Alcoa of Australia Limited

WGP00184 RSA 10 CONSTRUCTION SURFACE WATER MANAGEMENT PLAN

WAGERUP REFINERY

July 2025

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A	07/06/2024	Issued for Approval			
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Contents

1 Introduction

Alcoa of Australia Ltd (Alcoa) operates the Wagerup Alumina Refinery (the Refinery) located approximately 120 km south-east of Perth within the Shire of Waroona.

The Refinery produces alumina through the Bayer process and generates approximately two (2) dry tonnes of bauxite residue per tonne of alumina produced. Residue mud is currently stored in multiple existing Residue Storage Areas (RSAs). Existing stacking and storage limitations have resulted in a current shortfall of approximately 7 hectares (ha) of storage area per year. To address this shortfall, Alcoa proposes to construct a new RSA (referred to as RSA 10).

The Surface Water Study undertaken for RSA 10 recommended that a sediment management plan is required during the construction of the RSA 10 infrastructure (GHD, 2024). This Construction Surface Water Management Plan (SWMP) is an adaptive management plan for the project construction and commissioning phases. Once operational, RSA 10 will be integrated into the existing Wagerup Refinery residue area management practices which will be continuously adapted based on the learnings from the implementation of this Construction SWMP, ongoing monitoring results and any other relevant studies undertaken.

2 Site Characteristics

The proposed RSA 10 is located at the northwest extremity of the existing Wagerup Refinery residue management area. The new RSA 10 is to be constructed within Alcoa's current grazing farmlands with new embankment walls adjoining the existing residue area stack.

2.1 Climate

The Wagerup Refinery area experiences a Mediterranean-type climate, with hot dry summers and cool wet winters. On average, rainfall occurs during every month of the year with most falling during winter and spring. Alcoa maintains a weather station on the eastern side of the Wagerup Alumina Refinery with data provided to the Bureau of Meteorology (Station No. 009894) (Rockwater, 2023).

Mean annual rainfall is 841 mm with mean monthly rainfall ranging between 14 mm in February and 160 mm in July. Around 80% of annual rainfall generally occurs in the five-month period between May and September. There is a general trend of decreasing annual rainfall since the mid-1990s (Rockwater, 2023).

The Mean annual evaporation rate is 2,059 mm with monthly average rates ranging between 73 mm in July and 310 mm in January and December. Evaporation exceeds rainfall on average for seven months of each year, between January to April, and October to December (Rockwater, 2023).

2.2 Surface Hydrology

The Refinery is located within the lower Harvey River Catchment in the Harvey Estuary Environmental Protection Policy (1992) area. The purpose of this policy is to protect the Peel-Harvey estuarine system, maintain environmental quality objectives and to prevent environmental damage, primarily from nutrient pollution. The Peel Inlet Management Area, a gazetted Waterways Conservation Act (1976) Management Area, is located approximately 1 km west of the RSA 10 footprint. The Harvey River Main Drain lies approximately 4 km to the west of the RSA 10 footprint and flows in a north-westerly direction discharging into the Harvey Estuary (GHD, 2023).

Existing drainage within the area has been significantly modified (Figure 1). Agricultural drains were constructed to drain low-lying farmlands of the coastal plain section that were winter water-logged, and modified sections of rivers and brooks have been renamed as drains. Surface water systems are also highly regulated with some of the upland forested streams dammed for water supply and surface flows diverted for district irrigation schemes (GHD, 2024).

Surface water drainage is directed around the north of the existing residue management area via the Samson South Drain which is fed by a small catchment to the north of the Refinery (Figure 1). A section of Samson South Drain was previously diverted around the long-term residue management area footprint (Alcoa, 2017). The Samson South Drain (diverted section) passes to the north of the proposed RSA 10 but south of the current planned topsoil stockpile and borrow pit areas. The RSA 10 footprint, haul road, laydown and construction office facilities are all located within the Samson South Drain catchment area (Figure 2).

North Yalup Brook and South Yalup Brook are located to the east of the residue management area. Flows from these brooks together with surface water from the Refinery, residue management area and overflow from Detention Pond 1 (DP1) are diverted around the residue management area on the eastern and southern sides via the Yalup Brook Drain (Rockwater, 2023). This drain is also known as the South Samson Diversion Drain however this drain is referred to as the Yalup Brook Drain in this SWMP.

The confluence of Samson South Drain and Yalup Brook Drain occurs approximately 2 kilometres west of the residue management area (Figure 1).

Geomorphic Wetlands of the Swan Coastal Plain (DBCA-019) mapping (Figure 3) identifies the study area and its surrounds as a multiple use wetland, comprising a palusplain (seasonally waterlogged flat) that extends north south along the Swan Coastal Plain. There are no Environmental Protection Policy (EPP) listed wetlands in the immediate vicinity of the Wagerup Refinery or residue area. There is one EPP listed wetland located approximately 1 kilometre south of the residue management area, on the northern side of Bancell Road. This wetland is often referred to as Exelby Wetland and is part of a low-lying swampland on Bancell creek. This wetland was traditionally an ephemeral wetland, however due to the inflow of excess irrigation water from surrounding farmland, it has become a permanent water body. The lower extent of Samson Brook is mapped as conservation wetland (floodplain flat), with two linear resource enhancement sumpland basins occurring over 2 km west. Other nearby wetlands include four small wetlands near Yarloop (located approximately 3.5 kilometres south of the Refinery), and three small wetlands near Hamel (located approximately 4 kilometres north of the Refinery) (Alcoa, 2017).

All alkaline contaminated surface water runoff from the Refinery and residue management area is collected and stored in the lined Run Off Water Storage (ROWS) Pond or the Cooling Pond within the residue area for recycling via the Refinery process as make-up water. The RSAs, ROWS and Cooling Ponds are lined to prevent groundwater infiltration.

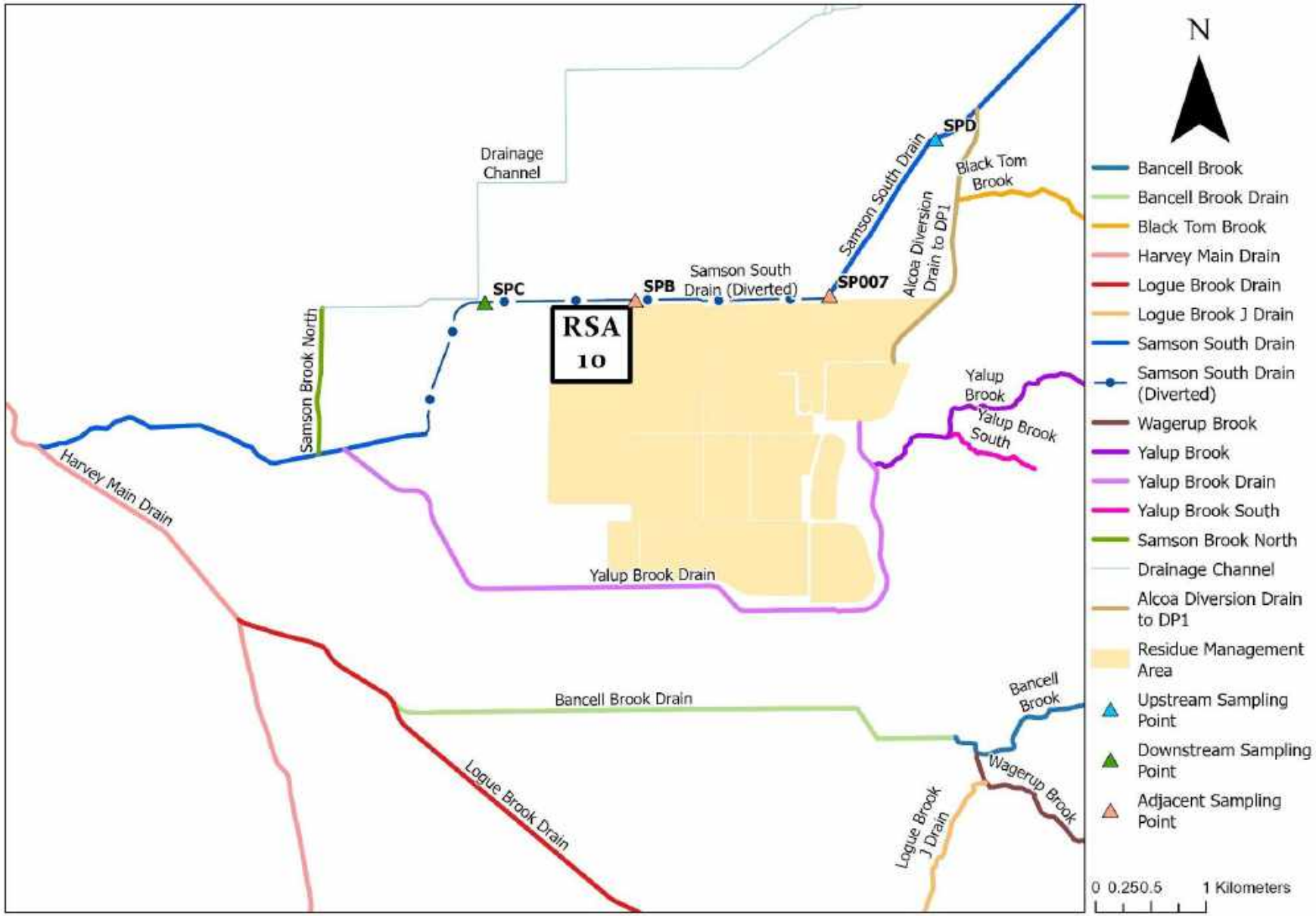


Figure 1: Surface Hydrology at Wagerup Alumina Refinery

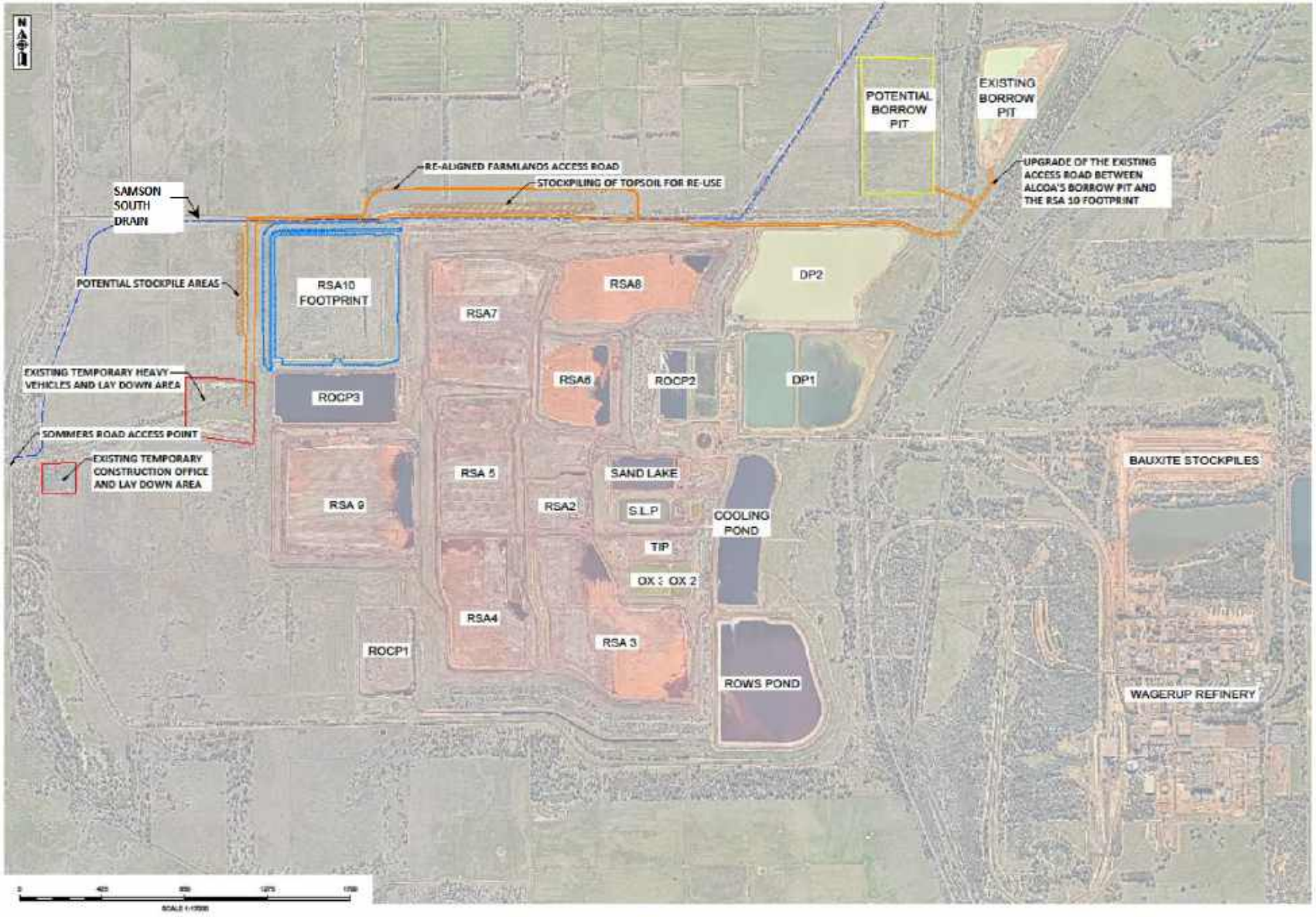


Figure 2: RSA 10 Construction Infrastructure Locations

Figure 3: Wetlands near RSA 10

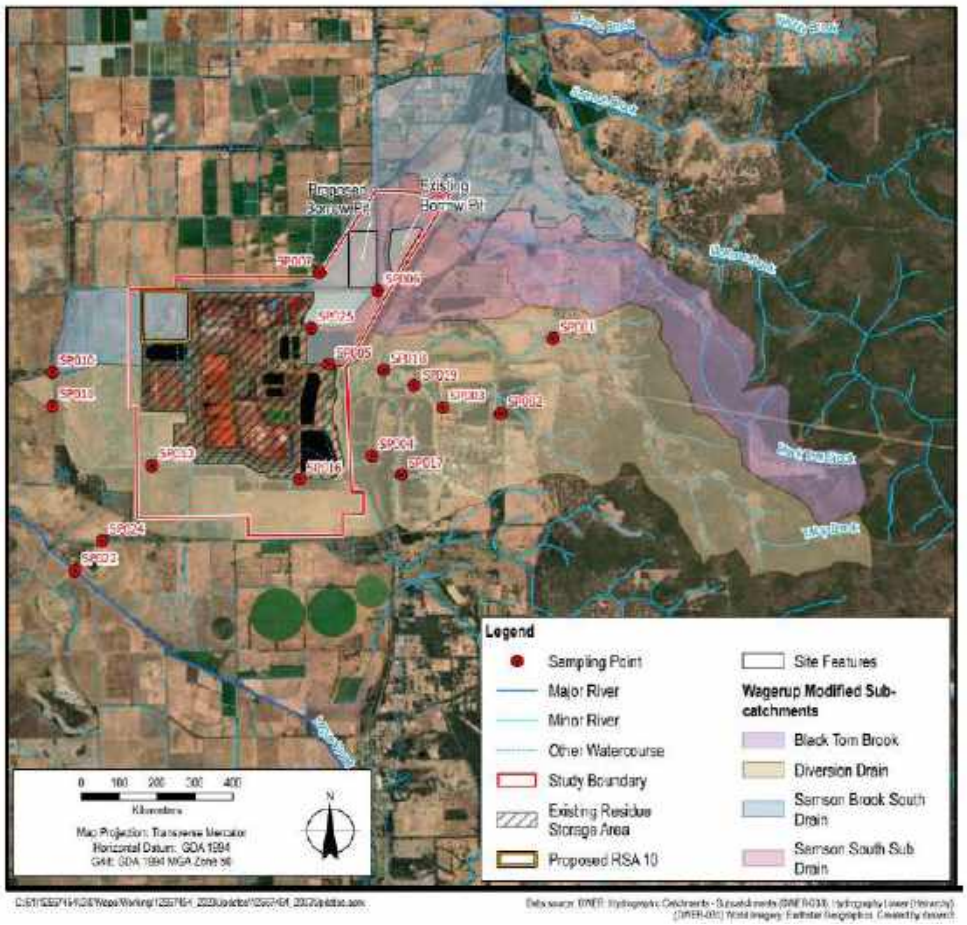


Figure 4: Surface water sub-catchments (GHD, 2024)

3 Project Overview

Alcoa proposes to construct RSA 10 on the north-western corner of the existing residue management area (Figure 2). RSA 10 is planned to have an overall footprint of approximately 53 hectares (ha) providing an initial additional residue drying surface area of approximately 45 ha.

3.1 Civil Works

Civil works included in this Construction SWMP are planned to be completed in two phases:

1) Pre-Construction Works – these are works required to be completed prior to the RSA 10 construction scope of work.
2) RSA 10 Construction Works.

3.1.1 Pre-Construction Works

Foundation Work

- Installation of new groundwater monitoring bores.
- Decommissioning of existing groundwater monitoring and depressurising bores and other infrastructure within the RSA 10 footprint.
- Clearing and grubbing of approximately 60 hectares.
- Progressive removal of topsoil from RSA 10 footprint to stockpile area.
- Foundation and earthworks to achieve desired ground level prior to composite liner works.

Farmlands Interface Works

- Realignment of the farmlands road to the north to allow for construction of the haul road and current planned topsoil stockpile location.
- Redirection of the farmlands drainage channels.
- Development of a narrow section of the farmlands road to facilitate stock movement and bulk fill haulage.

Haul Road and Borrow Pit

- Expansion of the existing Borrow Pit, to enable extraction of bulk fill and clay.
- Rework and repair of approximately 4.5 km of existing haul road.
- Construction of new haul roads to go around RSA 10 footprint.
- Construction of a haul road crossing over Samson South Drain (Diverted Section).
- Development of a potential borrow pit to the west of the existing borrow pit to provide additional fill if required.

Construction Surface Water Catchment Network

- Construction of a surface runoff catchment network consisting of sumps, windrows, pumps and transfer pipes to capture all runoff from the construction site and transfer this back to Detention Pond 1 (DP1) and Detention Pond 2 (DP2).

Construction Freshwater Supply to Support Dust Control and Conditioning

- Installation of a new freshwater supply pipeline and multiple reservoir tanks direct from DP1 so only freshwater is used on the RSA 10 construction site/unlined

areas. This will include installation of truck fill points for dust suppression for construction works.

3.1.2 Construction Works

Embankment Wall Construction

- Construction of new RSA 10 new starter embankment walls.
- Construction of new RSA 10 access and crest roadways.

Composite Liner System Installation

- Construction of a low permeability soil liner equivalent to at least a 0.5m-thick layer of moisture conditioned mechanically compacted clay or manufactured geosynthetic clay liner (GCL), with a permeability coefficient not greater than 1 x 10-9 m/s.
- Installation of a new 1.5mm HDPE liner to create a composite liner.
- Excavation to expose the Runoff Collection Pond 3 (ROCP 3) and RSA 5, 7 and 7N existing composite liners.

Above Liner Underdrainage System Installation

- Haulage and placement of a new sand underdrainage layer over the HDPE lining.
- Sand to be either harvested from stockpiles within the residue management area or imported clean fill.
- Construction of a new underdrainage system, inclusive of drain collector and header systems into the new pumping station.

Temporary Decant System Installation

- Construction of a new temporary decant system within the RSA 10 footprint to collect alkaline surface water and transfer the existing ROCP3.

Dust Control System (Sprinklers) Installation

- Construction of new and/or extension of the existing sprinkler ring main and new RSA 10 dust control sprinkler infrastructure inclusive of laterals and risers within the new RSA floor.

Mud Distribution System Installation

- Construction of new temporary mud header. The new RSA 10 header will be located on the existing ROCP3 or RSA7N embankment wall, and new RSA 10 western and northern embankment wall. This will include mud droppers, embankment erosion protection, sleepers and road crossing as required.

3.1.3 Dewatering

Dewatering will be required for clay extraction from borrow pits.

Sediment can be entrained in dewatering effluent and surface flows across disturbed or constructed ground. Consequently, the earthworks and associated dewatering activities have the potential to cause sediment release into the surrounding environment if not managed.

3.2 Stormwater Management

During construction, rainwater and runoff from the RSA 10 construction site will be directed to surface water catchment drainage basins. Runoff from the construction laydown and carpark area will pass through a temporary triple staged hydrocarbon oil separator-lined collection sump to remove any potential hydrocarbons and then be pumped to ROCP3 for re-use within the residue circuit. Runoff from the remainder of the RSA 10 construction site will be pumped to DP1 and DP2 and re-used for dust suppression within the residue sprinkler network and RSA 10 construction activities. Stormwater management measures are detailed in Section 5.4.

4 Context

4.1 Scope

This Construction SWMP applies to all project areas during the pre-construction, construction and commissioning works required for the RSA 10 project. This includes:

- The RSA 10 footprint
- Contractor Laydown Areas
- Topsoil stockpile
- Haul roads
- Clay Borrow pits.

Specifically, this Construction SWMP applies to:

- Design considerations
- All ground disturbing activities associated with site establishment
- All earthworks
- All surface water drainage systems, including culverts
- Dewatering activities
- Establishment and maintenance of haul roads
- Establishment and operation of project site administration, minor servicing and laydown facilities
- Surface water control measures
- Any stockpiles and soil management
- All pollution control measures
- All stormwater and wastewater management measures.

4.2 Environmental Assessments

RSA 10 has been designed in accordance with the following standards:

- Alcoa Standards
- Australian Codes and Standards
- Australian National Committee on Large Dams (ANCOLD) Guidelines on Tailings Dams (July 2019)
- Department of Mines, Industry Regulation and Safety (DMIRS) Guide to the preparation of a design report for tailings storage facilities (August 2015)
- International Council on Mining and Metals (ICMM) Guidelines
- Mining Association of Canada (MAC) Guidelines
- Global Industry Standard on Tailings Management (GISTM) (August 2020).

In addition to designing RSA 10 in accordance with these standards, Alcoa commissioned a range of environmental assessments to inform the design of the RSA 10 project. Key findings from the environmental assessments are outlined below.

4.2.1 Surface Water Assessment

A Surface Water Assessment was undertaken (GHD, 2024) which identified that the surface water disturbance area of the proposed RSA 10 and potential borrow pit locations are only a small proportion of the local contributing catchments, with similarly low impacts to the water balance. Impacted catchment areas are outlined in Table 1.

Table 1: Impacts Catchment Areas

Potential disturbance	Concept design area (km^2)	Catchment name	Catchment area (km^2)	Proportion disturbed	Lower Harvey River catchment disturbed	Harvey River catchment proportion disturbed
RSA10	0.53	Samson Brook south drain	26.6	2.16%	0.14%	0.03%
Northern borrow pit (existing and proposed are the same footprint area)	0.19	South Samson Sub Drain (including Black Tom Brook)	10.9	1.75%	0.05%	0.01%

There is potential for construction and operation of the proposed RSA 10 and borrow pits to increase surface water and sediment runoff to downstream environments. The study found that:

- Sediment needs to be managed during the construction of the project.
- Surface runoff from disturbed surfaces, and accumulated flows within borrow pits, should be treated using recommended controls prior to discharge to the environment via vegetated overland pathways.
- Ongoing maintenance of external facing batter walls will be required.

GHD (2024) recommended that water quality data during the construction, operation and rehabilitation period should be compared to baseline data and in consideration of natural and seasonal variations. If exceedance of baseline water quality occurs, the study recommended that the following contingency measures be considered:

- Localised site investigation during monthly monitoring to identify potential cause of exceedance.
- Undertake follow up monitoring if required.
- Review site activities and procedures (e.g., construction management, erosion, and water management during operation) and implement remediation measures if required.

4.2.2 Aquatic Fauna Survey

An aquatic fauna survey (WRM-SLR, 2023) was undertaken at six creekline and three wetland sites in the Wagerup area. The most significant finding was the large population (+200 individuals) of Carter's Freshwater Mussels, *Westralunio carteri* which is listed as vulnerable under the *Environment Protection and Biodiversity*

Conservation Act 1999. It was found at surface water sampling site SP012 on Samson Brook, immediately downstream of where Yalup Brook Drain and Samson Brook North enters Samson South Drain (See Figure 1 and Figure 5). Smaller populations of mussels were also found at a sample location downstream of SP015. Other identified fauna includes 122 macroinvertebrate taxa, five native fish species, two native crayfish species, two introduced fish species and one introduced crayfish species. The Australian water rat, Rakali (*Hydromys chrysogaster*) listed as Priority 4 species was sighted at an upstream reference site and was regularly recorded during a fauna assessment indicating it is likely to occur regularly along the network of drains in the area (M.J. & A.R. Bamford Consulting Ecologists, 2022).

This dataset provides a baseline against which potential impacts to water quality from the RSA 10 project can be assessed.

4.2.3 Carter's Freshwater Mussel

Following the identification of Carter's Freshwater Mussel (CFM) in the aquatic fauna survey (see Section 4.2.2), a targeted CFM survey (SLR, 2023) was undertaken. This survey identified CFM populations within the Samson South Drain at locations upstream and downstream but not adjacent to the Refinery or RSA 10 location (Figure 5). The assessment recommended that significant impacts to CFM could be avoided with the implementation of appropriate water management controls such as stormwater runoff and retention of the in-stream vegetation along the Samson South Drain.

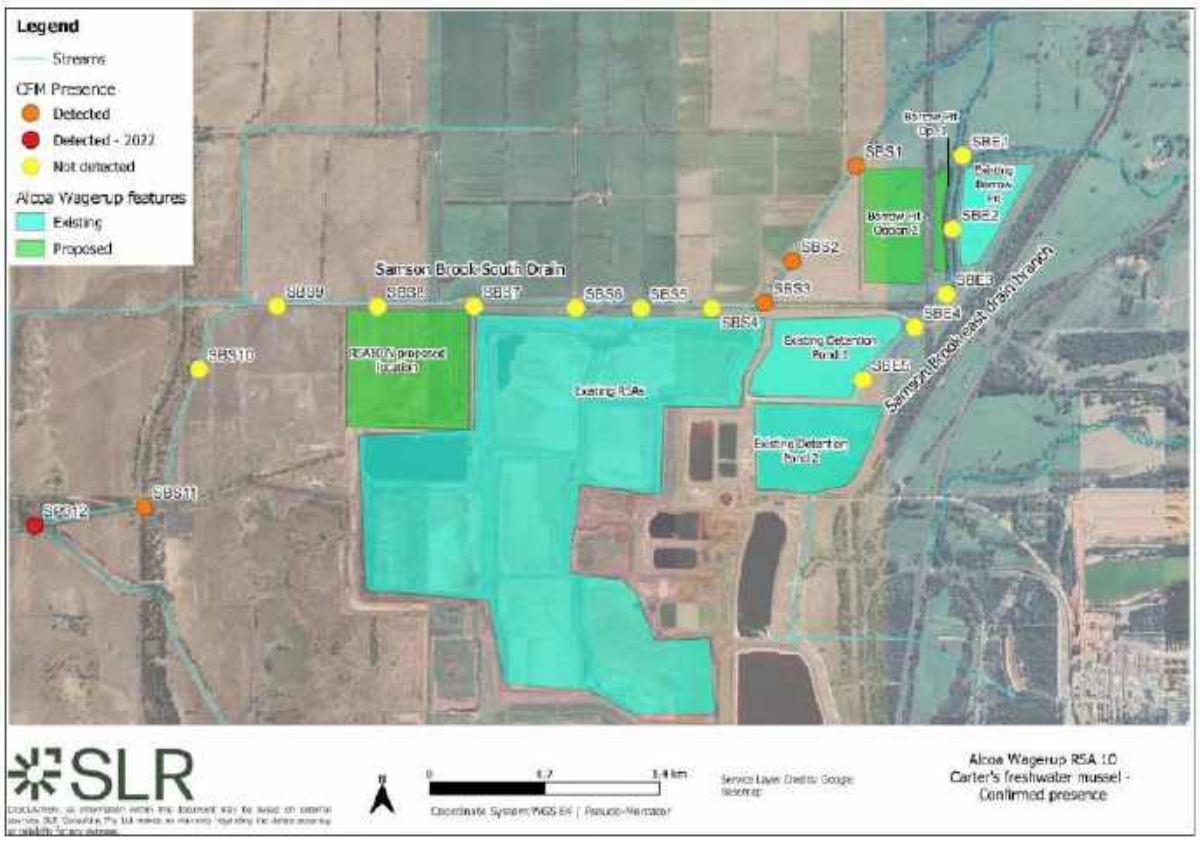


Figure 5: Samson South Drain CFM detection sites

4.2.4 Water Quality Hazard Analysis

A water quality hazard analysis (WRM-SLR, 2022) was undertaken to provide an understanding of the ecological risks and hazards associated with potential discharges to groundwater, seepage and/or runoff to surface sumplands and drainage creeklines in the vicinity of the project area and downstream environmental values.

The hazard analysis compared recent water quality data from groundwater monitoring bores and surface water monitoring points along the drains and the lower Harvey River against default Australian and New Zealand Guidelines for Fresh and Marine Water Quality (ANZG, 2018), and developed preliminary site-specific guideline values (SSGVs) for surface waters downstream of RSA 10.

4.2.5 Acid Sulfate Soils

The RSA 10 footprint is mapped as having a moderate to low risk of acid sulfate soils (ASS) occurring within 3 m of the natural ground surface but 'high to moderate' risk of ASS beyond 3m of natural soil surface (GHD, 2023).

An ASS assessment was completed within the RSA 10 footprint by Hatch (2024), in accordance with DWER's Guideline: Identification and Investigation of Acid Sulfate Soils and Acidic Landscapes (Department of Environmental Regulation, 2015). The assessment found that the soils over the RSA 10 footprint and clay borrow pit areas are considered to be slightly acidic however the majority of soil samples and all samples below 2 metres depth are assessed as non-sulfidic soils. The results of the investigation indicate the near surface soils at the site are slightly acidic and not Actual ASS (AASS), and treatment of the soil is therefore not required. Surface water will be managed in accordance with this SWMP.

The soils were assessed for Potential ASS (PASS) using the results of the field pH after oxidation with hydrogen peroxide (pHFOX) and Chromium Reducible Sulfur (SCR) analysis. The results of this analysis indicated that soils at the site were considered not to be PASS within the investigation extent.

4.3 Purpose of Surface Water Management Plan

This (SWMP) addresses the recommendations of the Surface Water Assessment (GHD, 2024), Water Quality Hazard Analysis (WRM-SLR, 2022), Aquatic Fauna Survey (WRM-SLR, 2023) and the Carter's Freshwater Mussel (CFM) Survey (SLR, 2023). This plan is focussed on how surface water will be managed and monitored during the construction and commissioning of RSA 10.

Potential sediment impacts to surface water bodies and watercourses is identified as a risk during the construction of RSA 10 (GHD, 2024). This SWMP details the measures that will be put in place to mitigate potential sedimentation and water quality impacts on local watercourses, surface water bodies and associated aquatic fauna down gradient of the site and to ensure compliance with the *Environmental Protection (Unauthorised Discharges) Regulations 2004*.

The diversion, collection, and transfer of surface water from the construction footprint for storage and use by the Refinery is a priority for the environmental management of the RSA 10 Project. Inappropriate management could result in an unauthorised

discharge into the environment, sediment deposition or a modification of normal chemistry profile in soil and waterways.

The purpose of this SWMP is to provide a framework which describes how the project will assess, manage, monitor and mitigate impacts to surface water and receiving waterways during construction and commissioning of the project in accordance with the applicable regulatory requirements and permit obligations.

4.4 Regulatory Requirements

Alcoa employees and contractors are obliged to comply with all relevant environmental Commonwealth and State legislation. Legislation directly relevant to the management of surface water and sediment in Western Australia is provided in in Table 2 below.

Table 2. Legislation Relevant to Surface Water and Sediment Management

Legislation	Application
Environment Protection and Biodiversity Conservation Act 1999 (Commonwealth)	Protection of environmental matters of national significance such as national heritage sites, wetlands of international importance, nationally threatened species, and ecological communities and migratory species.
Environmental Protection Act 1986 (WA)	Prevention, control and abatement of pollution, conservation, protection, and enhancement of environment. Alcoa has a 'prescribed premises' licence under Part V of the Act to operate Wagerup Refinery.
Environmental Protection (Unauthorised Discharges) Regulations 2004 (WA)	Prevention of direct discharge of sediment or pollutants to the surrounding surface waters.
Rights in Water and Irrigation Act 1914 (WA)	Relates to rights in water resources, to make provision for the regulation, management, use and protection of water resources, to provide for irrigation schemes, and for related purposes.
Soil and Land Conservation Act 1945 (WA)	Addresses the conservation of soil and land resources and the mitigation of the effects of erosion.
Biodiversity Conservation Act 2016 (WA) and Biodiversity Conservation Regulations 2018	Provide for protection of biodiversity, particularly threatened species and threatened ecological communities.
Environmental Protection (Peel Inlet - Harvey Estuary) Policy 1992	Developed to manage algal growth in the Peel-Harvey Estuarine System caused by an increase in nutrients and protect the Estuary from further degradation.

The following standards and guidelines are also of relevance to this Plan:

- Australian and New Zealand Guidelines for Fresh and Marine Water Quality (ANZG, 2018)
- National Water Quality Management Strategy (Australian Government, 2018)
- Stormwater Management Manual for Western Australia (Department of Water and Environmental Regulation, May 2022).

4.4.1 Licence Conditions

Wagerup Refinery's operating licence (L6217/1983/15) includes existing conditions for water pollution control. These conditions have been considered in the RSA 10 project design and construction plan. The relevant conditions include:

INSTALLATION OF DRAINAGE BELOW RESIDUE DISPOSAL DAM

W1 The licence holder shall maintain low permeability (10-9 metres per second) base and embankment seals and gravity base drainage systems on RDA's [RSAs] to minimise seepage and collect leachate.

CONTAINMENT OF CONTAMINATED OR POTENTIALLY CONTAMINATED WATERS

W2 The licence holder shall minimise the release of contaminated water to the environment by providing containment systems to capture any spillages and minimise contact of process liquors to the ground.

WATER QUALITY MONITORING AND CRITERIA

W3(a) The licence holder shall collect representative water samples at the frequencies specified in Table 9 from surface point 12 (SP12) depicted in Appendix B, and have them analysed for the parameters specified in Table 9. The licence holder shall present the results of the analysis in the annual report.

Table 9: SP12 Water Quality Monitoring

Parameter	Frequency	Guideline
pH	Monthly when flowing	5.0 – 9.5
Electrical Conductivity (or equivalent TDS measurement)		Less than 2000 µS/cm
Nephelometric Turbidity units		no criteria set
Aluminium	6-monthly (during April – May , October – November)	5.0 mg/L
Arsenic		0.5 mg/L
Mercury		0.002 mg/L
Selenium		0.02 mg/L
Vanadium		0.1 mg/L
Manganese		1.0 mg/L
Molybdenum		0.15 mg/L
Uranium		0.2 mg/L

Note: Guideline for metals are taken from the livestock watering guidelines given in ANZECC 2000.

W3(b) Where analysis of a sample collected in accordance with condition W3(a) measures a pH and an electrical conductivity (or equivalent TDS measurement) above the guideline specified in Table 9, the licence holder shall also analyse the same sample for sodium, chloride and alkalinity (as calcium carbonate) and calculate the sodium:chloride ratio.

W3(c) The licence holder shall manage activities at the premises to ensure that its activities are not responsible for water samples collected and analysed in accordance with condition W3(a) and W3(b) to exceed the limits specified in Table 10.

Table 10: SP12 Water Quality Monitoring

Parameter	Frequency	Limit
Sodium:chloride ratio, alkalinity	In circumstances where both pH and EC are in excess of the guideline in Table 9.	sodium:chloride ratio no greater then 0.8 as well as alkalinity no greater than 50 mg/L as Calcium Carbonate.

W3(d) The licence holder shall operate and maintain a flow metering device to measure the cumulative volume of stream flow (in cubic metres per month) at surface water station SP12 depicted at Appendix B. The licence holder shall provide results on flow monitoring in the annual report.

W3(e) The licence holder shall maintain the flow metering device referred to in condition W3(d) so as to provide reliable data for a response level of greater than 90 percent of the total time when the stream is flowing, over a calendar year.

W3(g) When any sample collected and analysed in accordance with condition W3(f) exceeds the guideline value for that parameter listed in Table 9 of condition W3(a), the licence holder shall advise the CEO as soon as practicable.

W3(h) The licence holder shall advise the CEO within 14 days of any surface water monitoring location described in condition W3(a) or groundwater monitoring bore described in condition W3(f) that is de-commissioned or rendered unusable.

GENERAL MONITORING CONDITIONS

W4(a) The licence holder shall collect all water samples in accordance with the relevant part of AS 5667.1:1998.

W4(b) The licence holder shall submit all water samples to a laboratory with current NATA accreditation for the specified parameters for analysis in accordance with the current “Standard Methods for Examination of Water and Wastewater-APHA-AWWA-WEF”.

W4(c) The licence holder shall keep the original laboratory analysis reports (or copies thereof) on record, and shall provide copies of these reports to an Inspector on request.

5 Management Plan

5.1 Responsibility

All Alcoa employees, contractors and subcontractors are required to comply with the requirements of this Plan.

During construction, the Construction Manager is responsible for implementing the SWMP with technical support from the Wagerup Project Environmental Representative/Environmental Department.

Note: The Construction Manager must seek approval for any modifications to the SWMP from the Wagerup Project Environmental Representative/Environmental Department before implementation. Such changes and approvals must be fully supported with appropriately stored and disseminated documentation.

The Wagerup Project Environmental Representative/Environmental Department is responsible for providing technical support and review of any monitoring reports and the SWMP.

The Community Relations Department is responsible for providing advice on neighbouring properties and consultation processes, where required. All communication with neighbours must be co-ordinated via the Community Relations Department.

5.2 Potential Surface Water Risks and Management Outcomes

The potential risks and impacts relating to surface water from the construction and commissioning of RSA 10 are outlined below. The purpose of this SWMP is to ensure that these risks and impacts are managed.

The following risks relating to surface water quality have been identified for RSA 10 construction and are to be managed via this SWMP.

1. Decrease in the identified downstream population of vulnerable CFM due to decreased water quality in Samson South Drain resulting from construction of RSA 10.
2. Surface run-off containing turbidity resulting in decreased water quality in nearby water bodies.
3. Surface run-off containing turbidity resulting in a breach of licence conditions or complaint.

The desired outcome of this SWMP is to ensure that the construction and commissioning of the RSA 10 project does not result in detectable adverse direct or indirect impacts on surface water quality.

The following management objectives have been developed to guide mitigation of sedimentation impacts on surface water that could potentially be caused by the RSA 10 project. These are:

1. Prevent and minimise turbidity and downstream sedimentation caused by erosion and runoff from RSA 10 construction and commissioning.

2. Monitor for changes in surface water quality.
3. Trigger investigation into the cause of any identified changes including potential failure of any project impact avoidance and mitigation measures, and
4. Enable corrective action to be taken.

This is to be achieved through an effective program of surface water runoff and dust control for the construction activities, combined with turbidity monitoring.

5.3 Potential Sediment Sources

Table 3 presents the RSA 10 construction activities and potential sediment sources.

Table 3: Construction activities and potential sediment sources

Operational activity	Activity description	Overview of potential sediment sources
Clearing	Vegetation will be cleared and approximately 200 mm of topsoil stripped from the RSA 10 footprint.	Stormwater run-off from cleared area.
Stockpile	Topsoil stripped from the RSA 10 footprint will be placed in a stockpile.	Stormwater run-off from stockpiled topsoil.
Clay Borrow Pit	Clay to be used in the construction of the RSA 10 project is planned to be sourced from nearby clay borrow pit(s).	Storm water run-off from clay mining activities
Clay Borrow Pit Dewatering Effluent	Dewatering will occur within the clay borrow pit(s) to allow for extraction of clay. Dewatering of clay borrow pits will be conducted by sump pumping from within the pit. Borrow pit dewater will be turbid. It will be pumped via pipe laid over land to DP1 and DP2 where settling will occur (see Figure 2). Water from the Detention Ponds is used for make-up water within the Refinery water circuit. The primary potential source of sediment to surface water bodies from the clay borrow pits will be from any turbid water dewatered from them. The mined depth of the clay borrow pits and the degree of dewatering will potentially be limited by the depth to groundwater and any associated dewatering management. The borrow pits have no natural inward or outward stream or surface flow connections.	Turbid water dewatered from clay borrow pit/s.
RSA 10 Footprint	Development of the RSA 10 footprint is currently planned to involve: 1. Construction of the foundation of the starter wall from bulk fill from borrow pit and/or imported fill. 2. Installation of a low permeability soil liner equivalent to at least a 0.5m-thick layer of moisture conditioned mechanically compacted clay or manufactured geosynthetic clay liner (GCL), with a permeability coefficient not greater than 1 x 10^{-9} m/s, up the inside surface of the starter wall, and across the starter wall crest. 3. Placement of topsoil on outer embankments to promote vegetation regrowth. 4. Installation of an HDPE Liner to the RSA base walls and crests. 5. Installation of a sand layer which incorporates the RSA 10 liquor under-drain system.	The ground disturbance and bulk fill handling that will occur during the RSA 10 construction will provide a potential source of sediment release especially during any sheet flow associated with rainfall events and stormwater run-off. RSA 10 footprint development steps 1 and 2 are regarded as the construction steps with the largest risk for surface water management. RSA 10 starter wall and clay liner run-off.

Operational activity	Activity description	Overview of potential sediment sources
Haul Road	A haul road (existing and extension) connecting the clay borrow pits to the RSA construction area will be surfaced and graded with clay material mined from the borrow pits.	Stormwater runoff from the haul road will be a potential source of sediment load in surface flows.
Dust Management	The primary sources of dust from the RSA 10 construction project are the earth works activities involved in clay extraction, haulage and placement. Dust management for the project will be implemented via the project specific construction dust management plan (Alcoa, 2024) and is therefore excluded from this SWMP.	Potential dust deposition on water surfaces from clay borrow pit, haul road, contractor laydown area and RSA 10 footprint areas.
Contractor Laydown Area	The contractor laydown area established for the previous RSA9 project remains in situ to the west of the RSA9. This contractor laydown area will be utilised for the RSA 10 project.	Run-off from the contractor laydown area
Site office, crib room, ablutions and parking area	Temporary amenities established for the previous RSA9 construction project including a site office, crib room, ablutions and parking area will be re-established used for contractor personnel involved in the construction of the RSA 10 project.	Storm water runoff from the site office, crib, ablutions and parking area.

5.4 Impact Avoidance and Minimisation Measures

Impact avoidance and mitigation measures that reduce the risk of turbid water generation at potential sources and surface water runoff to Samson South Drain have been adopted as part of the construction planning process. Implementation will be monitored to assess effectiveness as construction progresses, and site designs revised if required.

5.4.1 Surface Water Catchments

During the construction phase of RSA 10, surface water management is based on the indicative catchment areas shown in Figure 6.

The catchment areas mainly consist of very light cover grasslands with some areas also containing haul and access roads with compacted gravel base and wearing courses.

Catchment areas have been designed to contain surface water flow within the project footprint and existing residue storage area up to the designed storm event and prevent direct runoff from construction areas outside of the project boundary.

5.4.2 Drainage Basins

Surface water runoff from RSA 10 construction areas will be directed to drainage basins installed in selected catchment areas to enable collected stormwater to be pumped to existing water storage areas within the Wagerup refinery residue area.

The drainage basins will be sized to attenuate flows from 20% AEP storm events (approximately 1 in 5 year). This design frequency is consistent with industry practice for temporary stormwater management facilities. Basin sizing was completed using a Probabilistic Rational Method (Ball J, 2019) that converts rainfall depth data to runoff volume based on a coefficient relevant to the proposed site haul roads, access roads, embankments and prepared RSA 10 floor.

Basin capacity will be routinely assessed, and sediment removed to maintain sump capacity as required. Material removed from the basins will be disposed of according to Alcoa waste management standards.

Surface water runoff collected from most RSA10 catchment areas will be pumped to DP1 and DP2 so that it is available for reuse by the Refinery operations. Runoff from the construction laydown and heavy vehicle park up area that reports to a triple-lined interceptor will be pumped to ROCP3 for reuse. Pumping rate calculations have been used for the sizing of pumps, based on their duty rate, and pipes from each of the basins.

5.4.3 Haul Roads

The haul roads will be graded such that stormwater flow across them will drain into culverts/drains at the road edges, which will direct surface flow towards storage areas and basins within the RSA footprint.

Haul roads at the site will be bordered on either side by a mounded safety bund, with surface water from the haul road draining to the stormwater run-off culvert drain (Figure 7) then on to the collection points (Figure 6).

5.4.4 RSA starter wall

Once the RSA 10 starter wall is complete, the potential for run-off outside the starter wall structure will be significantly reduced. Potential stormwater sheet flow from the outer batter of the starter wall will; however, continue to be a potential source of sediment loaded surface flow.

The starter wall will be constructed and graded with a 1:4 slope (Figure 8). The outer starter wall batter will be covered in topsoil. Vegetation growth will be encouraged on the topsoil batter slope to stabilise the batter against erosion.

Stormwater run-off from the starter wall once constructed, will be transported via the light-vehicle access road culvert back to the basin at the north of ROCP3 (Figure 6).

5.4.5 Clay extraction activities

Existing and proposed clay borrow pits are not connected to natural watercourses or drainage lines. The clay borrow pits will not receive water from or release water to the surface environment. Rainfall that lands in the borrow pit will drain to the lowest point and be removed by the sump pump dewatering process to DP1 and DP2

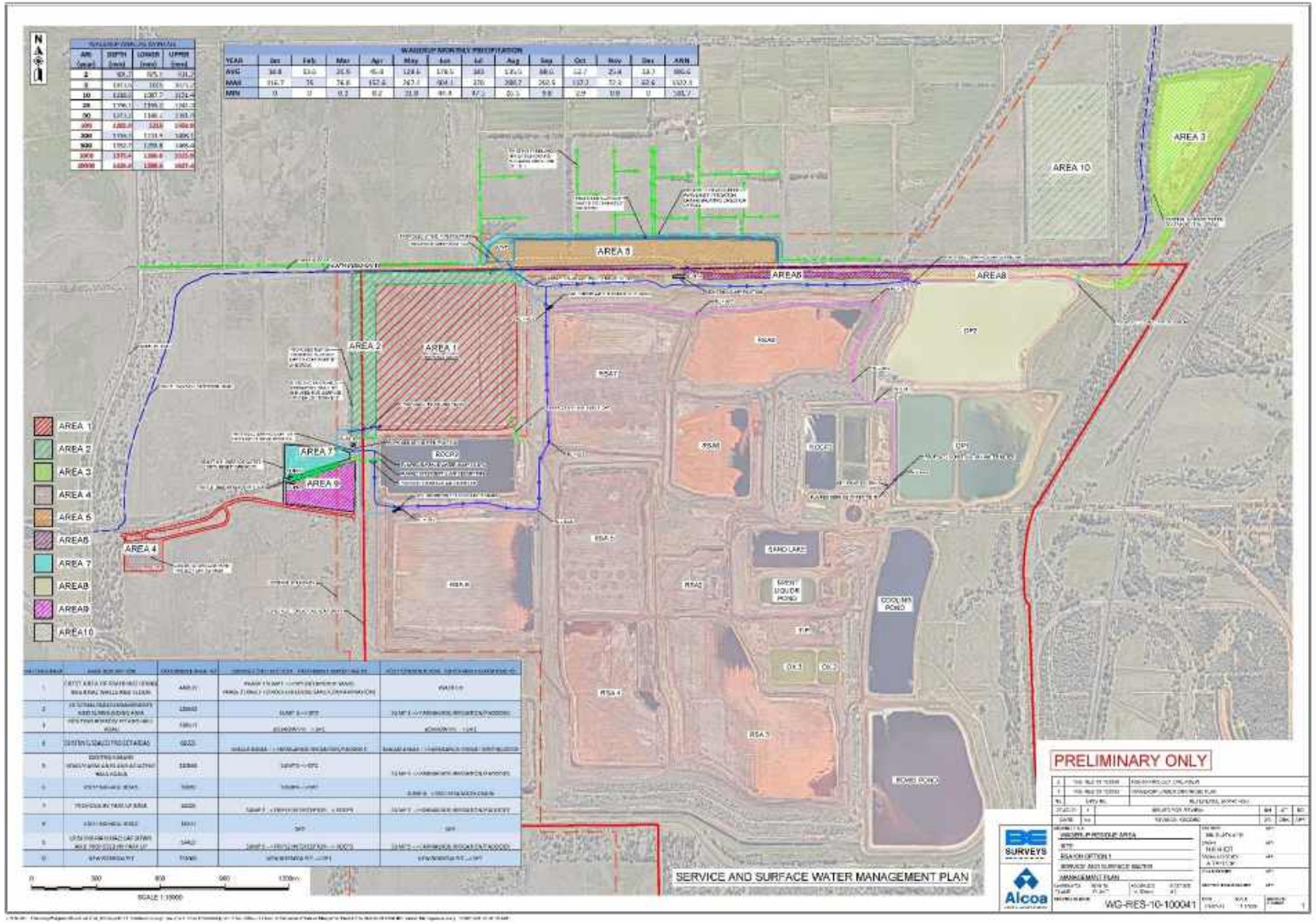
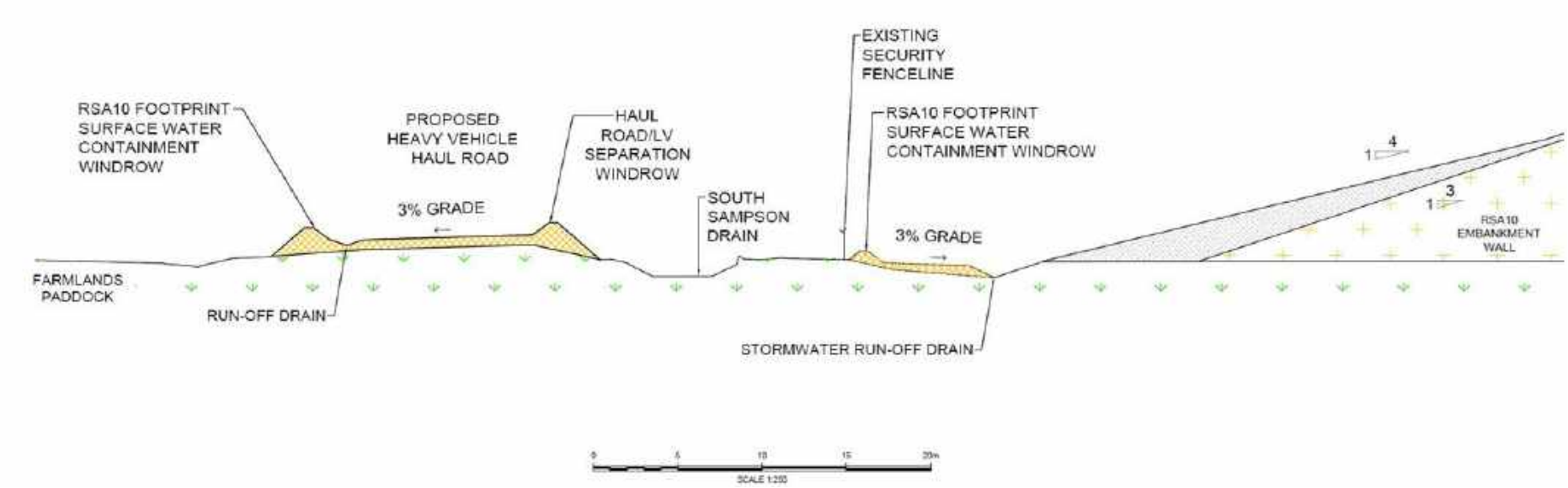


Figure 6: RSA 10 Indicative Construction Stormwater Management Plan

North Wall



West Wall

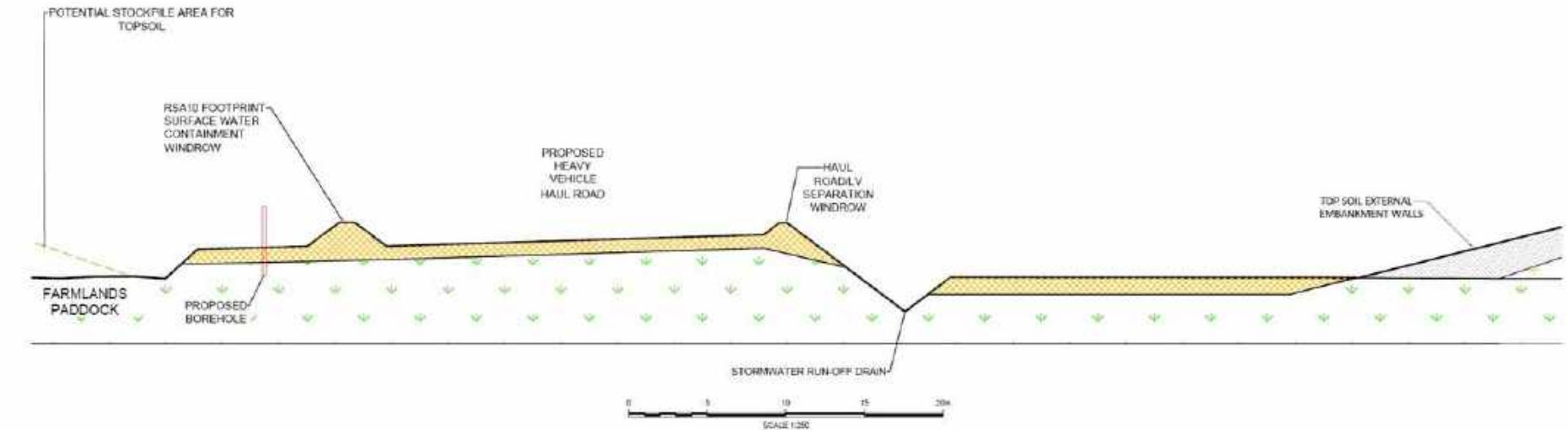
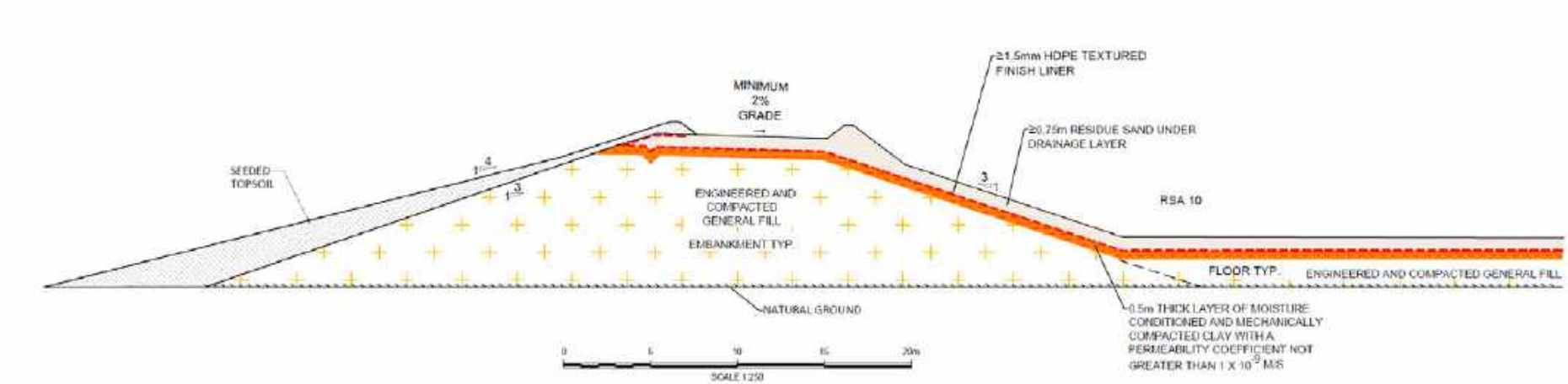


Figure 7: Haul Road Cross-Section and Drainage

North Wall looking East



West Wall looking North

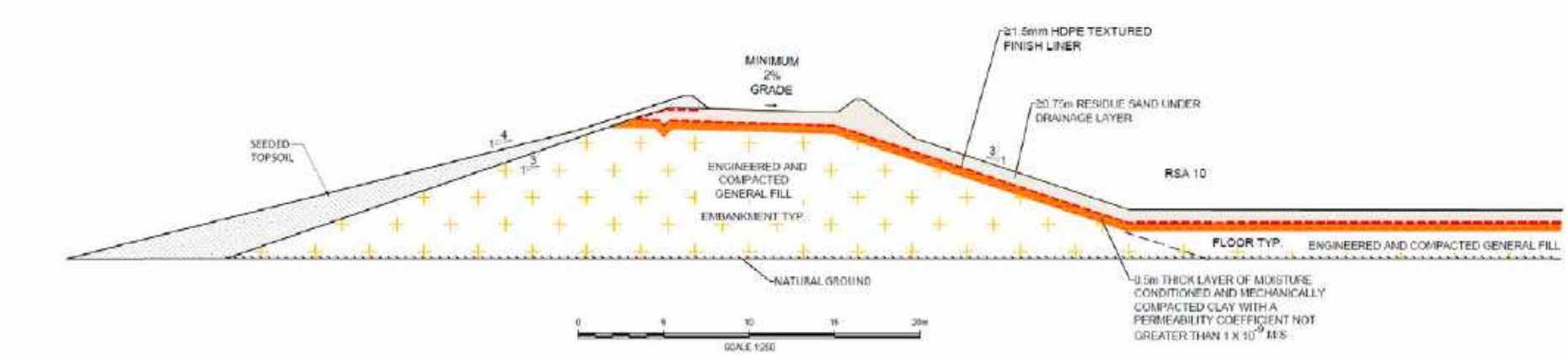


Figure 8: RSA 10 Starter Wall Cross Section

5.4.6 Construction Timing

Activities for the project are planned as pre-construction and construction works (see Section 3.1). The pre-construction works are focussed on surface water protection for the RSA 10 construction works and include works that are identified as seasonally constrained to the drier months (approximately October to May) for surface water protection and for stormwater management.

5.4.7 Induction Training

All contractor employees and subcontractors working on the project will complete the RSA10 project induction that includes information on this SWMP. Surface water management performance and improvement opportunities will be communicated regularly, including at the daily RSA10 project morning meeting.

5.4.8 Dewatering Effluent

Dewatering effluent will be managed so that it cannot enter surface water bodies or watercourses.

The clay borrow pit(s) contain surface water and may contain groundwater. All dewater shall be pumped directly to DP1 and DP2 for storage and reuse.

5.4.9 Dust Management

A Construction Dust Management Plan has been prepared and will be implemented during the construction phase of RSA 10 to minimise dust generation from the construction activities.

5.4.10 Weather Forecasting

A specialist weather forecasting service provides operations with hourly and daily rainfall forecasts to enable the RSA10 project to respond to potential high rainfall events. These forecasts are intended to provide leading indicators for runoff and serve as a trigger for actions detailed in this SWMP and the Construction Dust Management Plan.

5.4.11 Weather Monitoring

Wagerup Refinery has a weather monitoring station located at Bancell Road. Data from this weather monitoring station is used to provide an indication of the weather conditions experienced on site.

5.5 Monitoring and Indicators

5.5.1 Visual Inspection

Construction areas will be visually inspected for any surface water run-off following high rainfall events. A high rainfall event is defined as greater than 20mm of rain falling in a 24-hour period. These visual inspections will complement surface water monitoring and are intended to identify any areas of concern at the source.

5.5.2 Surface Water Sampling

A surface water monitoring program will commence prior to pre-construction works (Section 3.1.1) and will continue for 12 months following RSA 10 commissioning to confirm the effectiveness of surface water management controls.

5.5.3 Sampling Location and Rationale

Sampling locations used to monitor surface water quality during the construction of RSA 10 are classified as being upstream, downstream or adjacent to RSA 10 project areas. The proposed sampling locations are shown in Figure 9 and detailed in Table 4.

Sampling Program

Water quality will be sampled as outlined below. Exceptions to this sampling schedule may be made in the following circumstances:

- there is inadequate flow to sample at the location
- the sampling location is not accessible
- the monitoring equipment is not available or functioning correctly.

Turbidity Monitoring

Surface water samples will be collected weekly at each sampling location to provide a turbidity measurement upstream, downstream and adjacent to RSA 10 construction areas.

Turbidity levels will also be checked after periods of high rainfall, to identify if assigned limits have been exceeded. If an exceedance occurs construction areas will be inspected to determine if the RSA10 project is the likely source. Exceedances attributed to the RSA10 project will be investigated to determine the cause and actions required to reduce the likelihood of reoccurrence.

Water Quality Analytes

Surface water quality samples will be taken and analysed for the suite of analytes in Table 5. Samples will be collected quarterly (when there is adequate stream flow) and following any exceedance of a turbidity trigger level that is found to have been caused by RSA 10 construction works.

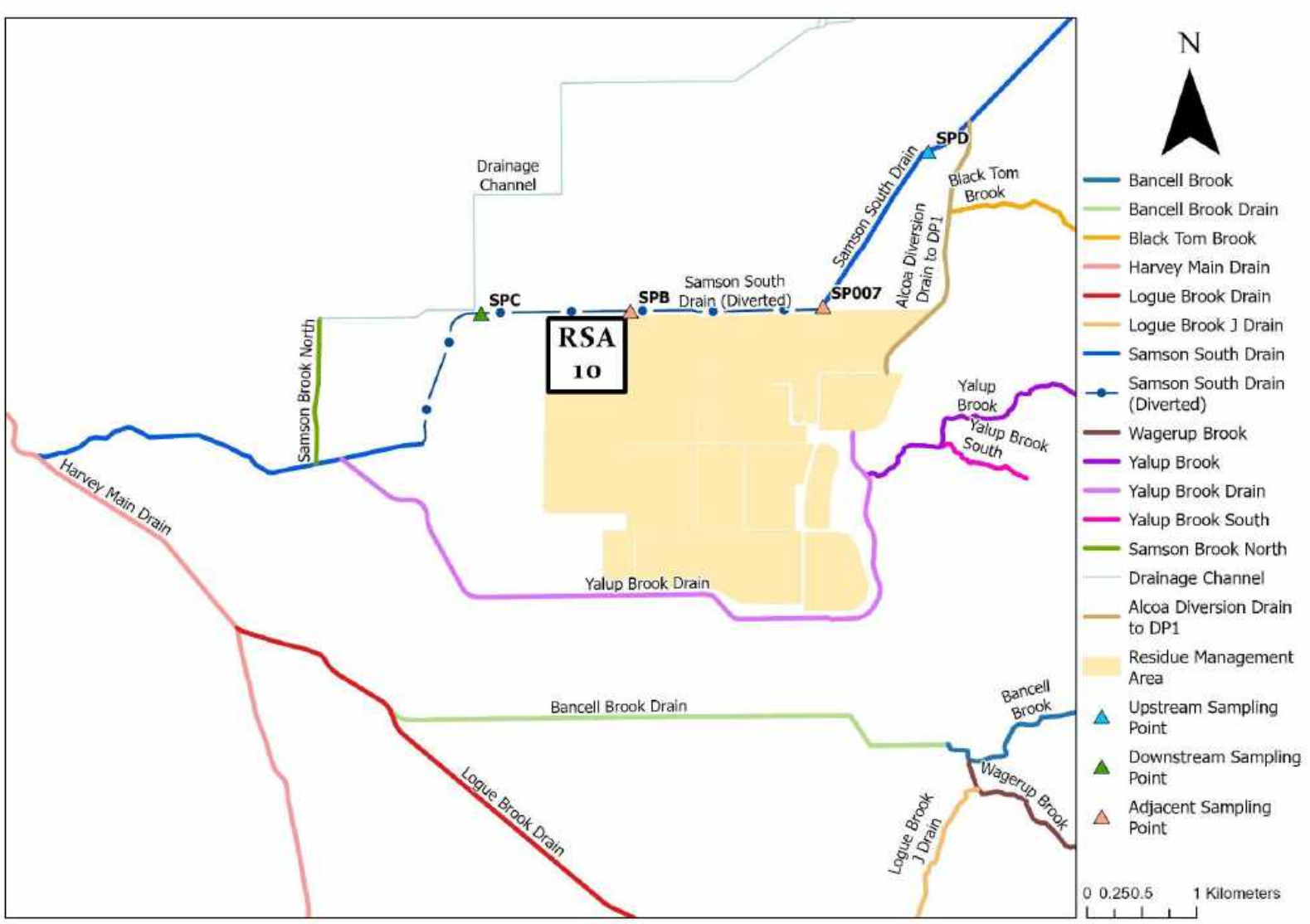


Figure 9: Wagerup Refinery Surface Water Sampling Locations for Use in Construction Surface Water Management

Table 4: Surface Water Sampling Points for RSA 10 Construction

Sample Location Name	Existing /New	Monitoring Objective	Location Description	Potential risks from RSA10 Project	Proximity to identified Aquatic Fauna populations	Monitoring Program
SP-D	New	Assess water quality upstream of RSA 10 project areas to provide background data.	Samson South Drain	No	Small CFM population located downstream.	Weekly Turbidity Sampling Quarterly Analyte Sampling
SP-C	New	Assess water quality downstream of RSA 10 project areas to provide data on the potential impact of construction activities.	Samson South Drain	Yes	Large CFM population (+200 individuals) located approximately 2.1 km downstream.	Weekly Turbidity Sampling Quarterly Analyte Sampling
SP-B	New	Assess water quality downstream of existing residue area and upstream of RSA 10 footprint.	Samson South Drain	Yes	Small CFM population located upstream and large CFM population (+200 individuals) located approximately 3.5 km downstream.	Weekly Turbidity Sampling Quarterly Analyte Sampling
SP007	Existing	Assess water quality downstream of RSA10 Potential Borrow Pit and upstream of existing residue area.	Samson South Drain	Yes	Small CFM population located nearby and upstream.	Weekly Turbidity Sampling Quarterly Analyte Sampling

Trigger Values

(WRM-SLR, 2022) developed interim site-specific guideline values (SSGVs) for surface waters downstream of RSA 10. The aim of the proposed SSGVs is to prevent any further deterioration in water quality in downstream surface water environments from the RSA. These SSGVs have been set at the 80th percentile of the parameters considered potential contaminants of concern, and the turbidity guideline has been set at the 80th percentile of sampling data from 1997-2024. These are outlined in Table 5.

These SSGVs will serve as trigger values. These values are proposed as preliminary and may be reviewed during construction in line with adaptive management practices once additional baseline data is available. If flows from Harvey River and Samson Brook were to decrease, concentrations in downstream sites may increase and preliminary SSGVs for downstream areas may be exceeded. In such a situation, then a revision of the SSGVs will be conducted.

Table 5: Proposed preliminary water quality guidelines for Wagerup RSA 10 Construction

Greater than or equal to the ANZG (2018) DGV for protection of 95% of freshwater species.

Proposed SSGV is equal to the ANZG (2018) DGV for protection of 95% of freshwater species.

Proposed SSGV is greater than the ANZG (2018) DGV for protection of 95% of freshwater species, or a DGV has not yet been published.

Proposed SSGV is equal to the 80th percentile value of Alcoa's long term surface water sampling results (1997-2024) with two outlying high value data points removed from 2012.

Analyte		ANZG (2018)	Upstream RSA	Adjacent RSA	Downstream RSA	Preliminary SSGV
		95% TV	80%ile	80%ile	80%ile	
Al (pH>6.5)	T	0.055	0.044	0.038	0.04	**0.055**
Alkalinity (as $CaCO_3$)		np	68.4	120	63	**63**
As-total	T	np	<0.001	<0.001	<0.001	**np**
B	T	0.94	0.03	0.04	0.04	**np**
Ca	E	np	17	40.8	18.8	**np**
Cd	T, H	0.0002	<0.0001	<0.0001	<0.0001	**0.0002**
Cl (chloride)	E	np	142	206	140	**np**
CO_3	E	np	<1	<1	<1	**np**
Cr (VI)	T	0.001	np	np	np	**np**
Cr-total	T	np	<0.001	<0.001	<0.001	**0.001**
Cu	T	0.0014	0.002	0.002	0.0028	**0.0028**
DO-field (% sat)		85-120	np	np	np	**85-120**
EC (uS/cm)	E	300	755	952	616	**616**
F	T, F	2.4	0.12	0.3	0.1	**2.4**
Fe	T, F	np	0.63	1.08	0.56	**0.56**
Hardness (as $CaCO_3$)		np	102	226	118	**np**
HCO_3	E	np	59.8	218	130	**np**
Hg-inorganic	T, B	0.00006	<0.00005	<0.00005	<0.00005	**0.00006**
K	E	np	5.5	4.2	3.8	**np**
Mg	E	np	15.2	31.2	17	**np**
Mn	T	1.9	0.03	0.128	0.05	**1.9**
Mo	T, M	0.073	<0.001	0.002	<0.001	**0.073**
Na	E	np	77	120	78.4	**78.4**
Ni	T, H	0.011	<0.001	0.001	<0.001	**0.011**
$N\text{-}NH_3$	T	0.9	0.038	0.033	0.028	**0.9**
$N\text{-}NH_4$ (eutrophication)		0.01	np	np	np	**np**
$N\text{-}NO_x$ (eutrophication)		0.15	0.32	0.01	0.12	**0.15**
NO_2		np	0.052	0.01	0.01	**np**
NO_3	T, N	9.3	1.4	0.01	0.85	**9.3**
N-total (eutrophication)		0.3	2	1.8	1.66	**1.66**
FRP (eutrophication)		0.04	0.083	0.073	0.054	**0.054**
P-total (eutrophication)		0.01	0.184	0.23	0.166	**0.166**
Pb	T, H	0.0034	<0.001	<0.001	<0.001	**0.0034**
pH-field (H^+)		6.5-8.0	7.7 7 (20%ile)	7.2 6.7 (20%ile)	7.3 6.9 (20%ile)	**6.5 - 8.0**
Redox (mV)		np	264	275	266	**np**
Sb	T	0.009	<0.001	<0.001	<0.001	**0.009**
Se-total	T, B	0.005	<0.001	<0.001	<0.001	**0.005**
SO_4	E	np	32.2	65	30	**np**
TDS		np	386	700	408	**np**
Temperature-field (°C)		np	23.2	18.2	23.2	**np**
Turbidity-field (NTU)	ID	20	np	np	52	**52**
U	T	0.005	<0.0005	0.0033	<0.0005	**0.005**
V	T	0.0006	0.002	0.003	0.001	**0.001**
Zn	T, H	0.008	0.002	0.004	0.005	**0.008**

Notes:

B = ANZG (2018) 99% species protection level TV recommended due to the ability of these metals to bioaccumulate. However, laboratory analysis of mercury for routine screening is only achievable to 0.0001 mg/L Hg-inorganic or 0.00005 mg/L Hg-total; the latter by persulfate digestion on low salinity samples.

E = Conductivity (EC) and associated ions (*e.g.* Ca, Mg, SO_4) will vary depending on flow; values higher than the preliminary GV may occur naturally in seasonal sites during the drying phase if water levels are reduced due to evapo-concentration.

F = ANZG (2018) state the DGVs for F and Fe are under review and recommend use of a site-specific GV where background levels are higher than the DGV. Interim guideline values for fluoride (mg/L) in freshwaters have been proposed as 3.4 mg/L for 90% species protection, 2.4 mg/L for 95% species protection, 1.4 mg/L for 99% species protection (R. van dam, pers. com).

H = GV should be modified for water hardness at the time of sampling using the default algorithms in Tables 3.4.3 and 3.4.4 of ANZG (2018). Note, worldwide literature now report default hardness modified trigger value (HMTV) for Cu may not be sufficient to protect key sensitive species (see Markich *et al*. 2005, USEPA 2014), so an **HMTV for Cu is not recommended here**.

ID = Insufficient baseline data to derive SSGV, ANZG (2018) DGV applied.

N = NZG DGV for NO_3 as a toxicant is soon to be revised to around 9.3 mg/L NO_3 (*i.e.* 2.1 mg/L N-NO_3); to convert nitrate-nitrogen (N-NO_3) to nitrate (NO_3), multiply by 4.43.

np = Not provided.

T = Toxicant.

5.6 Action Plan

The Surface Water Management Action Plan can be found in Table 6. This summarises the indicators, response actions, monitoring and reporting that will be put in place during the construction of RSA 10.

Table 6 Surface Water Management Action Plan

Outcome:	The construction of the RSA 10 project does not result in detectable adverse direct or indirect impacts on surface water quality			
Indicators	**Response Actions**	**Monitoring**	**Timing**	**Reporting**
Weather Forecasts				
Rainfall - forecast rainfall greater than 20mm in a 24-hour period	• Communication of high rainfall event to all personnel. • High rainfall inspection is completed as required and filed. • All practicable measures taken to address potential site drainage issues to minimise the risk of surface water management controls failing from a high rainfall event.	See Section 5.4.10 for weather forecast details.	Response actions completed prior to high rainfall event.	Inspection findings reported to RSA10 Construction Manager.
Weather Observations, Visual Inspections and Turbidity Monitoring				
Rainfall - observed rainfall greater than 20mm in a 24-hour period	• Visual inspection of surface water management controls in construction areas undertaken and inspection checklist completed. • Surface water samples collected at sampling locations to assess turbidity levels. Exceedances investigated to determine if caused by the RSA10 project. • Root cause of exceedances attributed to the RSA10 Project addressed through corrective actions.	See Section 5.4.11 for weather monitoring details.	Response actions initiated within 24 hours of high rainfall.	Inspection findings reported to RSA10 Construction Manager. Exceedances reported in Alcoa EHS Incident Management System.

Outcome:	The construction of the RSA 10 project does not result in detectable adverse direct or indirect impacts on surface water quality			
Indicators	**Response Actions**	**Monitoring**	**Timing**	**Reporting**
Turbidity Monitoring				
Turbidity result exceeds the preliminary trigger SSGV value in Table 5.	• Exceedance investigated to determine if caused by the RSA10 project. • Root cause of exceedances attributed to the RSA10 project determined and addressed through corrective actions. • Review trigger SSGV if there is a trend of exceedances not caused by RSA10 project.	Weekly and high rainfall surface water analysis. See Section 5.5.2 for monitoring details.	Response actions initiated within 24 hours.	Exceedances reported in Alcoa EHS Incident Management System.
Surface Water Sampling				
Quarterly surface water sampling results exceeds preliminary trigger SSGV in Table 5.	• Exceedance investigated to determine if caused by the RSA10 project. • Root cause of exceedances attributed to the RSA10 project determined and addressed through corrective actions. • Review trigger SSGV if there is a trend of exceedances not caused by RSA10 project.	Quarterly surface water analysis See Section 5.5.2 for monitoring details	Response actions initiated within 24 hours.	Exceedances reported in Alcoa EHS Incident Management System.

Outcome:	The construction of the RSA 10 project does not result in detectable adverse direct or indirect impacts on surface water quality			
Indicators	**Response Actions**	**Monitoring**	**Timing**	**Reporting**
Complaints				
Receipt of turbidity related complaint.	• Complaint investigated to determine if issue caused by the RSA10 project. • Root cause of issues attributed to the RSA10 project determined and addressed through corrective actions. • Source of issue investigated if there is a trend of complaints not caused by RSA10 project.	Complaints received	Response actions initiated within 24 hours.	Complaints reported in Alcoa EHS Incident Management System.

5.7 Summary of Commitments

To prevent impact to surface water resources in the vicinity of and down gradient of the RSA 10 project area, Alcoa is committed to undertaking the measures described in this SWMP and summarised below:

#	Commitment	Reference	Responsible Party
1	Stormwater management in the proposed RSA 10 construction area has been designed to ensure rainfall runoff is contained up to the designed storm event without conveying haul road, access road and tailings facility surface water runoff to local watercourses including Samson South Drain.	Section 5.4.2	Construction Manager
2	The haul roads will be graded such that stormwater flow across them will drain into culverts/drains at the road edges (Refer Section 6.2) which will direct surface flow towards storage areas and basins within the RSA footprint.	Section 5.4.3	Construction Manager
3	All contractor employees and subcontractors working on the project will complete the RSA10 project induction that includes information on this SWMP.	Section 5.4.7	Construction Manager
4	Monitor weather forecast conditions for predicted high rainfall conditions that could impact on surface water flows and sediment management.	Sections 5.4.10 and 5.4.11	Construction Manager
5	Implement a turbidity monitoring program upstream and downstream of the construction area to provide an indicator of the performance of RSA10 project surface water management controls.	Section 5.5.2	Project Manager
6	Surface water quality samples will be taken and analysed quarterly for the suite of analytes in Table 5 at all surface water sampling locations if flowing.	Section 5.5.2	Project Manager

5.8 Adaptive Management and Review

This Construction SWMP is an adaptive management plan. The plan will be reviewed and modified as required as RSA 10 project details develop, and construction progresses.

Triggers to review and modify this SWMP will include (but not be limited to):

1) Definition of the borrow pit clay mining activities.
2) Any updates to relevant Alcoa procedures.
3) A review of monitoring results and surface water management performance.
4) Amendments to the Wagerup Refinery Operating Licence.
5) Receipt of the RSA 10 Project Works Approval conditions.
6) Changes to the planned construction methodology or timeline.

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