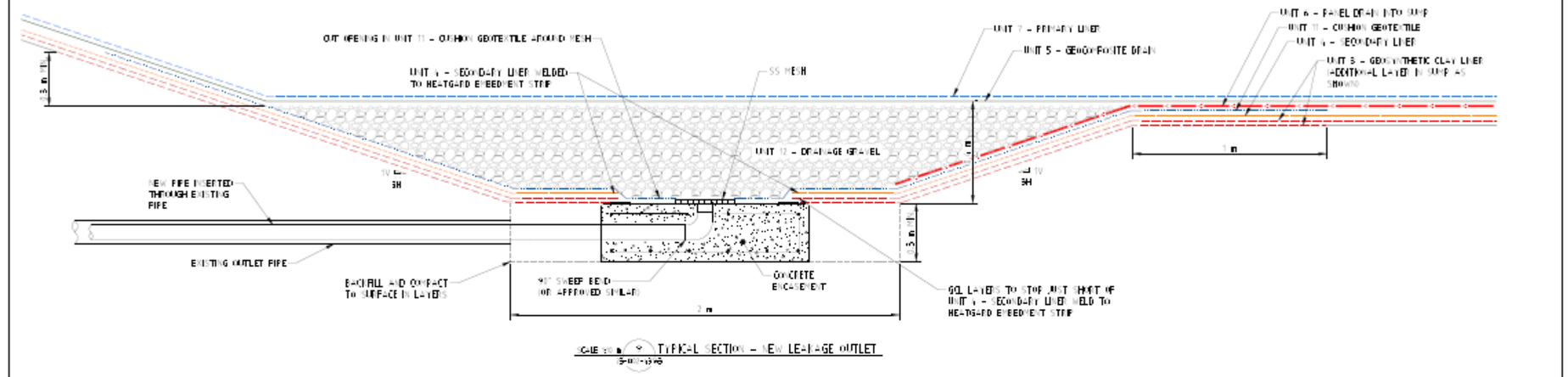
NUMBER: 23-002-43163-C.21184-2000-100

REV: 2 A1

wsp

PS3465

Figure 18: Leakage outlet concrete encasement specifications



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CONSTRUCTION

BHP

BALDIVIS EVAPORATION CELLS RELINING DESIGN

TYPICAL SECTIONS & DETAILS - LEAKAGE OUTLET (SHEET 2 OF 2)

NICKEL WEST KWINANA NICKEL REFINERY

NUMBER
23-002-43164-C-21184-2000-100

REV: 2 A1

Figure 19: Underdrainage system outlet showing new outlet pipe in relation to concrete encasement and drainage layer

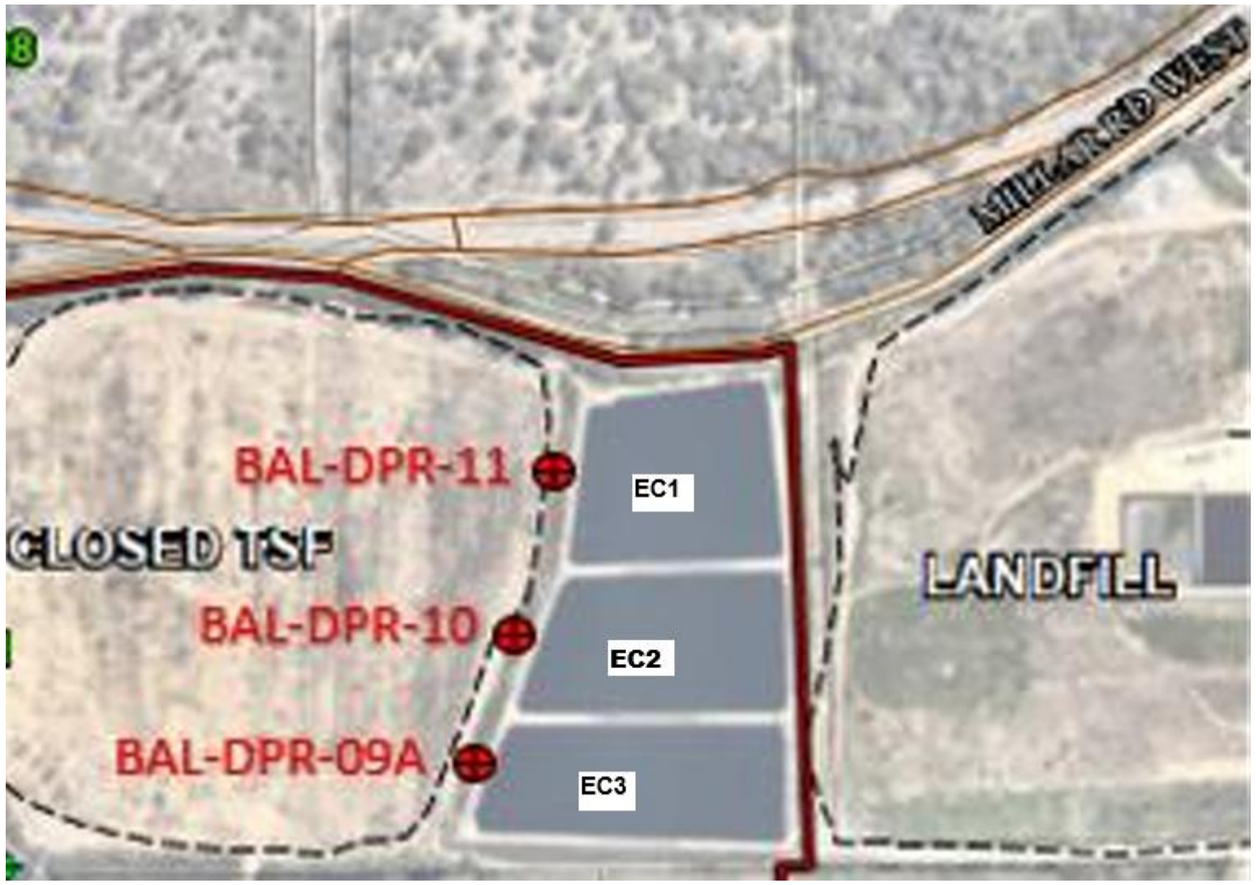

Figure 20: Location of groundwater monitoring bores

Schedule 2: Construction Quality Assurance Testing

Geosynthetic Clay Liner

The Construction Quality Assurance Requirements for the installation of the geosynthetic clay liner are outlined in Table 7 below.

Table 7: GCL CQA Testing.

Property	Units	Test Method	Minimum Value (MARV[1])	Testing Frequency	
				Source approval	As-delivered approval
Hydraulic conductivity with potentially incompatible solutions[2]	m/s	ASTM D 6766	≤ 6 x 10-11	1 test, prior to procurement3	Review MQC results
GCL Mass	g/m2	ASTM D 5993	≥ 4,000	1 test per 20,000 m²	1 test per 2,500 m²
Bentonite Mass (measure at 0% moisture content)	g/m2	ASTM D 5993	≥ 3,700	1 test per 4,000 m²	1 test per 1,250 m²
Particle size – percentage passing 0.075 mm sieve	%	Dry Screen	≥ 80	Manufacturer information	1 test per 10,000 m²
Cation exchange capacity of Bentonite	Meq/100 g (or mol/kg)	Methylene Blue Method	≥ 70	1 test per 50 tonnes	1 test per 2,500 m²

Property	Units	Test Method	Minimum Value (MARV[1])	Testing Frequency	
				Source approval	As-delivered approval
Montmorillonite Content	% by weight	X-ray diffraction	≥ 70	1 test per bentonite batch	1 test per 10,000 m²
Calcium Carbonate Content	% by weight	X-ray diffraction	≤ 2	1 test per bentonite batch	1 test per 10,000 m²
Additional Bentonite in edge overlap @ 0% moisture	g/m2	ASTM D 5993	≥ 200	NA	1 test per 3 rolls sampled from both sides
Strip Tensile Strength	kN/m	ASTM D 6768	≥ 8	1 test per 20,000 m²	1 test per 5,000 m²
CBR Elongation	%	AS 3706.4	≥ 15	1 test per 20,000 m²	1 test per 5,000 m²
CBR Strength	N	AS 3706.4	≥ 1500	1 test per 20,000 m²	1 test per 5,000 m²
Peel Strength	N/m	ASTM D 6496	≥ 600	1 test per 4,000 m²	1 test per 2,500 m²

Property	Units	Test Method	Minimum Value (MARV[1])	Testing Frequency	
				Source approval	As-delivered approval
Swell Index	mL/2g	ASTM D 5890	≥ 24	1 test per 50 tonnes	1 test per 2,500 m²
Fluid Loss	mL	ASTM D5891	≤ 18	1 test per 50 tonnes	1 test per 2,500 m²
Index Flux	m/s	ASTM D 5887	≤ 5 x 10-11	1 test per 25,000 m²	1 test per 10,000 m²
Nonwoven geotextile mass	g/m2	AS 3706.1	≥ 200	Manufacturer information	Review MQC results

Notes: 1. MARV = Minimum or Maximum Average Roll Value representing a confidence level of 97.5% of test results meet the required value.

1. Hydrated with liquor from the cells.
2. Two products, Elcoseal X1000pH+ and Bentofix NSP 4900, have been previously tested for hydraulic conductivity with potentially incompatible solutions (ASTM D 6766) to achieve the hydraulic conductivity requirement. If one of these products are proposed, then testing is not required for this property prior to procurement. Alternative products are required to meet this testing requirement prior to procurement and shall be undertaken by a NATA accredited independent geosynthetic testing laboratory approved by the Principal.

High Density Polyethylene Geomembrane

The Construction Quality Assurance Requirements for the installation of the HDPE geomembrane are outlined in Table 8 below.

Table 8: HDPE Liner Quality Assurance Requirements

Property	Units	Test Method	Minimum Value (MARV[1])	Testing Frequency	
				Source approval	As-delivered approval
Thickness (average)	mm	ASTM D 5994	≥ 2.0	1 test per roll	1 test per 5 rolls
Minimum Thickness (lowest individual roll thickness)	mm	ASTM D 5994	> 1.8	1 test per roll	1 test per 5,000 m²
Density (min)	g/cm3	ASTM D 1505 or ASTM D 792 (Method B)	≥ 0.947	1 test per batch	1 test per 5,000 m²
Melt Flow Index (190°C @ 2.16 kg loading)	g/10 min	ASTM D 1238	≤1	1 test per batch	Review MQC results
Tensile Properties (each direction) Strength at break Elongation at break Strength at yield Elongation at yield	N/mm % N/mm %	ASTM D 6693 ASTM D 6693 ASTM D 6693 ASTM D 6693	≥ 56 ≥ 600 ≥ 36.7 ≥ 12	1 test per 9,000 kg	1 test per 5,000 m²

Property	Units	Test Method	Minimum Value (MARV[1])	Testing Frequency	
				Source approval	As-delivered approval
Tear Resistance	N	ASTM D 1004	≥ 265	1 test per 20,000 kg	1 test per 5,000 m²
Puncture Resistance	N	ASTM D 4833	≥ 640	1 test per 20,000 kg	1 test per 5,000 m²
Carbon Black Content Range	%	ASTM D 42182	2 to 3	1 test per 9,000 kg	1 test per 5,000 m²
Carbon Black Dispersion	Rating	ASTM D 5596	90% Cat 1 or 2 10% Cat 3	1 test per 20,000 kg	1 test per 5,000 m²
Oxidative Induction Time (OIT) Standard OIT – and - High Pressure OIT	min min	ASTM D 3895 ASTM D 5885	≥100 ≥400	1 test per 90,000 kg	1 test per 10,000 m²
Oven Aging at 85°C Standard OIT retained after 90 days – or - High Pressure OIT retained after 90 days	% %	ASTM D 5721 ASTM D 3895 ASTM D 5885	≥ 70 ≥ 90	1 test per batch	Review MQC results

Property	Units	Test Method	Minimum Value (MARV[1])	Testing Frequency	
				Source approval	As-delivered approval
Environmental Tensile Load Crack Resistance	hr	ASTM D 5397	> 1000	1 test per batch	1 test per 10,000 m²
UV Resistance; High Pressure OIT percentage retained after 1600 hours [3]	%	ASTM D 5885	≥ 80	1 test per batch	Review MQC results

Notes: 1. MARV = Minimum / Maximum Average Roll Value representing a confidence level of 97.5% of test results meet the required value.

1. Other methods such as ASTM D 1603 (tube furnace) or ASTM D 6370 (TGA) are acceptable if an appropriate correlation to ASTM D 4218 (muffle furnace) can be established.
2. 66 Cycles, each cycle consisting of 20 hrs UV cycle at 75 deg C followed by 4 hrs condensation at 60 deg C.

Geotextile CQA Testing

The Construction Quality Assurance Requirements for the installation of the geotextile are outlined in Table 9 below.

Table 9: Geotextile CQA Testing

Property	Units	Value	Test Method	Testing Frequency	
				Source approval	As-delivered approval
Thickness (Typical)	mm	> 4	AS 3706.1	Manufacturer information	1 test per 500 m2
Mass per unit area	g/m2	≥ 1000	AS 3706.1		1 test per 500 m2
Grab Tensile Strength	N	≥ 2,500	AS 3706.2		1 test per 500 m2
Grab Tensile Elongation	%	≥ 50	AS 3706.2		1 test per 500 m2
Trapezoidal Tear Strength (both MD and CMD)	N	≥ 950	AS 3706.3		1 test per 500 m2
CBR Burst Strength	N	≥ 7,500	AS 3706.4		1 test per 500 m2

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