Appendix N

Surface Water Impact Assessment

Bromelton Compost Manufacturing Facility

Surface Water Impact Assessment

SOILCO Pty Ltd

28 August 2024

→ The Power of Commitment

Project name		Bromelton Compost Manufacturing Facility					
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Executive Summary

Background

SOILCO Developments Pty Ltd (SOILCO) is a producer of organic soil improvers, manufacturing a range of soil, compost, and mulch products and specialising in the processing of organic waste through composting facilities and organics processing facilities. SOILCO currently has four approved and licensed facilities in New South Wales and is proposing to develop and operate a Compost Manufacturing Facility (CMF) in Southeast Queensland, approximately 80 km south-west of Brisbane and 62 km west of the Gold Coast (the Project).

SOILCO engaged GHD to undertake a Surface Water Impact Assessment for the Project, comprising this report. This report also includes a conceptual surface water management plan. This has been developed in collaboration with the design process for the Project, to develop in-built mitigation measures which seek to manage water-related aspects of the Project in accordance with the relevant legislation and design criteria.

Existing conditions

The regional topography in the vicinity of the Project site includes foothills and valleys extending from an unnamed ridge, which is located 6km south of the Project site. The Project site is undulating and slopes relatively steeply towards the north. The grade of west-east undulations at the Project site are up to 24%.

The Project site is situated within the regional catchment of the Logan River, a coastal draining watercourse some 11 km downstream of the Project site. Major regional hydrological features include Wyaralong Dam, located 4.6 km to the northwest, which impounds Teviot Brook, a direct tributary of the Logan River downstream of the Project site. Bromelton Off Stream Storage, an off-stream storage located adjacent the Logan River, is also located 4.2 km north east of the Project site, however is currently not in commission.

Two first order drainage lines of Allan Creek intersect the Project site, which drain north to adjoin a third order, north easterly flowing tributary of Allan Creek. Allan Creek is a fourth order tributary of the Logan River at the confluence of these waterways. There are farm dams located within the lot boundary, including approximately 650 to 700 m east of the Project site. The hydrological features in the vicinity of the project site are shown in Figure 3.3.

The existing flood conditions at the site were characterised through development of a hydraulic flood model in TUFLOW. In the upper tributaries across the southern extent of the Project lot, for the 1% AEP storm, the lateral flood extents are shown to be topographically constrained, with minimal bank storage of flood waters. Peak flood depths in these areas were modelled up to 1.18 m within the tributary and generally less than 0.4 m in the bank areas. The topography flattens slightly in the northern portion of the Project lot. In the 1% AEP flood event, the lateral extent of the flood waters in this area extend from the north and occur out of stream bank areas, with flood depths predominantly less than 0.2 m to 0.4 m. Outside of the Project lot, at the confluence of the tributaries across the site, in stream peak flood depths of up to 1.5 m were modelled.

Water quality sampling undertaken indicates that existing surface water quality across the site was reasonably poor in relation to guideline values.

Proposed conditions

Based on the review of the relevant regulatory context applicable to the Project and the existing conditions at the Project site, a requirement for mitigation measures to be in-built into the Project was identified. This has been undertaken through the development of the Surface Water Management Plan in Section 4, described herein, which has been developed collaboratively with (and informed) the Project design development undertaken by SMEC.

The potential impacts of the Project were assessed with relation to surface water, including the in-built management measures. The water related risks were found to be generally acceptably managed based on the following:

– Appropriate separation of water types in accordance with best-practice for composting sites and the ERA53(s) Model Operating Conditions (MOC) produced by the Queensland Government.
– Provision of in excess of 30 ML of leachate storage sized in exceedance of the 24-hour event supported by the MOC, with reuse in the early stage of composting. No proposed active release of leachate and no overflow up to a design standard rainfall of 900 mm falling within a 6 month period.
– Separation of stormwater from contamination and management through provision of a stormwater treatment train in accordance with South East Queensland Water (SEQW) guidelines.
– Estimation of water demands by SOILCO and confirmation that during dry periods they can be sourced via appropriately licensed external sources. Provision of a 30ML harvesting storage to minimise reliance on imported water.
– Location of the operational site outside the 1% AEP flood impact for the identified flow paths adjacent to the site in accordance with SEQW guidelines and the Scenic Rim Hazard Overlay Code.
– Separation distances from identified flow paths consistent with the understood intent of the SEQW guidelines.
– Provision of an erosion and sediment control plan, based on relevant regulatory requirements, to be updated and confirmed during detailed design.

Risk reduction was anticipated as the Project water management measures were developed through the process outlined in this assessment, in consideration of potential impacts and in accordance with regulatory requirements. However, it was noted that whilst appropriate measures are specified to the degree that they can realistically be at this stage, there are some additional mitigations required, that can only be fully defined and implemented through the operational phase of the project. These additional mitigations consist of:

– Preparation and regular update of an Operational Management Plan.
– Adjustment of leachate catchment area when full processing rate is not occurring.
– Preparation of a detailed water balance model based on actual site operational data and provide emergency containment bunding if required.

With inclusion of the in-built measures, as well as the additional measures, the project is expected to appropriately manage risks with relation to surface water.

Limitations

This report is subject to, and must be read in conjunction with, the limitations, assumptions and qualifications contained throughout the Report.

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1. Introduction

The Bromelton Compost Manufacturing Facility (the Bromelton CMF Project) is an organics facility located along Mitchell Road in Bromelton, in South East Queensland. The Bromelton CMF Project will involve the construction and operation of a facility for the receipt, processing, composting, and storage of the following materials: garden, food, wood wastes, manures and soil for the sale and distribution of finished compost, mulch and soil products. SOILCO Pty Ltd (referred to as SOILCO) will design, construct and operate the Bromelton CMF Project.

SOILCO are seeking the following approvals for the Project:

– A State Development Area (SDA) Material Change of Use approval for works within the Bromelton SDA under the *State Development and Public Works Organisation Act 1971.*
– An Environmental Authority (EA) Approval for Environmentally Relevant Activities (ERAs) ERA:
  - ERA 33(1): Crushing, milling, grinding or screening more than 5,000t of material in a year.
  - ERA 53(a): Organic material processing - processing more than 200 t of organic material in a year by composting
  - ERA 54(2)(c): Mechanical waste reprocessing - operating a facility for receiving and mechanically reprocessing more than 10,000 t a year of general waste

SOILCO engaged GHD to undertake a Surface Water Impact Assessment for the Project, comprising this report. This Surface Water Impact Assessment has been prepared to support the application for an Environmental Authority (EA) for the above ERAs. The surface water assessment in the context of this report considers, flooding, drainage, surface water quality, wastewater, flooding and water sourcing.

This report also includes a conceptual surface water management plan. This has been developed in collaboration with the design process for the Project, to develop in-built mitigation measures which seek to manage water-related aspects of the Project in accordance with the relevant legislation and design criteria.

1.1 Project overview

The Bromelton CMF Project aligns with objectives in the Queensland Government Queensland Organics Strategy 2022–2032 by reducing the amount of organic waste going to landfill and it will offer economic and social benefits through employment and local business opportunities in South East Queensland.

SOILCO commenced composting operations in 1985 in Australia and has a strong distribution network in agricultural and urban markets in Australia. SOILCO are a manufacturer of quality assured compost, mulch and soil blends and specialise in the design, construction and operation of innovative organics recycling facilities in Australia. SOILCO's mission is to transform organic resources into the world's best products to regenerate and enhance the health and productivity of soil and to maximise our contribution to clean energy and sustainable communities. SOILCO successfully operates a state-of-the-art network of licensed organics processing facilities across Eastern Australia. SOILCO's infrastructure experience spans different technology solutions, including:

– Open Windrow (OW)
– In-Vessel Composting (IVC) tunnels
– Aerated Static Piles/ Covered Aerated Static Piles (ASP/CASP)

For the Bromelton CMF Project, SOILCO will utilise ASP & OW technologies..

Table 1.1 and Figure 1.1 summarise and depict the key Bromelton CMF Project components.

Table 1.1 Project components

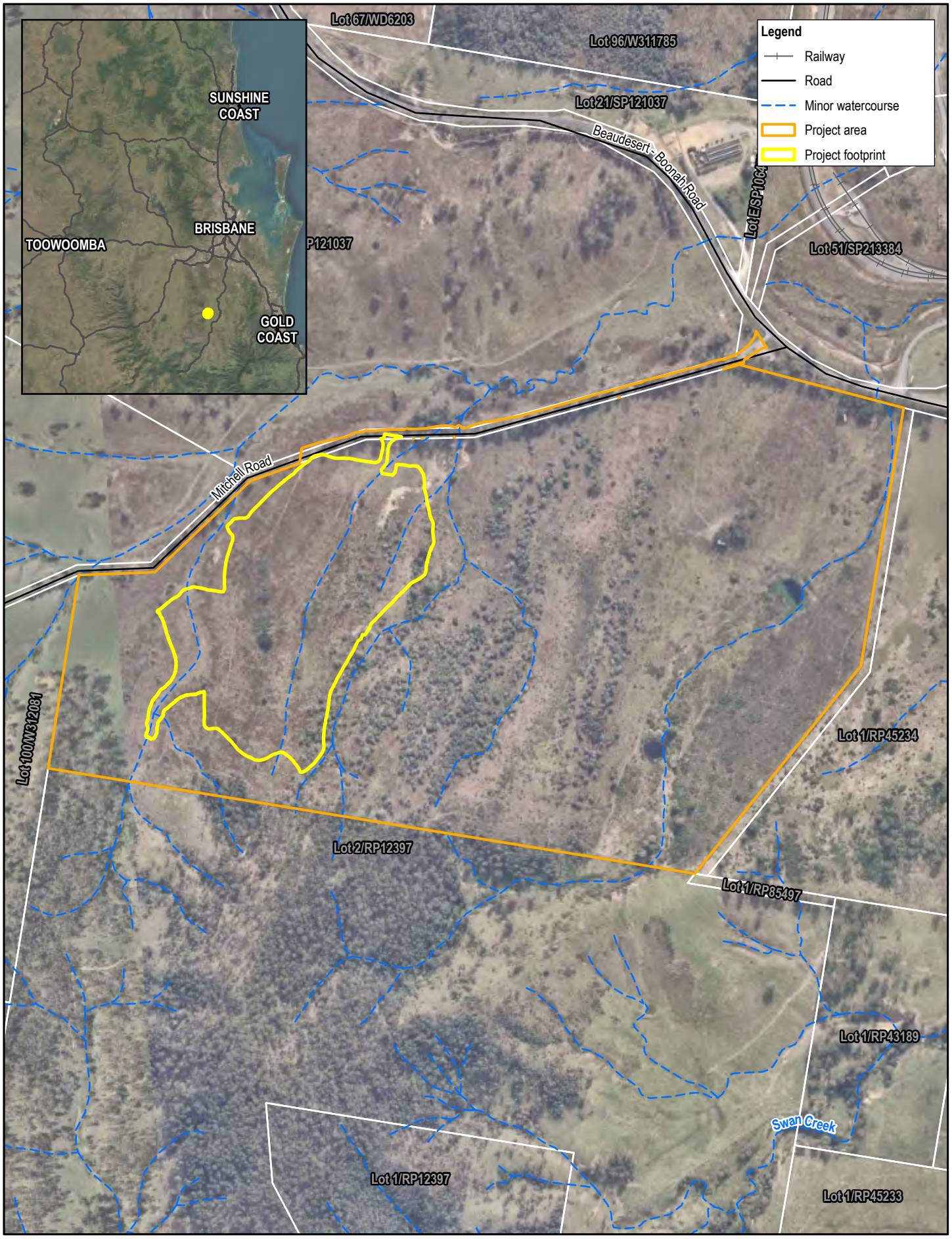
Project Component	Details
Lot on Plan	Lot 4 on Plan RP85497 and Mitchell Road (Local government road parcel)
Summary of proposed works	Construct and operate a Compost Manufacturing Facility (CMF) at 260 Mitchell Road, Bromelton for the sale and distribution of finished compost, mulch & soil products

Project Component	Details
	The site will be split into 3 different processing areas: Receival, decontamination and composting utilizing Forced Aeration Pad system (ASP).
Construction disturbance area within Lot 4 RP85497	21 hectares
Operational footprint within Lot 4 RP85497	18.5 hectares
Proposed output of the compost facility and type of material to be received and processed	Receipt, processing, composting, and storage of up to 250,000 tpa of the following materials: Garden, Food and Wood wastes and manure. Receipt, processing, storage and blending of up to 150,000 tpa of sand and soil products for manufacturing (Virgin Excavated Natural Materials or VENM).
Technology used	Two composting technologies will be utilised to handle different feedstocks: 100,000 tpa of garden organics (GO) composted by Passive Open Windrow (OW) method. 150,000 tpa of Food Organics and Garden Organics (FOGO) is to be processed on a Forced Aeration Pad system (ASP). Wood wastes and manure will make up a small portion of the composting feedstocks and will be blended with the GO & FOGO based on onsite capacity. VENM will be received and stored as required based on demand of finished products. Due to the seasonal nature of feedstock generation, up to 15% of the total annual waste may be received in any one month. This would typically occur around spring and autumn.
Key infrastructure and structures	Access from Mitchell Road Weigh bridges Internal road network Maintenance and storage shed Final screening and manufacturing area Water tanks Aeration Pad system Office, carparking and amenities FOGO receival area 3 x leachate ponds, lined with either HDPE or 300 mm thick clay with permeability of no more than 1 x 10^{-9}m/s 1 x freshwater dam Open windrows pad FOGO maturation pad Hardstand areas Retaining wall Upgrade of Mitchell Road
Hours of Operation	Monday – Friday 6am to 6pm Saturday – 6am to 4pm Sunday and public holidays 9am - 4pm
Operational Staff	22 employees
Access arrangements	Mitchell Road will connect the Bromelton CMF Project to the road network. Mitchell Road will be upgraded to accommodate the traffic from the Bromelton CMF Project.

Project Component	Details
Timeframe	Construction and Commissioning 7th April 2025 – 30th January 2026

Based on review of the proposed project the following key considerations with relation to surface water are noted:

– Water sourcing
– Water quality (construction and operational phase, including wastewater)
– Flooding
– Stormwater quantity (non-flooding)
– Waterways and separation distances



Paper Size ISO A4

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Metres

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Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 56

GHD

SOILCO
The Life-Giving Soil Company

SOILCO Pty Ltd
Bromelton Compost Manufacturing Facility

Project No. **12626213**
Revision No. **A**
Date **8/08/2024**

Project area and locality

FIGURE 1-1

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Print date: 08 Aug 2024 - 14:15

Data source: DoR: rail, watercourse (2023), cadastre (2024), road (2021); SoilCo: project area (2024); World Imagery: Earthstar Geographics public/NSW_POI: © Department of Finance, Services & Innovation 2018 nearmap.com: extracted 8/08/2024 . Created by: mvandermerwe

1.2 Purpose of this report

The purpose of this report is to document the outcomes of the Surface Water Impact Assessment undertaken by GHD to support SOILCO's application for the EA. This report also summarises the proposed conceptual surface water management pan developed through the assessment and design process.

1.3 Scope and limitations

The scope of this report is to summarise the surface water impact assessment considering potential surface water related impacts arising from the Project, including flooding, drainage, surface water quality, wastewater, flooding and water sourcing. The scope of this report also includes the development of a conceptual stormwater management plan.

This report has been prepared by GHD for SOILCO Pty Ltd and may only be used and relied on by SOILCO Pty Ltd for the purpose agreed between GHD and SOILCO Pty Ltd as set out in Section 1.2 of this report.

GHD otherwise disclaims responsibility to any person other than SOILCO Pty Ltd arising in connection with this report. GHD also excludes implied warranties and conditions, to the extent legally permissible.

The services undertaken by GHD in connection with preparing this report were limited to those specifically detailed in the report and are subject to the scope limitations set out in the report.

The opinions, conclusions and any recommendations in this report are based on conditions encountered and information reviewed at the date of preparation of the report. GHD has no responsibility or obligation to update this report to account for events or changes occurring subsequent to the date that the report was prepared.

The opinions, conclusions and any recommendations in this report are based on assumptions made by GHD described *throughout this* report. GHD disclaims liability arising from any of the assumptions being incorrect.

1.4 Structure of this report

This report is structured as follows:

– Section 2 – summarises the key governing legislation and policy to inform the design and management requirements of the Project with relation to surface water
– Section 3 – describes the existing environment at the Project site relevant to surface water
– Section 4 – describes the Surface Water Management Plan in-built into the proposal development/design. This includes the basis for its development, with reference to the requirements of Section 2.
– Section 5 – provides an assessment of the impacts on surface water due to the project, with the inclusion of the measures outlined in Section 4, and where required, outlines additional mitigation measures required.
– Section 6 – concludes the report.

2. Regulatory context

This section outlines a review of the relevant legislation and regulations that was undertaken to contextualise the Project within the QLD planning system. It should be noted that Sections 4 and 5 further review and synthesise these requirements into specific objectives for the Project that were then adopted into the development of the Surface Water Management Plan and impact assessment/mitigation process.

The relevant legislation, guidelines and performance criteria were reviewed with regard to integrating appropriate measures with relation to the following key issues:

– Water sourcing and licensing (Section 2.2)
– Operational phase water quality management (Section 2.3)
– Construction phase water quality management (Section 2.4)
– Flooding (Section 2.5)Waterways and separation distances (Section 2.6)
– Stormwater quantity (non-flooding) (Section 2.7)

2.1 Legislation, regulations and codes

2.1.1 Environmental Protection Act 1994

The *Environmental Protection Act 1994* aims to protect Queensland's environment to maintain ecological processes, while allowing for development that improves current and future quality of life. It also defines environmental values and environmental harm and states the general environmental duty which requires that a person must not carry out any activity that causes, or is likely to cause, environmental harm unless the person takes all reasonable and practicable measures to prevent or minimise the harm.

Environmental values relevant to the Project under the *Environmental Protection Act 1994* include natural and physical resources including surface water, groundwater and ecological habitats. Consideration of ecologically sustainable development principles is established in environmental licensing and a number of other legislative frameworks, relevant to the project as described below.

2.1.2 Environmental Protection Regulation 2019

Environmentally Relevant Activities (ERAs) describe activities which are generally industrial or intensive industries with the potential to release emissions which impact on the environment and surrounding land uses. Schedule 2 of the Environmental Protection Regulation 2019 lists all prescribed ERAs regulated by the Department of Environment, Science and Innovation (DESI). The Project is most closely aligned with the prescribed ERA 53 - Organic material processing. The organic material processing ERA is a listed concurrence ERA within Schedule 2 of the *Environmental Protection Regulation 2019*.

A Development Assessment (DA) is required for assessment of a prescribed concurrence ERA. An Environmental Authority (EA) is required to undertake an ERA; however, a DA application is also an application for an Environmental Authority (EA), under Section 115 (2) of the *Environmental Protection Act 1994*. Where a concurrence ERA is a Material Change of Use (MCU), the development application is referred to the state for assessment under Schedule 8 of the *Planning Regulation 2017* in accordance with State Code 22: Environmentally Relevant Activities and the Guideline.

2.1.3 State Code 22: Environmentally Relevant Activities

State Code 22 provides assessment benchmarks which identify overall performance outcomes (PO) to achieve the purpose statement and acceptable outcomes (AO) which identify one way to achieve the relevant performance outcome. Assessments must demonstrate compliance with either the PO or AO of the code. If the development does not meet the relevant AO or PO, SARA may determine on balance that the overall purpose statement is complied with. The provisions under State Code 22 for the Project relevant to surface water are addressed in the Environmental Assessment Report (GHD 2024).

2.1.4 Environmental Protection (Water and Wetland Biodiversity) Policy 2019

The *Environmental Protection (Water and Wetland Biodiversity) Policy 2019* (EPP Water 2019) is nested within the *Environmental Protection Act 1994* and exists to protect the quality of all waters and wetlands in Queensland while also supporting ecologically sustainable development. Part 2 of the Policy outlines how it aims to achieve its purpose:

– Identifying environmental values for waters and wetlands to be enhanced or protected.
– Identifying management goals for waters.
– Stating water quality objectives and water quality guidelines for enhancing or protecting the environmental values of waters.
– Providing a framework for making consistent, equitable and informed decisions about waters.
– Monitoring and reporting on the condition of waters.

Schedule 1 of the Policy refers to documents published by the department which contain prescribed environmental values and water quality objectives for waters in Queensland. The water quality objectives for the Logan river are described in Section 3.4.

Logan River Environmental Values and Water Quality Objectives

The Logan River Environmental Values and Water Quality Objectives contains Environmental Values (EVs) and Water Quality Objectives (WQOs) for surface fresh and estuarine waters in the Logan River Basin and is listed under schedule 1 of the EPP (2019). Review of the WQ1454 Logan River Map DES (2022) indicates the Project is located within the Western Logan River Fresh Waters environmental value zone boundary. The environmental values (EVs) for the catchment are shown in Figure 2.1 and outlined in Table 2.1.

LOGAN RIVER BASIN (Refer plan WQ1454)	Environmental values[1–5]											
	Aquatic ecosystem	Irrigation	Farm supply/use	Stock water	Aquaculture	Human consumer [5]	Primary recreation [5]	Secondary recreation [5]	Visual recreation [5]	Drinking water [5]	Industrial use	Cultural and spiritual values
Environmental Value Zone (listed alphabetically)												
Western Logan River Fresh Waters	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓

Figure 2.1 Environmental Values – Western Logan River Fresh Water catchment (EPP Water 2019 – Logan River Basin)

Table 2.1 Environmental Values – Western Logan River Fresh Water catchment

Environmental value zone	Description
Aquatic ecosystem	The aquatic ecosystem EV is a default applying to all Queensland waters, and therefore the WQOs for aquatic ecosystems form the minimum WQOs for all waters. The WQOs applicable to watercourses within the Project lot are described in Section 3.4.
Irrigation	The management goal for irrigation water is that the quality of water, when used in accordance with the best irrigation and crop management practices and principles of ecologically sustainable development, does not result in crop yield loss or soil degradation (noting that water quality requirements may differ by crop type).
Farm supply use	The management goal for farm supply use is that the quality of water is suitable for produce preparation and domestic uses other than drinking.
Stock water	The management goal for stock watering is that the quality of water provided to stock does not cause deterioration in stock health or condition (noting that water quality requirements may differ by stock type).

Environmental value zone	Description
Human consumption	The management goal is that the water quality is suitable for producing or taking aquatic foods that are safe and suitable for human consumption.
Primary recreation	The management goal for recreational water quality is to achieve a low risk to human health from water quality threats posed by exposure through ingestion, inhalation or contact during recreational use of water resources.
Secondary recreation	
Visual recreation	
Drinking water	The management goal is to: – minimise the risk that the quality of raw water taken for treatment for human consumption results in adverse human health effects – maintain the palatability rating of water taken for treatment for human consumption at the level of 'good' as set out in the Australian Drinking Water Guidelines – minimise the risk that the quality of raw water taken for treatment for human consumption results in the odour of drinking water being offensive to consumers.
Industrial use	The management goal for industrial use is that the quality of water provided to industry is, with an appropriate level of treatment, suitable for industrial use. Industries usually treat water supplies to meet their specific needs, accordingly no WQOs are specified
Cultural and spiritual values	The management goal is that water is suitable to support identified cultural and spiritual values of waters, including those of Aboriginal people or Torres Strait Islanders. Management goals and objectives specified for aquatic ecosystems and other human water uses (including recreation, human consumption of aquatic foods, and drinking water) will assist in supporting some aspects of cultural and spiritual values of water.

2.1.5 Water Act 2000

The *Water Act 2000* is the governing legislation for the sustainable management of Queensland's water resources. The main purposes of the *Water Act 2000* are to provide a framework for water security in terms of planning, management of supply and demand, management of impacts on underground water caused by the exercise of underground water rights by the resource sector and the effective operation of water authorities.

The *Water Act 2000* details the framework for licenses or permits to take water. However, these licenses do not authorise the construction of groundwater related works, which is dealt with in the *Planning Act 2016*. The *Water Regulation 2016* administers the provisions of the Water Act 2000 with respect to administrative and operational matters. The QLD Government also prepares and implements water plans and water use plans and administers these plans under the *Water Act 2000*. The Project is located within the Water Plan (Logan Basin) 2007 plan area (refer to Section 2.1.4).

2.1.5.1 Water Regulation 2016

The *Water Regulation 2016* intends to prescribe the administrative and operational matters of the *Water Act 2000*. Relevant sections of the *Water Regulation 2016* include water licencing and water allocations, water rights and planning, authorisations to take or interfere with water, and water supply and demand management.

A **water licence** is an authority granted under the *Water Act 2000* to either take water, interfere with water or both interfere with and take water where these two activities are inextricably linked. A water licence is required for taking or interfering with water in a watercourse for stock and domestic use on lands, irrigation, industrial and commercial use, storage of water behind a weir, impounding water behind a storage structure, or storing water in excavations that are within or connected to a watercourse.

Water sourcing and licensing requirements for the Project are described in Section 2.2.

2.1.6 Planning Act 2016

The purpose of the *Planning Act 2016* is to establish a system for land use planning, development assessment and related matters which facilitates ecological sustainability.

2.1.6.1 State Planning Policy 2017

The State Planning Policy (SPP) outlines the Queensland Government's interests in, and policies for, a range of land use planning matters. It provides a policy framework for planning outcomes across Queensland by requiring that these state interests are delivered through local government planning schemes and regional plans. The SPP contains guiding principles to ensure plan-making and development assessment systems are outcome focused, integrated, efficient and accountable.

Scenic Rim Regional Council Planning Scheme (refer below) has developed an integrated development scheme as per Part 2 State Planning Provisions.

2.1.6.2 Scenic Rim Planning Scheme 2020

SRRC developed the Scenic Rim Planning Scheme which commenced in 2020, which is a framework for managing development in accordance with the Planning Act 2016 and the SPP (2017). The Scenic Rim Planning Scheme contains overlay areas which identify areas relevant to state and local interests that may have sensitivity, land use constrains, valuable resources or development opportunities. The overlays which traverse through the project site include:

– OM4E Environmental significance – Local Watercourses (watercourse buffer area A)
– OM7A Landslide Hazard Steep Slope – Steep Slope
– Bromelton State Development Area Industrial Precincts

Where an overlay traverses a proposed assessable development lot boundary, the planning scheme outlines performance criteria and related acceptable outcomes to be achieved by the project, which are outlined within overlay codes. The overlay codes relevant to this assessment include:

– Environmental significance overlay code
– Landslide Hazard Steep Slope – Steep Slope overlay code

These overlay code performance outcomes relevant to the Project are discussed in Section 2.3 to Section 2.6.

2.1.6.3 Development Guidelines for Water Quality Management in Drinking Water Catchments 2017 (Seqwater 2017)

The Seqwater Development Guidelines for Water Quality Management in Drinking Water Catchments (Seqwater 2017) provide an assessment framework to manage the risk of development activities in the drinking water catchments in South East Queensland (SEQ), in accordance with the State Planning Policy (2017) and the South East Queensland Regional Plan (2017). Seqwater (2017) catchment overlay code applies to developments within a water resource catchment, Water Supply Buffer area or aquifer recharge area. The Project is located in a water resource area and within the water supply buffer area, as identified within Figure 1 of Seqwater (2017).

As the Project is considered to be a high impact industry, the development is considered to be 'Assessable' with the Assessment Benchmarks for Assessable Development. The benchmarks for assessable developments relevant to this report include:

– Separation distances
– Stormwater quality and hydrology
– Wastewater

2.2 Water sourcing and water licence

Water security and water licencing in Queensland are primarily governed by the *Water Act 2000* (Section 2.1.2) and administered by the *Water Regulation 2016* (Section 2.1.5.1). Water take within the Project site would be subject to the conditions set out by the *Water Plan (Logan Basin) 2007* (Section 2.2.1) for water resources. Water is required to be sourced from local water resources to support the construction and operation of the Project.

2.2.1 Water Plan (Logan Basin) 2007

A water plan is a plan that applies to a part of the State and advances the sustainable management of Queensland's water. Water plans may apply to rivers, lakes and springs, overland flow and underground water.

The Project is located within the Logan Basin water plan area. Water availability and supply is therefore regulated under the *Water Plan (Logan Basin) 2007* (the Water Plan). In accordance with Part 2 of the Water Plan, this area includes water in a watercourse or lake, and water in springs not connected to water which the *Water Plan (Great Artesian Basin and Other Regional Aquifers) 2017* applies. Review of the *Great Artesian Basin and Other Regional Aquifers) 2017* plan map indicates the Project is not located within this area.

The Water Plan also sets environmental flow objectives for performance indicators for sub catchments within the Plan area. As shown in Figure 2.2, the Project site is located south of Allan Creek, within sub catchment area 3, the largest sub catchment within the Plan. The use of these flow objectives within this assessment have been excluded, on the basis that impacts at the sub catchment outlet node G will not be measurable, given the relative size of the catchment area to be excised for the Project compared to the overall sub catchment area.

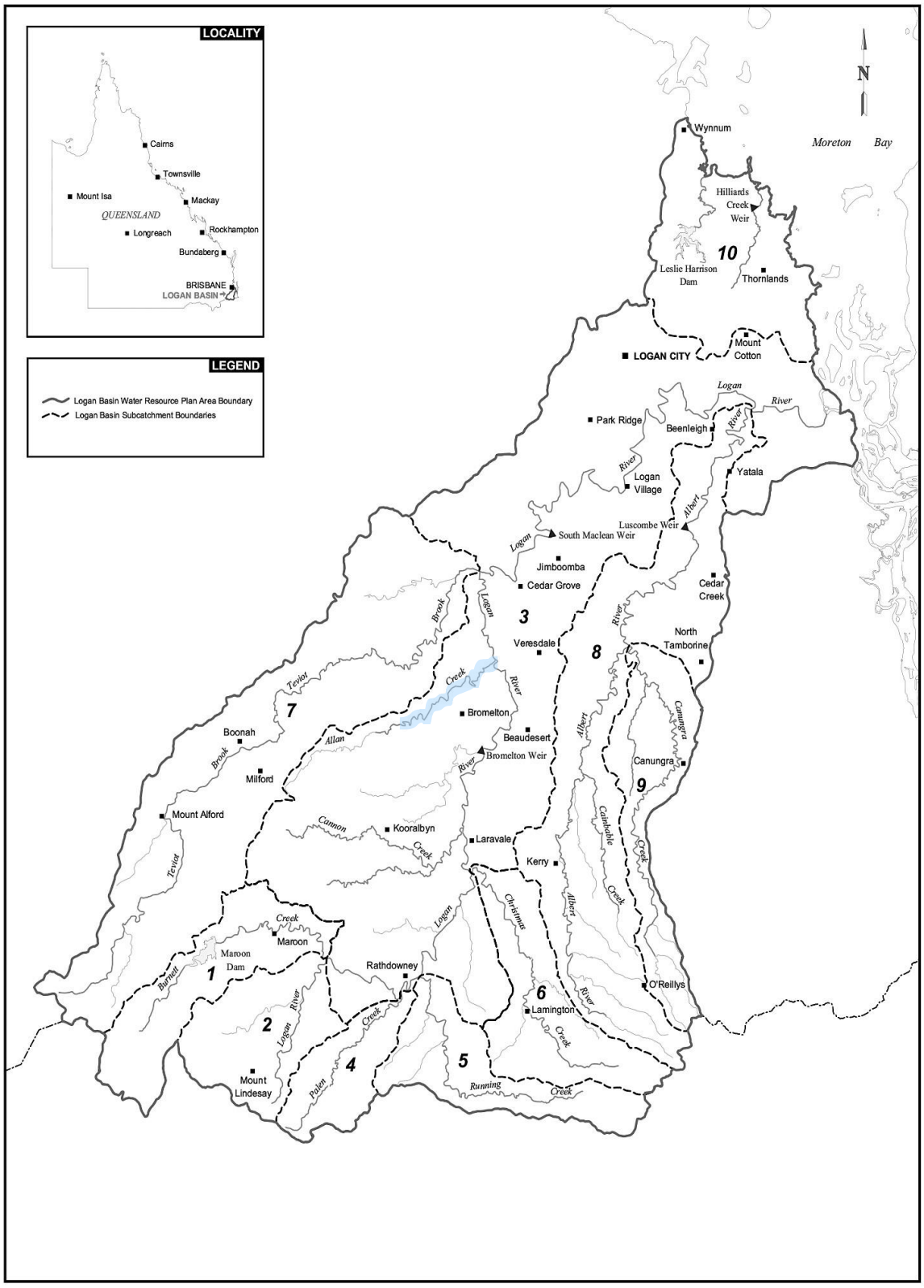


Figure 2.2 Logan Basin sub-catchments for the Water Plan (Logan Basin) 2007

Note: highlighted blue section of Allan Creek is downstream of the Project.

2.3 Operational phase water quality management

A critical component of operational water quality management for the Project is providing for the separation of water quality streams, in particular, the separation of stormwater (unimpacted by organics activities at the site) from impacted water.

The Model Operating Conditions (MOC) for ERA 53 were identified as the most specific guideline to inform the framework for the management of operational phase water quality. The MOC as relevant to this assessment are included in Section 2.3.1. Consideration of the Seqwater guidelines is also undertaken, noting they are not specific to composting sites.

2.3.1 ERA 53 (a) Model operating conditions

The MOC for ERA 53 (a) Organic material processing by composting document is relevant to the proposed development. The model operating conditions provide a non-mandatory framework of conditions that apply to site specific applications for an environmental authority to undertake ERA 53 (a) in QLD

The MOC outline specific conditions related to protecting water values, which may form part of the EA for the proposed development. As the EA would permit the site to undertake an ERA, the Project seeks to meet the MOC in addition to other relevant requirements.

Review of the operating conditions suggest that leachate means a liquid that has passed through or emerged from or is likely to have passed through or emerged from, a material that contains soluble, suspended or miscible contaminants. This is key for interpretation of the guidelines, however elsewhere in this report and in the design of the site, leachate is used to define any water potentially contaminated by organics handling or composting activities, whether infiltrated water or surface water runoff.

The conditions define disturbed areas as areas that are susceptible to erosion and/or have been contaminated by the activity, and/or upon which stockpiles of soil or other materials are located.

Table 2.2 Model operating conditions – ERA 53

Condition	Description
WT1	Other than as permitted within this environmental authority, contaminants must not be released to waters
WT2	Any stormwater which filters through composting piles or stored feedstock must be managed as leachate.
WT3	**Stormwater** Stormwater must be managed to: a) prevent stormwater from being contaminated by the activity; or b) direct stormwater that is contaminated by the activity to stormwater treatment and retention measures.
WT4	Stormwater treatment and retention measures must have capacity to retain stormwater runoff from disturbed areas generated by a rainfall event up to and including a 24-hour rainfall event with an Annual Exceedance Probability (AEP) of [insert site-specific AEP]
WT5	Stormwater may only be released to waters where: (a) beneficial reuse of contained stormwater runoff on site is not viable; and (b) the release is necessary to maintain stormwater retention capacity required by condition WT4; and (c) there are no contaminants present that will, or that are capable of causing environmental harm.
WT6	Leachate must be collected and stored in: (a) Aerated ponds that maintain aerobic conditions; or (b) An enclosed leachate tank.
WT7	Leachate collection and storage must be designed, installed, operated and maintained by an appropriately qualified person to: (a) Prevent ponding of leachate in any area other than the designated leachate collection and/or storage areas; and (b) Prevent the leachate directly entering a stormwater basin; and (c) Drain leachate away from composting material; and

Condition	Description
	(d) Drain leachate to a collection drain; and (e) Ensure the structural integrity of the impervious barrier is maintained.

2.3.2 Development Guidelines for Water Quality Management in Drinking Water Catchments 2017 (Seqwater 2017)

The Seqwater Development Guidelines for Water Quality Management in Drinking Water Catchments (SEQ Water 2017) include performance outcomes for stormwater management during operational stages to protect drinking water supply environmental values.

Table 2.3 Stormwater quality performance outcomes under Seqwater (2017) development guidelines

Performance outcomes	Acceptable outcomes
PO5 Wastewater treatment systems are designed, constructed and managed in ways that do not compromise the drinking water supply environmental values.	AO5.1 Development does not involve an on-site wastewater facility. OR AO5.2 Where the combined total peak design capacity of wastewater treatment is less than 21 Equivalent Persons (EP), the design of the system achieves a Low or Medium Risk classification in accordance with Seqwater's Land Use Risk Tool for on-site sewage facilities. OR AO5.3 Where the combined total peak design capacity of wastewater treatment is 21EP or greater, the system is located and designed in the following manner: a. achieves a minimum secondary treatment standard with nutrient removal and disinfection; b. on land at or above the 0.5% AEP flood event; c. the hydraulic capacity of the system is five times the average dry weather flow (ADWF); d. no direct discharge of sewage to a waterway or water supply source occurs, unless during a bypass event that exceeds peak hydraulic capacity and sewage is screened and disinfected before release; e. where treated effluent will be used in irrigation, application is: i. confined to a dedicated area of land suitably located and sized, and using irrigation practices that will not adversely affect groundwater and surface water quality; and ii. located on land at or above the 0.5% AEP flood event; and f. where the combined total peak design capacity of wastewater treatment is 1500EP or greater, and direct discharge to a waterway is the only reasonably practical disposal option, the contribution of flow from the system must be modelled over the range of reasonably expected flow events. If the proportion of flow is: i. <10% of the total flow, 3-log reduction bacteria and virus, and 4-log reduction protozoa, minimum pathogen log-reduction values apply; or ii. >10% of the total flow, it must demonstrate compliance with the Australian guidelines for water recycling (Phase 2): Augmentation of drinking water supply (to be undertaken in consultation with Seqwater).
PO8 Manage stormwater during operational (postconstruction) stages to protect drinking water supply environmental values	AO8.1 Development does not involve an impervious area greater than 1,000m².

Performance outcomes	Acceptable outcomes
and facilitate the achievement of water quality objectives for receiving waters. Note: Drinking water supply environmental values are referenced within Schedule 1 of the Environmental Protection Policy (Water) 2009.	OR AO8.2 Development is for reconfiguring a lot that; a. will not create more than two additional lots; or b. involves a land area less than 1000m2. OR AO8.3 Stormwater run-off generated during operation (post-construction) demonstrates a minimum reduction in mean annual load from unmitigated development that achieves the following stormwater management design objectives: • 85% reduction in total suspended solids; • 65% reduction in total phosphorus; • 45% reduction in total nitrogen; and • 95% reduction in gross pollutants. OR AO8.4 Stormwater run-off generated during operation is captured and transferred off-site or captured and treated to any applicable re-use standards and reused on-site. Note: A Site Stormwater Quality Management Plan is to be prepared by a suitably qualified individual such as a Civil Engineer or an Environmental Professional and is to be certified by a Registered Professional Engineer (RPEQ) (Civil or Environmental) to demonstrate compliance with the stormwater design objectives.

2.3.3 Scenic Rim Planning Scheme (SRRC 2020)

The SRRC (2020) Landslide Hazard Steep Slope Overlay traverses the Project site. The relevant performance objectives from the overlay code with respect to stormwater drainage are presented in Table 2.4.

Table 2.4 Landslide hazard steep slope overlay

Performance objective	Acceptable outcome
PO6 Development ensures that stormwater runoff does not: increase the susceptibility of the site to landslide; and does not cause detriment to the natural environment or to any other lots.	AO6 Stormwater drainage (including roof guttering and rainwater tank overflows) is managed to avoid an increase in on-site groundwater, ponding of water and water concentration into slopes and discharges to a lawful point of discharge

2.4 Construction phase water quality

In addition to the operational phase water quality guidelines, the scale of construction phase activities also requires consideration of particular controls to restrict impacts to water quality. These include consideration of the Seqwater (2017) guidelines, the SPP (2017), and best practice erosion and sediment control guidelines (IECA 2008), as described below.

2.4.1 Seqwater Development Guidelines – Water quality management in drinking water catchments

Seqwater (2017) provides performance outcomes for the management of surface water runoff during the construction phase. The Seqwater performance outcomes are outlined in Table 2.5. The acceptable outcomes of the Seqwater (2017) guidelines make reference to Appendix 2, Table A of the SPP for the development of stormwater management design objectives. These design objectives are outlined in Section 2.4.2.

Table 2.5 Seqwater (2017) stormwater quality and hydrology

Performance outcome	Acceptable outcomes
PO7 Manage stormwater at the construction phase to protect drinking water supply environmental values and facilitate the achievement of water quality objectives for receiving waters.	AO7.1 At the construction stage, an erosion and sediment control program (ESCP) demonstrates that stormwater achieves the design objectives listed in Table A of the SPP (appendix 2): Construction Phase – Stormwater management design objectives (all parts). OR AO7.2 An ESCP demonstrates how stormwater quality will be managed at the construction stage in accordance with an acceptable regional or local guideline so that target contaminants are treated to a design objective at least equivalent to Table A of the SPP (all parts). OR AO7.3 Stormwater run-off generated during construction is captured and transferred off-site or captured and treated to any applicable re-use standards and reused on-site.

2.4.2 State Planning Policy (2017) – Appendix 2 – Stormwater management design objectives

The stormwater management design objectives as described by the SPP (2017) are presented in Table 2.6. The SPP (2017) makes reference to construction areas greater than 2500m^2 requiring a minimum of 80% of average annual runoff volumes of the contributing catchment to be treated to 50 mg/L TSS or less and pH in the range of 6.5 – 8.5 pH units. It is noted these requirements are implemented within the *Procedural guide, Releases to waters from land development sites and construction sites 2500 m^2 and greater* (the Procedural Guide*;* DES 2019) in accordance with IECA (2008 and 2018). These guidelines are described in Section 2.4.3 and Section 2.4.4 respectively.

Table 2.6 State Planning Policy – Appendix 2 - Stormwater management design objectives

Issue	Desired outcomes
Sediment control	1. Direct runoff from exposed site soils to sediment controls that are appropriate to the extent of disturbance and level of erosion risk. 2. All exposed areas greater than 2500 m^2 must be provided with sediment controls which are designed, implemented and maintained to a standard which would achieve at least 80% of the average annual runoff volume of the contributing catchment treated (i.e. 80% hydrological effectiveness) to 50mg/L Total Suspended Solids (TSS) or less, and pH in the range (6.5–8.5).
Drainage control	1. Manage stormwater flows around or through areas of exposed soil to avoid contamination. 2. Manage sheet flows in order to avoid or minimise the generation of rill or gully erosion. 3. Provide stable concentrated flow paths to achieve the construction phase stormwater management design objectives for temporary drainage works (part 2). 4. Provide emergency spillways for sediment basins to achieve the construction phase stormwater management design objectives for emergency spillways on temporary sediment basins (part 3).
Erosion control	1. Stage clearing and construction works to minimise the area of exposed soil at any one time. 2. Effectively cover or stabilise exposed soils prior to predicted rainfall. 3. Prior to completion of works for the development, and prior to removal of sediment controls, all site surfaces must be effectively stabilised using methods which will achieve effective short-term stabilisation.
Litter, hydrocarbons and other contaminants	1. Remove gross pollutants and litter. 2. Avoid the release of oil or visible sheen to released waters. 3. Dispose of waste containing contaminants at authorised facilities.
Waterway stability and flood flow management	1. Where measures are required to meet post-construction waterway stability objectives (specified in table B), these are either installed prior to land disturbance and are integrated with erosion and sediment controls, or equivalent alternative measures are implemented during construction. 2. Earthworks and the implementation of erosion and sediment controls are undertaken in ways which ensure flooding characteristics (including stormwater quantity characteristics) external to

Issue	Desired outcomes
	the development site are not worsened during construction for all events up to and including the 1 in 100 year ARI (1% AEP).

2.4.3 Procedural guide, releases to waters from land development sites and construction sites 2500 m^2 and greater (DES 2019)

The Procedural guide provides a framework for achievement of the water quality provisions of the EP Act. The Procedural Guide applies to all Queensland construction sites greater than 2500 m^2. While the Procedural guide provides assessment criteria for actual and potential water contamination, it also provides assessment criteria for depositing prescribed water contaminants or release of stormwater runoff. The general provisions of the document include:

- Requirements for development of erosion and sediment control plans
- Prevention, reduction and treatment of contaminants
- Erosion control, including:
  - *the extent of clearing is restricted to that necessary for access to, and safe construction of the approved works i.e. vegetation remains intact or is protected in all other areas of the site the duration of exposure is minimised by undertaking works so that:*
    - *clearing of vegetation is only undertaken immediately prior to an area being actively worked*
    - *the work is staged to minimise the area of soil exposed at any one time*
    - *if clearing is undertaken in areas which are not intended to be immediately worked, such areas are effectively stabilised immediately following clearing*
    - *areas at finished level are effectively stabilised*
    - *steep areas, such as stockpiles, batters and embankments, which are not being actively worked, are effectively stabilised.*
- Drainage control, including the criteria provided in Section 2.4.5
- Sediment control, including:
  - *all site sub-catchments with greater than 2500m^2 of exposed soil drain to an appropriate sediment control device (e.g. sediment basins and including associated drainage controls), which is designed, implemented and maintained to a standard which would achieve at least 80 per cent of the average annual run-off volume of the contributing catchment treated to 50mg/L Total Suspended Solids (TSS) or less*
  - *the sediment control have the capacity to store two months' sediment from the receiving catchment, as determined using the Revised Universal Soil Loss Equation (RUSLE)*
- Risk management
- Disturbances in waterways
- Monitoring and adaptive management.

It should be noted that the sediment control standard has been developed in response to the low effectiveness of traditional batch sediment basins which were implemented in accordance with the previous standard. The above revised standard was incorporated in an update to IECA (2008) - Appendix B (IECA 2018) to incorporate design procedures for more effective continuous-flow (or high efficiency) sediment basins capable of meeting this standard.

2.4.4 Best Practice Erosion and Sediment Control (IECA 2008 and 2018)

IECA has published a suite of Erosion and Sediment Control guidelines which intends to provide guidance in the planning, design installation and maintenance of erosion and sediment control measures on building and construction sites, with the intent to facilitate the minimisation of environmental harm. The general principles from

IECA (2008) will be applied the development of erosion and sediment controls for the project, where local or state guidelines and codes are non-specific.

The design and implementation of sediment basins are outlined in the updated Appendix (IECA 2018) is relevant to the management of construction phase water quality.

Table 2.7 Basin type and performance criteria

Basin type	Soil and/or catchment conditions	Features
Type A	The duration of the soil disturbance within a given drainage catchment, exceeds 12 months 1,2,3	– Type A basins are considered the most effective sediment traps for clayey soils. – Pond size is governed by both minimum volume and minimum surface area requirements. – Operation of the sediment basin relies on the installation of an automatic chemical dosing system. – A floating decant system collects water from the top of the water column during the storm event. – In most circumstances, the settling pond is required to be de-watered to the nominated static level prior to a rain event that is likely to produce runoff. – Temporary basins are typically sized for the 1 year ARI, 24 hour storm event.
Type B	The duration of the soil disturbance within a given drainage catchment, does not exceed 12 months1,2,3	– Pond size is primarily governed by a minimum required surface area. – These basins are typically larger in volume and surface area than Type A basins. – Operation of the sediment basin relies on the installation of an automatic chemical dosing system. – Ideally the settling pond should be de-watered prior to a rain event that is likely to produce runoff; however, during dry conditions water may be retained in the pond as a source of water for usage on the construction site. – Temporary basins are typically sized for a discharge of 0.5 times the peak 1 in 1 year ARI critical duration storm.
Type C	Less than 33% of soil finer than 0.02 mm (i.e. d_{33} > 0.02 mm) and no more than 10% of soil dispersive	– Type C basins are limited to works within non-dispersive, low-clay, sandy soils. – Pond size is governed by a minimum required surface area. – These basins are free-draining, which means they are normally ‘empty’ at the start of rainfall; however, under certain conditions water may be retained in the pond as supply a source of water for usage on the site. – Temporary basins are typically sized for a discharge of 0.5 times the peak 1 in 1 year ARI critical duration storm
Type D	An alternative to type A or B basin where it can be demonstrated that automatic chemical flocculation is not reasonable or practical 3,	– Pond size is governed by a minimum required volume. – Operation of the sediment basin normally relies on chemical dosing, using either an automatic or manual chemical dosing system. – The settling pond is required to be de-watered to the bottom of the settling zone prior to a rain event that is likely to produce runoff. – Temporary basins are typically sized for an 80%ile, 5-day rainfall depth, depending on catchment conditions and risk.

Note:

1. Duration of soil disturbance include periods when there is likely to be less than 70% of groundcover
2. Reasonableness and practicality comes down to whether effective automated dosing can be implemented – i.e. multiple inflow locations
3. Type D basins may be implemented in lieu of type A or B basins where shown to achieve a commensurate performance outcome. Alternative designed should demonstrate through long-term water balance modelling:
   a. The equivalent water quality outcomes of existing type A basins in the local area
   b. If local data on the performance of type A basins is not available, as least 80% of the annual average runoff volume can achieve the specified WQO

2.4.5 Scenic Rim Planning Scheme

The Environmental Significance Overlay Code for local waterways applies to the Project. PO11/AO11 of this code requires that a site-based stormwater quality management plan be prepared in accordance with the design objectives identified in Table 8.2.4.3.2 of the Planning Scheme. These design objectives are replicated in Table 2.8. It is noted that the requirements contained in Table 2.8 generally reflect those described in IECA (2008), DES (2019) and SPP (2017), given the Scenic Rim Planning Scheme is the regional framework for managing development in accordance with the *Planning Act 2016* and the SPP (2017). However, it is noted that the requirements outlined for sediment control are equivalent to the requirements of DES (2019), as outlined for Type D sediment basins described in the updated appendix (IECA 2018) to Best Practice Erosion and Sediment Control, IECA (2008).

Table 2.8 SRRC Planning Scheme - Stormwater management design objectives

Element	Measure	Criteria
Drainage control	Temporary drainage works	1. Design life and design storm for temporary drainage works:
		a. Disturbed area open for <12 months—1 in 2-year ARI event
		b. Disturbed area open for 12–24 months—1 in 5-year ARI event
		c. Disturbed area open for > 24 months—1 in 10-year ARI event
		2. Design capacity excludes minimum 150 mm freeboard
		3. Temporary culvert crossing—minimum 1 in 1-year ARI hydraulic capacity
Erosion control	Erosion control measures	1. Minimise exposure of disturbed soils at any time 2. Divert water run-off from undisturbed areas around disturbed areas 3. Determine the erosion risk rating using local rainfall erosivity, rainfall depth, soil-loss rate or other acceptable methods 4. Implement erosion control methods corresponding to identified erosion risk rating
Sediment control	1. Sediment control measures 2. Design storm for sediment control basins 3. Sediment basin dewatering	1. Determine appropriate sediment control measures using: a. potential soil loss rate, or b. monthly erosivity, or c. average monthly rainfall
		2. Collect and drain stormwater from disturbed soils to sediment basin for design storm event: a. design storm for sediment basin sizing is 80th% five-day event or similar
		3. Site discharge during sediment basin dewatering: a. TSS < 50 mg/L TSS, and b. Turbidity not >10% receiving waters turbidity, and c. pH 6.5–8.5
Water quality	Litter and other waste, hydrocarbons and other contaminants	1. Avoid wind-blown litter; remove gross pollutants
		2. Ensure there is no visible oil or grease sheen on released waters

Element	Measure	Criteria
		3. Dispose of waste containing contaminants at authorised facilities
Waterway stability and flood flow management	Changes to the natural waterway hydraulics and hydrology	1. For peak flow for the 1-year and 100-year ARI event, use constructed sediment basins to attenuate the discharge rate of stormwater from the site

2.5 Flooding

2.5.1 Australian Rainfall and Runoff (ARR, 2019)

Australian Rainfall and Runoff (ARR 2019) is the primary technical publication for stormwater and hydrological estimates and design considerations. The publication was the result of several years' of updates to the previous version of Australian Rainfall and Runoff (Engineers Australia 1987). The technical analysis and development of the hydrologic and hydraulic models, including the management and flooding at the site would need to consider this guideline.

2.5.2 Scenic Rim Planning Scheme (2020) - Flood Hazard Overlay Code

SRRC (2020) has published a flood overlay code which provides overarching performance outcomes and acceptance criteria for assessable developments. The purpose of the Flood Hazard Overlay Code is to ensure that development in a flood hazard area is compatible with the risk of the flood hazard and protects life and property. While the flood hazard overlay does not traverse the site, the minimum flood immunity standards for infrastructure have been adopted.

The defined minimum flood immunity standards for infrastructure, such as waste management facilities (refer to Table 8.2.6.3.2 of Scenic Rim Planning scheme) are replicated in Table 2.9.

Table 2.9 Scenic Rim Planning scheme – Minimum flood immunity standards for infrastructure

Infrastructure type	Settlement context	Floodplain Context	Minimum immunity
Cemetery and crematorium Sporting facility, community centre, meeting hall (where not used as an evacuation or recovery facility) Waste management facilities Storage and works depots and similar facilities, including administrative facilities associated with the provision or maintenance of the community infrastructure mentioned in this part.	All	High hazard or limited warning (e.g. less than 24 hours)	Locate outside 1% AEP.
		High hazard and longer warning	Locate outside 1% AEP. OR Building floor levels above 1%AEP plus freeboard.
		Lower hazard and longer warning	

2.6 Waterways and separation distances

2.6.1 Seqwater (2017) guidelines

The Seqwater (2017) guidelines note the following assessment benchmarks for separation distances for assessable developments, outlined in Table 2.10. Table 5 of Seqwater (2017) are replicated in Figure 2.3.

Table 2.10 Assessment benchmarks for separation distances Seqwater (2017)

Performance outcome	Acceptable outcome
PO1 Development maintains an adequate separation distance and avoids areas of potential flood inundation to protect waterways or water supply sources.	AO1.1 Development complies with the separation distances and other locational criteria specified in Table 5. Note: Where another setback distance or locational criteria is identified within this code, the higher standard applies.

Development type and activities	Stream Order 1 To 3	Stream Order 4 or greater	Full supply level of a dam, lake or reservoir or watercourse that serves as a potable water supply	Flood immunity
Intensive animal industry	50m	100m	800m	AEP 1%
Aquaculture	Case-by-case basis	Case-by-case basis	Case-by-case basis	N/A
All other agricultural or forestry land uses	50m	100m	400m	Buildings – AEP 1% Other areas – AEP 20%
Extractive industry	50m	100m	400m	AEP 1%
All other industry uses	100m	100m	800m	
Motor sport facility	50m	100m	400m	Buildings – AEP 1% Other infrastructure (e.g. trails) – AEP 20%
Outdoor sport and recreation				
Major sport, recreation and entertainment facility				
Service station	50m	100m	800m	AEP 1%
All other development types	50m	100m	400m	AEP 1%

Figure 2.3 Table 5 of Seqwater (2017)

The Seqwater (2017) guidelines also provide assessment benchmarks for excavation and filling activities on development sites. These benchmarks would apply to construction phase earthworks and design of developments near waterways for assessable developments. These benchmarks are outlined in Table 2.11.

Table 2.11 Assessment benchmarks for excavation and filling Seqwater (2017)

Performance outcome	Acceptable outcome
PO13 The siting and design of earthworks minimises impacts on the natural landform that may cause contamination or interfere with the flow of a waterway or water supply source.	**AO13.1** Earthworks comply with the following locational criteria: a. 25m setback to a stream order 1–3; b. 50m setback to a stream order 4 or greater; c. 200m setback to a full supply level of a dam, lake or reservoir or watercourse which serves as a potable water supply; d. is not undertaken on land at or below the 1% AEP; and e. is not undertaken on a slope greater than 15%.

2.6.2 Scenic Rim Planning Scheme (2020) – Environmental Significance Overlay Code

SRRC (2020) Environmental Significance Overlay Code performance outcome (PO10) requires developments within a watercourse buffer area shown on the Environmental Significance Overlay Map – Local watercourse OM-04-E. The requirements are outlined in Table 2.12.

Table 2.12 Performance outcomes for watercourse offsets – Scenic Rim Planning Scheme

Performance outcome	Acceptable outcome
PO10 Development within a Watercourse Buffer Area (A, B or C) shown on environmental Significance Overlay Map – Local Watercourse OM-04-E has no adverse impact on: – Native vegetation – Terrestrial and aquatic habitat – Ecological functions – Native conservation functions	**AO10** The development footprint is not located within: – 10 m from the high or outer bank of the watercourse located in Watercourse buffer area A – 25 m from the high or outer bank of the watercourse locate din Watercourse buffer area B – 50 m from the high or outer bank of the watercourse located in watercourse buffer area C

2.7 Stormwater quantity (non flooding)

2.7.1 Seqwater (2017) guidelines

The Seqwater (2017) guidelines note the following assessment benchmarks for surface water flows for assessable developments, outlined in Table 2.10.

Table 2.13 Performance outcomes for stormwater quantity Seqwater (2017)

Performance outcomes	Acceptable outcomes
PO10 Development avoids and minimises changes to the existing surface water natural hydrological regime so that: a. there is no change to the reference high-flow and low-flow duration frequency curves, lowflow spells frequency curve and mean annual flow to and from waterways as a result of the development; b. any relevant flows into waterways comply with the relevant flow objectives of the applicable water plan for the area; and c. the collection and re-use of stormwater occurs so there is no increase to the velocity or volume of stormwater flows entering a waterway.	No Acceptable outcome is nominated

3. Existing environment

This section outlines the existing environment of the project site and surrounds with particular relation to surface water.

3.1 Climate

Daily rainfall data were obtained from the Scientific Information for Land Owners (SILO) database operated by the Queensland Government - Department of Environment and Science (DES 2024). SILO patched point data are based on historical data from a particular Bureau of Meteorology (BOM) station with missing data interpolated from nearby stations. For this assessment, SILO data were obtained for grid point -28.00, 152.90, which is located within proximity to the Project site. The patched point annual rainfall depth totals between 1970 and 2023 inclusive are shown in Figure 3.1.

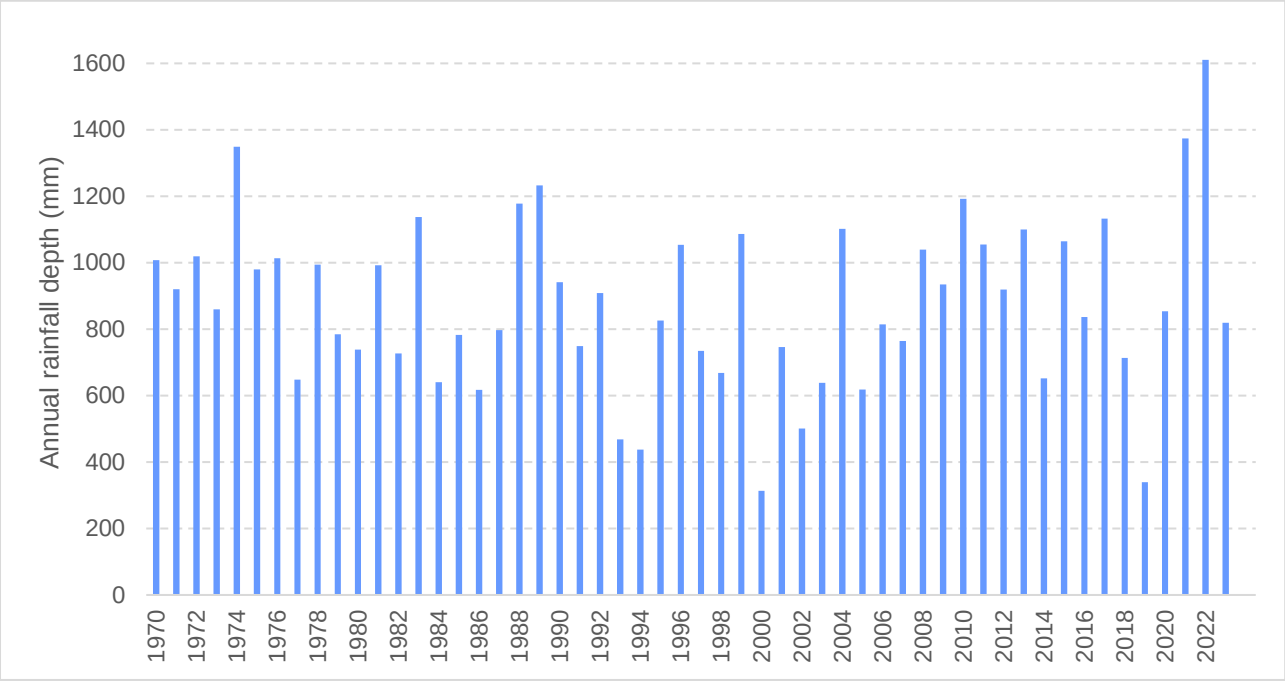


Figure 3.1 Annual rainfall depth totals

The annual rainfall statistics associated with the Project area are:

– Minimum annual rainfall total – 313.4 mm in 2000
– Median annual rainfall of 856.1 mm
– Average annual rainfall of 888.0 mm
– Maximum rainfall total – 1610.2 mm in 2022

Average monthly rainfall and evaporation depths have been reviewed as shown in Figure 3.2.

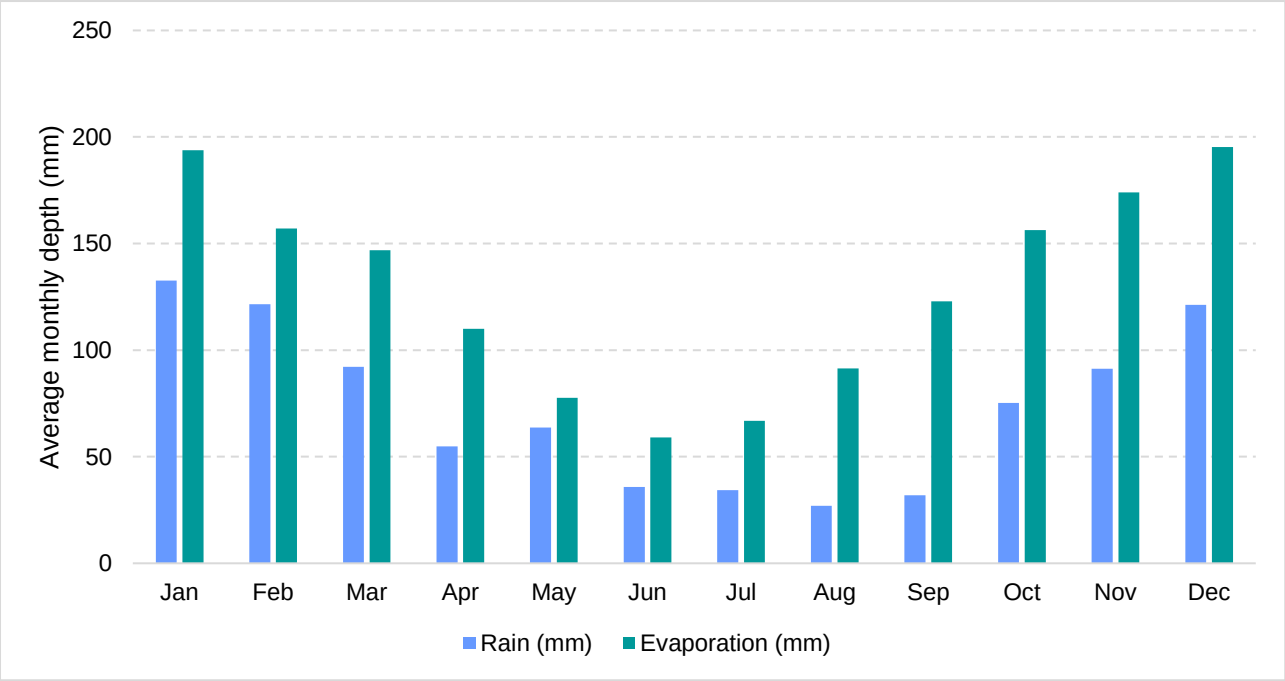


Figure 3.2 Average monthly rainfall and evaporation depths

As shown in Figure 3.2, rainfall and evaporation are seasonal, with higher rainfall and evaporation totals occurring in October to March, and the lowest totals occurring in April to September. Review of the average monthly rainfall and evaporation depths indicates a monthly rainfall deficit in each month throughout the year, though occurring more strongly during September to April. The annual average rainfall deficit from 1970 to 2023 is 673 mm.

3.2 Topography and hydrology

The regional topography in the vicinity of the project site includes foothills and valleys extending from an unnamed ridge, which is located 6km south of the Project site. The Project site is undulating and slopes relatively steeply towards the north, with site elevations ranging from 155 m AHD at the southern boundary of the Project site to 100 m AHD at the northern boundary. The grade of west-east undulations at the Project site are up to 24%.

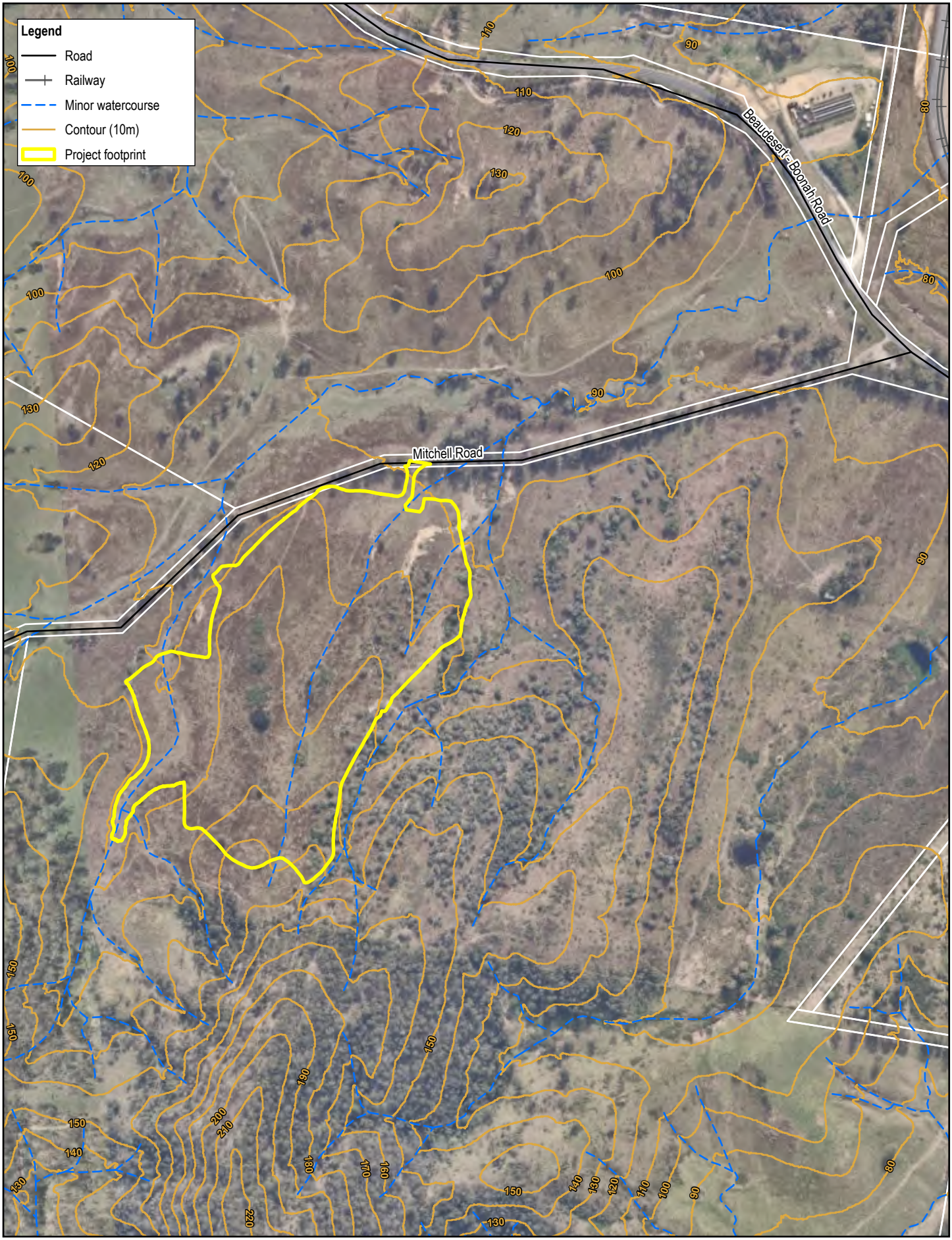
The Project site is situated within the regional catchment of the Logan River, a coastal draining watercourse some 4.8 km downstream of the Project site. Major regional hydrological features include Wyaralong Dam, located 4.6 km to the northwest, which impounds Teviot Brook, a direct tributary of the Logan River downstream of the Project site. Bromelton Off Stream Storage, an off-stream storage located adjacent the Logan River, is also located 4.2 km north east of the Project site, however is currently not in commission.

According to Queensland Globe mapping, two mapped “drainage features” of Allan Creek intersect the Project site.

For the purposes of the definitions of waterways under the *Water Act 2000,* the waterways within the Project lot are considered to be “drainage features”. However, several of the first order tributaries are also mapped as “unmapped” features. Liaison with DRDMW has informed the following outcome:

– The unmapped features traversing Lot 4 RP85497 have been determined as drainage for the purpose of the *Water Act 2000*, and Queensland Globe will be updated to reflect this. Therefore, the department has no requirements for an authorisation to undertake any proposed works.

These unmapped features therefore drain north to adjoin a third order, north easterly flowing tributary of Allan Creek. Allan Creek is a fourth order tributary of the Logan River at the confluence of these waterways. There are farm dams located within the lot boundary, including approximately 650 to 700 m east of the Project site. The hydrological features in the vicinity of the Project site are shown in Figure 3.3.



Paper Size ISO A4

0 50 100 150 200

Metres

N

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 56

GHD

SOILCO
The Life-Giving Soil Company

SoilCo Pty Limited
Bromelton Compost Manufacturing Facility
Stormwater Impact Assessment

Project No. **12626213**
Revision No. **A**
Date **9/08/2024**

Topography and hydrology

FIGURE 3.3

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Print date: 09 Aug 2024 - 09:13

Data source: DoR: cadastre, property boundary (2024), rail, watercourse (2023), road (2021); SoilCo: project footprint (2024); GA: Contours (2024);nearmap.com: extracted 9/08/2024 .
Created by: mvandermerwe

3.3 Flooding

The existing flood conditions at the site were characterised through development of a hydraulic flood model in TUFLOW as outlined in Appendix B, with peak flows for the critical durations of the waterways developed using a Watershed Bounded Network Model (WBNM) used as inputs to the TUFLOW model. The model was simulated for the 63.2%, 50%, 20%, 10%, 2%, 1% and 0.2% AEP storm events in accordance with the procedures of Australian Rainfall and Runoff (Section 2.5.1). The 0.2% AEP storm event has been presented as a proxy for the future climate change 1% AEP storm event. The full modelling methodology and results are included in Appendix B, however key results have been summarised to characterise the baseline flood conditions under a range of storm events.

As shown in Figure 3.4, in the upper tributaries across the southern extent of the Project lot, for the 1% AEP storm, the lateral flood extents are topographically constrained, with minimal bank storage of flood waters. Peak flood depths upstream of Mitchell Road were modelled up to approximately 0.8 m in the western tributary, 1.2 m in the eastern tributary and generally less than 0.4 m in the bank areas. The topography flattens slightly in the northern portion of the Project lot. In the 1% AEP flood event, the lateral extent of the flood waters in this area extend from the north and occur out of stream bank areas, with flood depths predominantly less than 0.2 m to 0.4 m. Outside of the Project lot, at the confluence of the tributaries across the site, in stream peak flood depths of up to approximately 1.9 m were modelled.

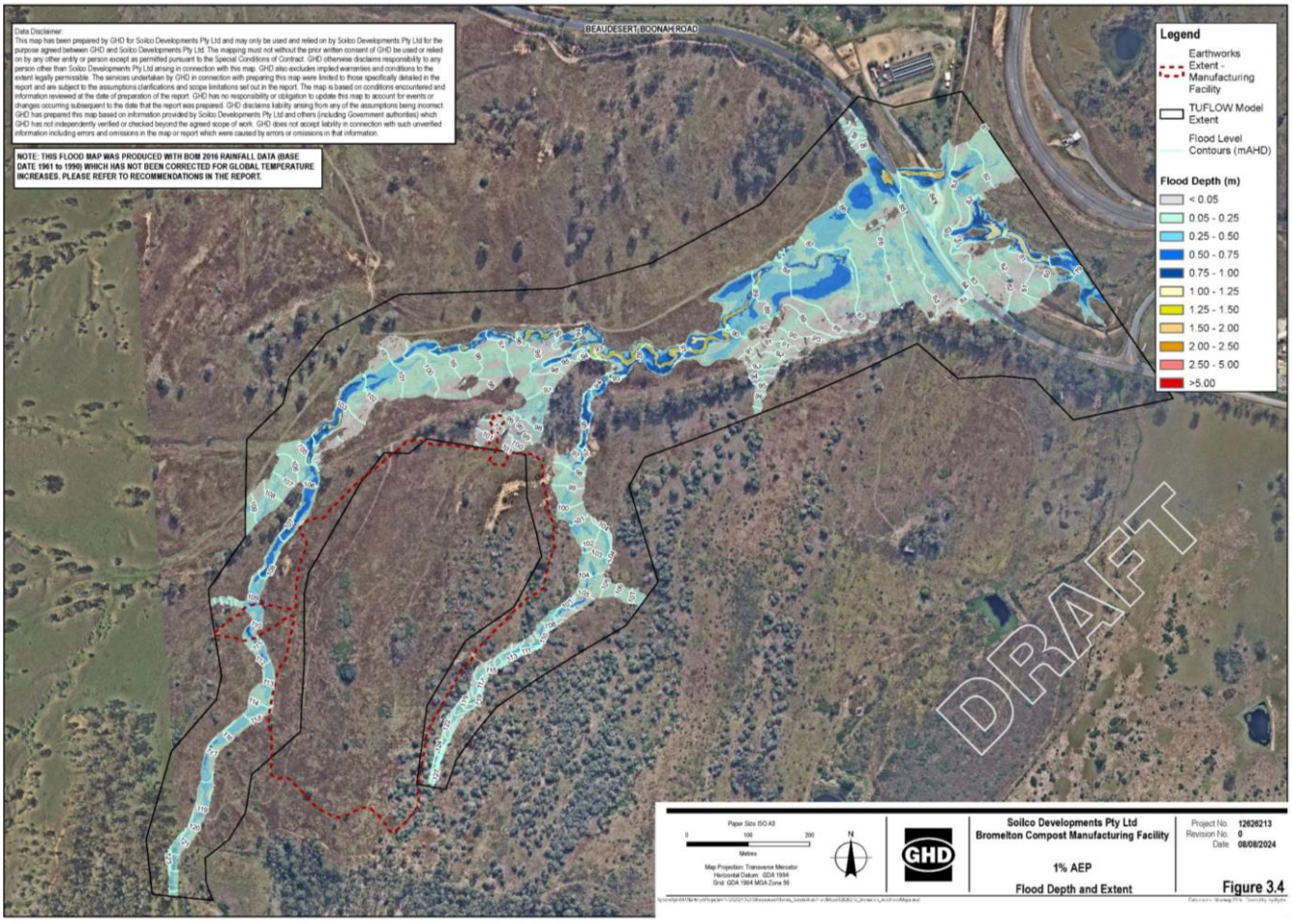


Figure 3.4 1% AEP flood extent and depth

3.4 Surface water quality

A field survey was conducted on 5 April 2024 and 10 April 2024 by GHD for the purpose of the Aquatic Ecology Assessment GHD (2024). During the survey, opportunistic *in-situ* water quality sampling was undertaken. A total of five monitoring locations were sampled, across each tributary of Allan Creek within the site and per the methodology described in GHD (2024). Sampling locations are shown in Figure 3.5 and included:

– ACT1 located in the south-west extent of the Project area
– ACT2 located in the Project area
– ACT3 is located slightly east and outside of the Project area but within the Lot boundary
– ACT4 is located far east and outside of the Project area but within the Lot boundary
– ACT5 is outside of the Lot at the confluence of tributaries ACT1 to 3

The results of the *in-situ* water quality sampling are shown in Table 3.1.

As described in Section 2.1.4, the aquatic ecosystem WQOs applicable to the Project site under EPP (2019) are the Western Logan River Freshwaters –Moderately Disturbed waters (Low Flow) (DES 2022). The surface water quality data has been compared against the guidelines (DES 2022) as shown in Table 3.1. There are no water quality guidelines for water temperature; however, water temperatures were within normal ranges expected for the sampling season.

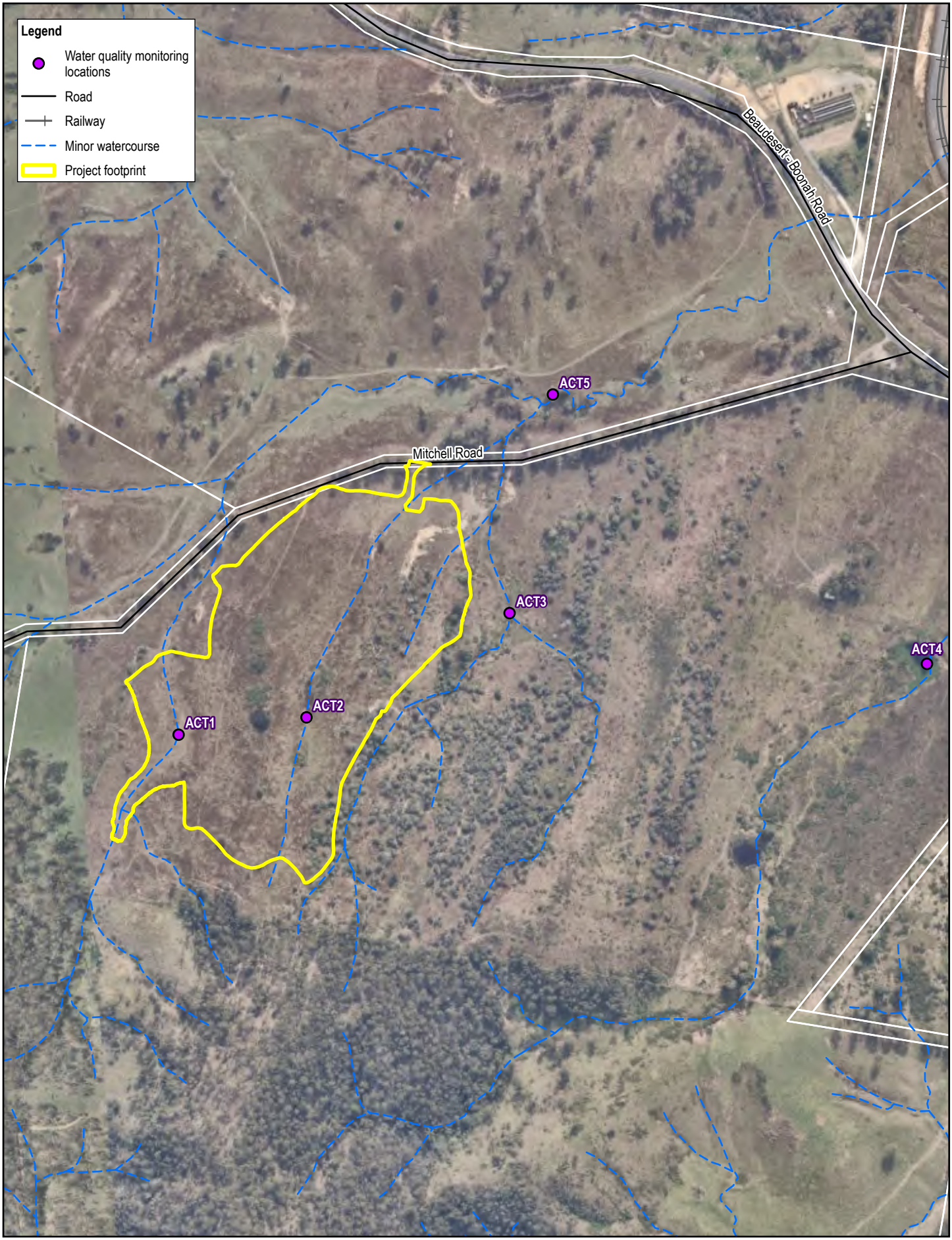
Table 3.1 In-situ water quality results

Sample Location ID	Date	Temp.	pH	Electrical conductivity	Dissolved oxygen	Dissolved oxygen	Turbidity
Units	**DD/MM/YY**	**°C**	**pH unit**	**µS/cm**	**mg/L**	**% sat.**	**NTU**
Guideline *	**-**	**–**	**6.5-8.2**	**350**	**–**	**85 – 110%**	**11**
ACT1	05/04/24	27.5	7.5	371	5.9	51.2	78.15
ACT2	05/04/24	27.2	7.0	365	5.8	50.6	64.12
ACT3	05/04/24	26.9	6.9	357	6.2	58.6	74.72
ACT4	10/04/24	21.8	7.3	346	6.4	65.8	42.11
ACT5	10/04/24	22.1	7.9	361	6.8	84.1	73.85

* *Environmental Protection (Water and Wetland Biodiversity) Policy 2019*, Logan River Environmental Values and Water Quality Objectives Basin No. 145 (part) – Western Logan River Freshwaters – Upland Freshwaters – Upland Moderately Disturbed waters (Low Flow)

Orange cells note exceedances compared against water quality guidelines

As shown in Table 3.1, exceedances were recorded at all five sites for dissolved oxygen and turbidity. Dissolved oxygen ranged from 50.6% (ACT2) to 84.1% (ACT5) whilst turbidity ranged from 42.11 NTU (ACT4) to 78.15 NTU (ACT1). Exceedances for electrical conductivity were also recorded at all sites, except for site ACT4 (346 µS/cm). The pH was within the water quality guideline range at each site. These results indicate the overall water quality across site was reasonably poor in relation to the guideline values.



Paper Size ISO A4

0 50 100 150 200

Metres

N

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 56

GHD

SOILCO
The Life-Giving Soil Company

SoilCo Pty Limited
Bromelton Compost Manufacturing Facility
Stormwater Impact Assessment

Project No. **12626213**
Revision No. **A**
Date **9/08/2024**

Water quality monitoring locations

FIGURE 3.5

\\ghdnet\GHD\AU\Birtinya\Projects\41\12626213\GIS\Maps\Deliverables\12626213_BromeltonCompostManufacturingFacility\12626213_BromeltonCompostManufacturingFacility.aprx - 12626213_402_WaterQualityMonitoringLocations_RevA
Print date: 09 Aug 2024 - 09:06

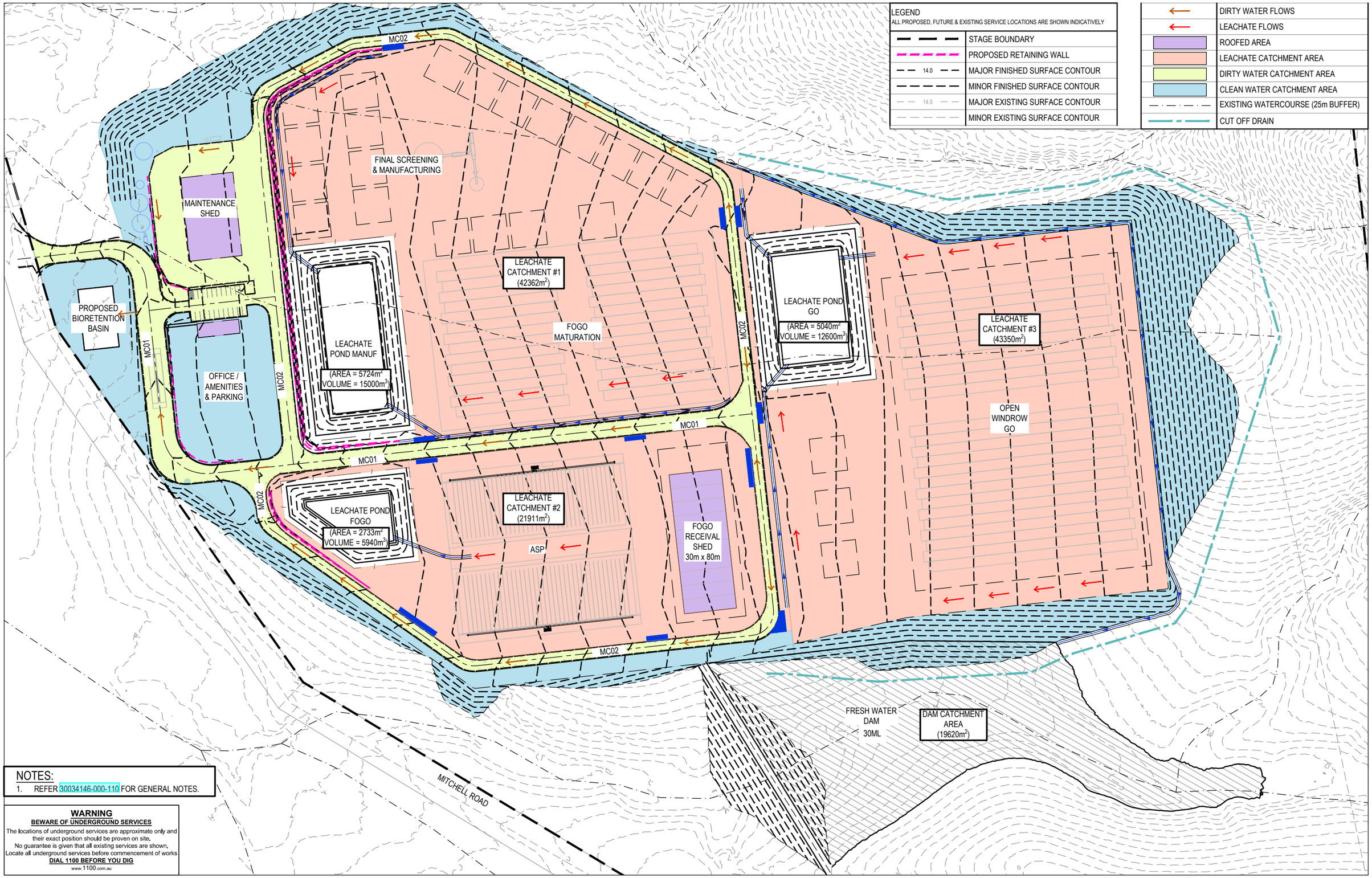
Data source: GHD: aquatic survey locations (2024); DoR: cadastre, property footprint (2024), rail, watercourse (2023), road (2021); SoilCo: project boundary (2024); nearmap.com: extracted 9/08/2024 .
Created by: mvandermerwe

4. Surface water management plan

Based on the review of the relevant regulatory context applicable to the Project (refer Section 2) and the existing conditions at the Project site (refer Section 3), a requirement for mitigation measures to be in-built into the Project was identified. This has been undertaken through the development of this Surface Water Management Plan, described herein, which has been developed collaboratively with (and informed) the Project design development undertaken by SMEC.

Figure 4.1 outlines the SMEC design, inclusive of surface water management measures during operation and Figure 4.2 also providing a construction phase Erosion and Sediment Control Plan.

Table 4.1 outlines the in-built water management measures, consistent with the SMEC design and with additional detail where applicable. The table also includes the basis of the measures, developed in consideration of the regulatory context outlined in Section 2.



NOTES:

1. REFER 30034146-000-110 FOR GENERAL NOTES.

WARNING

BEWARE OF UNDERGROUND SERVICES

The locations of underground services are approximate only and their exact position should be proven on site.
No guarantee is given that all existing services are shown.
Locate all underground services before commencement of works
DIAL 1100 BEFORE YOU DIG
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REV	DATE	AMENDMENT \ REVISION DESCRIPTION	DRAFT	DESIGN	WVR No.
01	06.08.2024	ISSUED FOR APPROVAL	KM	KM	0001
02	07.08.2024	ISSUED FOR APPROVAL	KM	MH	0002

STATUS: **SUBJECT TO APPROVAL**

APPROVED RPEQ:

DATE

smec an SJ company

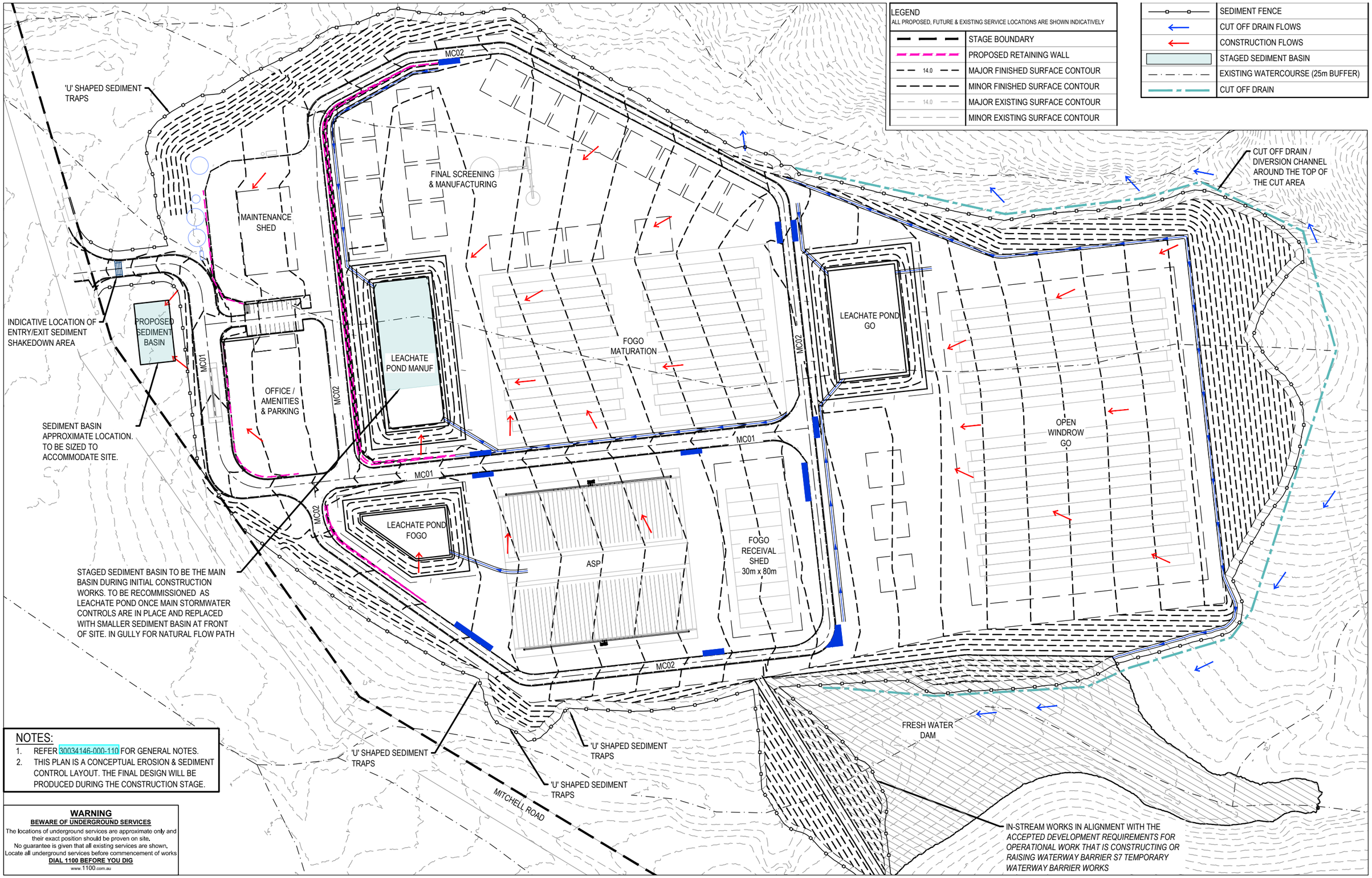
0 10 20 40
Scale 1:1000

CLIENT: SOILCO

PROJECT NAME: PROPOSED DEVELOPMENT
SOILCO PTY LTD
BOONAH ROAD, BEAUDESERT
SCENIC RIM REGIONAL COUNCIL

DRAWING TITLE: STORMWATER FLOW LAYOUT

DATUM	SCALE	SIZE	PROJECT\DRAWING No	REVISION
AHD	AS SHOWN	A1	30034146-000-300	02



NOTES:

1. REFER 30034146-000-110 FOR GENERAL NOTES.
2. THIS PLAN IS A CONCEPTUAL EROSION & SEDIMENT CONTROL LAYOUT. THE FINAL DESIGN WILL BE PRODUCED DURING THE CONSTRUCTION STAGE.

WARNING

BEWARE OF UNDERGROUND SERVICES

The locations of underground services are approximate only and their exact position should be proven on site.
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STATUS: **SUBJECT TO APPROVAL**

APPROVED RPEQ:

DATE

smec an SJ company

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0 10 20 40
Scale 1:1000

CLIENT: SOILCO

PROJECT NAME: PROPOSED DEVELOPMENT
SOILCO PTY LTD
BOONAH ROAD, BEAUDESERT
SCENIC RIM REGIONAL COUNCIL

DRAWING TITLE: EROSION & SEDIMENT CONTROL LAYOUT

DATUM	SCALE	SIZE	PROJECT\DRAWING No	REVISION
AHD	AS SHOWN	A1	30034146-000-111	02

Table 4.1 Surface Water Management Plan in-built water management measures

Category	Phase	Description	In-built control measures	Basis of measures
Separation of water types	Operation	Composting sites generate differing water types distinguished by their respective water quality. This has impacts on both risk to downstream environments but on the ability to use in the composting process. They consist of leachate that has been in contact with organic material, stormwater which has not, roofwater, and runoff from areas external to the operational site. It should be noted that at times 'leachate' is used to refer specifically to water that has seeped from organic piles but for this assessment the term refers to any water in significant contact with organics. Leachate can only be reused in early phase stage of the process, whereas other water types can be used throughout the full process. Due to the different water quality risks and reuse opportunities, these types of water must be appropriately separated.	• Diversion of upstream run-on around the facility • Designation of respective leachate and stormwater catchments within the operational site, with separate stormwater conveyance systems. With leachate catchments those with realistic probability of generating runoff quality impacted by the presence of organic material.	The *Model Operating Conditions (MOC) ERA53(a) Organic Material Processing by Composting* (Section 2.3.1*)* form the most specific authoritative guideline that considers the specific requirements of composting sites with relation to their need to separate and manage different water types differently. This is reflected in Condition WT3 requiring prevention of stormwater being contaminated by the activity or direction of water that is contaminated to treatment and retention measures.
Leachate management	Operation	Runoff that has come into significant contact with organic material is generally not suitable for regular, untreated discharge and must therefore be contained up to a design standard rainfall.	Provision of in excess of 30 ML of contact water storage with disposal via reuse in the early phase of the process. No proposed active release of leachate and no overflow up to a design standard rainfall of 900 mm falling within a 6 month period.	The MOC (Section 2.3.1*)* nominate (WT3) that leachate needs to be directed to stormwater treatment and retention measures and that these measures must have the capacity to retain runoff for a 24-hour rainfall event up to an unspecified site-specific Annual Exceedance Probability (AEP). It is noted that there is precedent for other sites for an Average Recurrence Interval (ARI) of 10 years and that this is consistent with the NSW guideline *Environmental Guidelines, Composting and Related Organics Processing Facilities, NSW DEC 2003.* Therefore containment of the 10-year 24 hour event (152 mm) was taken as the initial minimum sizing and identified to be approximately 17 ML assuming 100% runoff. However, it was identified based on preliminary water balance of the site that the site would be most sensitive to longer durations of regular rainfall rather than a shorter intense storm. Therefore, approximately twice (i.e. 30ML) the volume of the minimum sizing

Category	Phase	Description	In-built control measures	Basis of measures
				was adopted. This, based on water balance calculations considering a 6 month period in which 900 mm of rainfall occurs. This rainfall was selected as approximately the depth within a 6 month period that is exceeded once every 10 years on average based on historical rainfall records. The water balance calculations indicated that this period could be managed with disposal via early phase reuse. The required disposal estimated approximately on average 150% of the typical conditions average demand/disposal rates supplied by SOILCO. In consultation with SOILCO this was considered to be achievable on the basis that the typical operational demand estimates are based on water demands during average and dryer times, not volumes that can be disposed of during periods of excess water. There are a number of operational actions that SOILCO could implement including increasing fan speeds of the ASP and increasing frequency of windrow turning. The preliminary water balance calculations are shown in Appendix C.
Stormwater management	Operation	Runoff from impervious site areas not impacted by organic material includes a water quality risk consistent with typical urban stormwater, requiring consideration accordingly.	Provision of a typical urban stormwater treatment train including 500 m^2 of bio-retention filter area and a Gross Pollutant Trap.	The MOC (Section 2.3.1*)* note that runoff to be conveyed to the stormwater treatment and retention measures consists of water contaminated by the activity (WT3) and runoff from "disturbed areas". Disturbed areas are defined to include areas susceptible to erosion, contaminated by the activity or upon which stockpiles are located. Being an engineered surface, free of organics storage the stormwater catchment is not considered to be classified as a disturbed area and not subject to the treatment and retention measures under the MOC. Notwithstanding this, typical urban stormwater quality risks still exist and as such the *Development Guidelines Water Quality Management in Drinking Water Catchments (SEQW Guidelines)* (Section 2.3.2) were considered the most applicable and specify pollutant reduction targets in outcome AO 8.3. MUSIC modelling was developed for the stormwater catchment in accordance with *Water By Design MUSIC Modelling Guidelines Nov 2018* demonstrating compliance with these targets. This modelling is summarised in Appendix A demonstrating the derivation of the proposed stormwater treatment train.
Wastewater	Operation	Management of wastewater generated in the amenities building is required	Provision of advanced secondary 10EP wastewater treatment plant and land application area adjacent to amenities building	AO5.2 of the Seqwater (2017) guidelines require developments with wastewater treatment system designed for less than 21EP achieve a low or medium risk classification in accordance with the Land Use Risk Tool (LURT) for on site sewage facilities. A site soil and evaluation report (Stav's Hydraulic Services 2024, refer to Appendix D) was undertaken for the proposed effluent

Category	Phase	Description	In-built control measures	Basis of measures
				disposal from the proposed on-site waste water treatment facility. Based on the evaluation report and proposal, a LURT assessment has been undertaken for the Project site, as included in Appendix D. The outcomes of the LURT determined a “very low risk” for subsurface irrigation of effluent and therefore meets AO5.2 of Seqwater (2017).
Water sourcing	Operation	Water is required for the composting process, including in the early phase and later phase processes, with leachate only able to be used in the early phase process.	Provision of a 30 ML harvesting storage to the west of the operational area. Water to be sourced externally from appropriately licensed source for delivery during dry periods to meet water supply needs.	Demand estimate for water use was provided by SOILCO equalling approximately 700,000 L/week. SOILCO has confirmed the ability to provide this demand during dry periods (if required) via appropriately licensed, externally sourced water imported to site. Reliance on externally sourced water has been reduced through provision of the harvesting storage. The storage was sized based water balance optimisation considering the catchment available for the storage and evaporation from the dam. With respect to the Logan Water Plan (Section 2.2.1), the drainage line of the harvesting storage is not mapped as a watercourse under the plan and is therefore not subject to surface water licensing requirements. Groundwater is not to be utilised to contribute to site water requirements.
Impact from flooding	Operation	Avoidance of impact from external floodwaters is required both with respect to minimising impact on operations and also water quality risks associated with site inundation.	As shown in Appendix B, the operational site is located outside the 1% AEP flood impact for the identified flow paths adjacent to the site, other than for two minor locations where through detailed design extents would be altered as required to locate outside the flood extent. This would also be undertaken in consideration of waterway separation distance requirements (refer later in this table). ACS Engineers has prepared design documentation for the upgrade of Mitchell Road including provision of appropriate flood protection and flow conveyance.	*SEQW Guidelines (Section 2.3.2)* and the *Scenic Rim Hazard Overlay Code (Section 2.3.3)* require flood immunity in the 1% AEP event.

Category	Phase	Description	In-built control measures	Basis of measures
Impact on flooding	Operation	Increasing impervious areas associated with the site has the potential to increase the peak rate of runoff and impact downstream flooding conditions.	Leachate storages	As outlined in Appendix B, critical storm durations of receiving waterways for flooding are up to 4.5 hours. The 1% AEP 4.5 hour event corresponds to approximately 130 mm of rainfall which is less than half of the runoff depth associated with filling the leachate storages from empty. Therefore, as the leachate catchment is sensitive to longer duration events and is to be maintained relatively empty, it is anticipated that for storm events critical for flooding the leachate catchment would typically be contained. As this comprises the majority of the impervious catchment it is anticipated to offset the impact of increasing imperviousness at the site. This would be confirmed hydrologic modelling undertaken during detailed design.
Separation distances from existing flow paths	Construction and Operation	Government authorities	25 m setback from flow paths, other than the harvesting storage Location of site operational activities above the 1% AEP.	With respect to water quality impacts from the operations: providing an equivalent outcome of the separation distances, by locating outside of the 1% AEP flood extent requirement of the SEQ Guidelines (Section 2.6.1). This in turn meets the intended outcomes of the separation distances specified in Table 5 of the guideline. With respect to vegetation clearing and earthworks: maintaining the 25m specified in the guideline. Achieved in most locations in current design with detailed design to set toe of batter based on 25m setback based on detailed survey.
Erosion and sediment control	Construction	During construction, substantial ground disturbance activities will be undertaken with the potential to generate sediment discharged to the downstream environment.	Construction phase erosion and sediment control plan (Figure 4.1) prepared as a component of the facility design. Including provision of sediment basins. During detailed design these would be sized in accordance with management of at least 80% of the annual average runoff to 50 mg/L of TSS. Erosion and drainage controls to be included as required in Section 2.4. Staging of the works is also to be considered during detailed design, and in particular the provision of early stage temporary sediment basin(s) before final pad levels are reached and leachate basins	As outlined in Section 2.4 IECA Appendix B provides design guidance for sediment basins to achieve management of at least 80% of average annual runoff to 50 mg/L of Total Suspended Solids. This guidance has been adopted in specifying the sediment basin sizing and also in specifying general drainage and erosion controls.

Category	Phase	Description	In-built control measures	Basis of measures
			cannot be used as temporary sediment basins.	

5. Impact assessment and mitigation

The potential impacts of the Project were assessed with relation to surface water, including the in-built management measures outlined in Section 4. The water related risks were found to be generally acceptably managed based on the following:

- Appropriate separation of water types in accordance with best-practice for composting sites and the ERA53(s) Model Operating Conditions (MOC).
- Provision of in excess of 30 ML of leachate storage sized in exceedance of the 24-hour event supported by the MOC, with reuse in the early phase of composting. No proposed active release of leachate and no overflow up to a design standard rainfall of 900 mm falling within a 6 month period.
- Provision of a wastewater treatment system for amenities wastewater in accordance with the Seqwater (2017) guidelines.
- Separation of stormwater from contamination and management through provision of a stormwater treatment train in accordance with SEQWater (2017) guidelines.
- Potential changes to general hydrological (not during times of flood) regimes were considered alongside water quality requirements for the proposal. It is noted that to manage water quality risks containment of flows for a large portion of the site is required. As such, maintenance of existing flow regimes is not possible. As this impacts only the direct area of the manufacturing pad, which is a small portion of the overall receiving catchment, it is not anticipated to result in measurable hydrologic change to the overall downstream system.
- Estimation of water demands by SOILCO and confirmation that during dry periods they can be sourced via appropriately licensed external sources. Provision of a 30ML harvesting storage to minimise reliance on imported water.
- Location of the operational site outside the 1% AEP flood impact for the identified flow paths adjacent to the site in accordance with Seqwater (2017) guidelines and the Scenic Rim Hazard Overlay Code (refer to 2.5.2).
- Containment of the leachate catchment offsetting the impact of increasing imperviousness on peak discharge rates.
- Separation distances from identified flow paths consistent with the understood intent of the Seqwater (2017) guidelines.
- Provision of an erosion and sediment control plan, based on relevant regulatory requirements, to be updated and confirmed during detailed design.

Risk reduction was expected as the Project water management measures were developed through the process outlined in this assessment, in consideration of potential impacts and in accordance with regulatory requirements. However, it was noted that whilst appropriate measures are specified to the degree that they can realistically be at this stage, there are some additional mitigations required, that can only be fully defined and implemented through the operational phase of the Project. These are outlined in Table 5.1, as well as the basis for why they are required.

With inclusion of the in-built measures outlined in Section 4, as well as the additional measures outlined in Table 5.1, the Project is expected to appropriately manage risks with relation to surface water.

Table 5.1 Additional Mitigation Required

Relevant Category (of Table 4.1)	Additional Mitigation	Basis
Separation of water types	Preparation and regular update of a Operational Management Plan	The critical nature of separation of waters was identified, and that a lack of separation could potentially occur due to operational factors. Therefore, preparation and annual updating of a management plan is required, stipulating in particular maintenance and observation requirements for the stormwater catchment to confirm it is not contaminated by organic material. At a minimum this plan is to include daily inspection of the stormwater catchment, demonstrating the appropriate isolation of the catchment from contamination. Water quality monitoring requirements are to be included with quarterly sampling undertaken. In addition, sampling is to be undertaken prior to, during and after any overflow from leachate storages. Analytes are to include suite of analytes potentially impacted by composting, including those specified in the NSW EPA Composting Guidelines as a minimum. Locations are to include the leachate dams and discharge from the stormwater catchment before and after the stormwater treatment train. As stormwater discharge is only periodic at least one sample per year is to be obtained during a rainfall event when the stormwater catchment is discharging.
Leachate management	Adjustment of leachate catchment area when full processing rate is not occurring	It was identified that leachate disposal is via reuse in the early phase process and that at site commencement the full processing rate and therefore full disposal rate will not be available. The water balance calculations (Appendix C) were undertaken based on the full rate. Therefore, prior to that rate being achieved only partial areas of the leachate catchment are to be used for organics storage or processing to reduce rainfall into the system. The drainage system is to be designed so that the site can be actively portioned, and part of the leachate catchment operates as part of the stormwater catchment during early periods of site operation.
Leachate management and water sourcing	Preparation of a detailed water balance model based on actual site operational data and provide emergency containment bunding if required	Highly accurate quantification of wet period water disposal/reuse ability through the early phase process cannot be achieved until data on the actual site operations. A reasonable estimate based on available data has been undertaken, suggesting that disposal for the design standard 6 month period is feasible, and is in excess of the 24-hour duration specified in the MOC. However, after 24 months of site operation a detailed water balance is to be prepared based on daily observations (via automated telemetry) collected on water application rates, withdrawals from the dams, leachate dam levels and harvesting storage levels. If the updated water balance predicts that the design standards adopted herein are not satisfied then operational controls are to be implemented, potentially including road tankering leachate offsite to an appropriately licenced facility, as well as bunding of part of the leachate catchment to provide temporary storage over select working areas up to that required for the design standard. That is, in the unexpected event that the leachate system is not performing as predicted in this assessment, the risks are transferred from environmental discharge to operational factors. The water balance would also include a more accurate representation of the harvesting storage, allowing for optimising of external water sourcing procedures. Further, SOILCO may consider a first-flush system for part of the stormwater catchment where initial runoff is conveyed to leachate system with subsequent runoff conveyed to the stormwater system. If implemented, this would be assessed in the detailed water balance to demonstrate it does not compromise the performance of the leachate system.

6. Conclusions

The potential impacts of the Project were assessed with relation to surface water, including the in-built management measures incorporated into the design and the Surface Water Management Plan developed herein. The water related risks were found to be generally acceptably managed which is to be expected as they were developed through the process outlined in this assessment, in consideration of potential impacts and in accordance with regulatory requirements. However, it was noted that whilst appropriate measures are specified to the degree that they can realistically be at this stage, there are some additional mitigations required and stipulated herein, that can only be fully defined and implemented through the operational phase of the project.

With inclusion of the in-built measures, as well as the additional measures, the project is expected to appropriately manage risks with relation to surface water.

7. References

DRDMW (2022) chrome- https://www.rdmw.qld.gov.au/__data/assets/pdf_file/0011/1645049/qld-non-urban-water-measurement-policy.pdf

Queensland Government, Queensland (2017) Exclusion zones, WetlandInfo website, accessed 20 March 2024. Available at: **https://wetlandinfo.des.qld.gov.au/wetlands/ecology/aquatic-ecosystems-natural/groundwater-dependent/exclusion-zones/**

DES (2022) WQ1454 - Logan River, Environmental Protection (Water and Wetland Biodiversity) Policy 2019, South-east Queensland Map Series accessed from **https://environment.desi.qld.gov.au/__data/assets/pdf_file/0028/273664/wq1454-logan-river.pdf**

Seqwater (2017) Development Guidelines – Water Quality Management in Drinking Water Catchments.

Stav's Hydraulic Services (2024) Site & Soil Evaluation Report Bromelton Compost Manufacturing Facility Lot 4 Mitchell Road Bromelton 4285

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ARR (2019) Ball J, Babister M, Nathan R, Weeks W, Weinmann E, Retallick M, Testoni I, (Editors), 2019, Australian Rainfall and Runoff: A Guide to Flood Estimation, Commonwealth of Australia.

Scenic Rim Regional Council (SRRC) (2020) Scenic Rim Planning Scheme

IECA (2008) Best Practice Erosion and Sediment Control

IECA (2018) Appendix B - Sediment Basin Design and Operation

DES (2019) Procedural guide, releases to waters from land development sites and construction sites 2500 m^2 and greater

DES (2022) WQ1454 Logan River Map

EPP Water (2019) *Environmental Protection (Water and Wetland Biodiversity) Policy 2019*

South East Queensland Regional Plan (2017).

Appendices

Appendix A

MUSIC Modelling Summary

Introduction

Conceptual MUSIC modelling was undertaken to inform the concept development for management of the stormwater (non leachate) catchment. Being an engineered surface, free of organics storage, the stormwater catchment is not considered to be classified as a disturbed area and not subject to the treatment and retention measures required for the leachate catchment.

Notwithstanding this, typical urban stormwater quality risks still exist and as such the Development Guidelines Water Quality Management in Drinking Water Catchments (Seqwater 2017) were considered the most applicable and specify pollutant reduction targets in outcome AO 8.3 (refer to Section 2.3)

Methodology

The MUSIC modelling was undertaken for the stormwater catchment in accordance with the requirements specified in Water By Design MUSIC Modelling Guidelines Nov 2018 (Water By Design 2018). The inputs and configuration of the modelling undertaken are summarised in this section. The stormwater quality treatment train included a gross pollutant trap (GPT) and a bioretention basin. The model configuration is shown in Figure 7.2. Key parameters input to the modelling were as follows:

Rainfall and PET

Rainfall and potential evapotranspiration (PET) data input requirements are stipulated within Appendix A of Water By Design (2018). The nearest listed gauging station to the Project is the Beaudesert Cryna (40014). The required climate period input to the model ranges 1 January 1968 to 31 December 1977. Rainfall data was sourced from the Pluviograph Rainfall Data Tool, accessed from the eWater toolkit. The monthly average PET data (mm) as defined in the Water by Design (2018) guidelines was input into the model. These were input into the model at 6 minute time intervals.

Catchment parameters

The stormwater catchments are conceptually split into roofed areas and ground areas.

The catchment area for the ground level stormwater catchments is approximately 4.25 ha, which are considered to be 100% impervious. The catchment area for the roofed areas within the stormwater catchment total 0.41 ha, which were also classified as 100% impervious.

Pollutant generation parameters

The stormwater catchment includes typical urban pollutants generated from runoff over distinct roofed areas and the ground surface. Therefore, the pollutant generation parameters input into the model for industrial split catchment land uses for roofs and ground surfaces, as outlined in Table 3.8 of Water By Design (2018). A summary of the pollutant generation parameters is included in Table 7.1.

Table 7.1 Industrial pollutant generation parameters – Water By Design (2018)

Land use	Flow type	Total suspended solids Log^{10} Values		Total phosphorus Log^{10} Values		Total Nitrogen Log^{10} Values	
		Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation
Roof	Baseflow	0	0	0	0	0	0
	Stormflow	1.3	0.44	-0.89	0.36	0.25	0.32
Ground level	Baseflow	0.78	0.45	-1.11	0.48	0.14	0.20
	Stormflow	1.92	0.44	-0.59	0.36	0.25	0.32

For the ground level, as the catchment areas are 100% impervious, the baseflow parameters are not applied.

GPT parameters

The efficiency of the Gross Pollutant Trap (GPT) treatment system was assumed to be equivalent to the OceanSave GPT, which were input into the model. The predicted removal efficiency of the OceanSave GPT is summarised in Figure 7.1. The high flow bypass was input as 0.8 m^3/s.

Table 3-1 OceanSave® Treatment Performance Accepted by Majority of Councils within Australia

Pollutant	Predicted removal efficiency (%)[1]	References[2]
Gross pollutants	• 100%	• Based on Allison et al (1998), Walker et al (1999) and high rates of sediment removal observed in other studies.
Total suspended solids	• 70%	• Based on Walker et al (1999), noting MUSIC modelling guidelines (Water by Design 2010, BMT WBM 2015, eWater 2016) recommend applying a storm event mean concentration of 269 to 270mg/L.
Total phosphorus	• 30%	• Based on Walker et al (1999)
Total nitrogen	• 0%	• Based on Walker et al (1999) and Birch et al (2009)

1: Removal up to design flow rate (refer to Technical Design Guide in Appendix B). All flows greater than this flow rate are assumed to be receive zero pollutant removal.

Figure 7.1 OceanSave GPT treatment efficiency

Bioretention parameters

The conceptual bioretention system configuration within the model included the following parameters:

Storage properties of the basin include a filter area of 500 m^2, an extended detention depth of 0.3 m and top of extended detention surface area of 750 m^2. The treatment filter media properties consisted to of a media depth of 0.5 m and a saturated hydraulic conductivity of 200 mm/h. The filter area and surface area of the basin were iterated until achievement of the pollutant reduction targets specified by Seqwater (2017). A high flow bypass of 0.8 m^3/s was input as the threshold for inflows to the system. The overall design of the treatment train would be refined during detailed design.

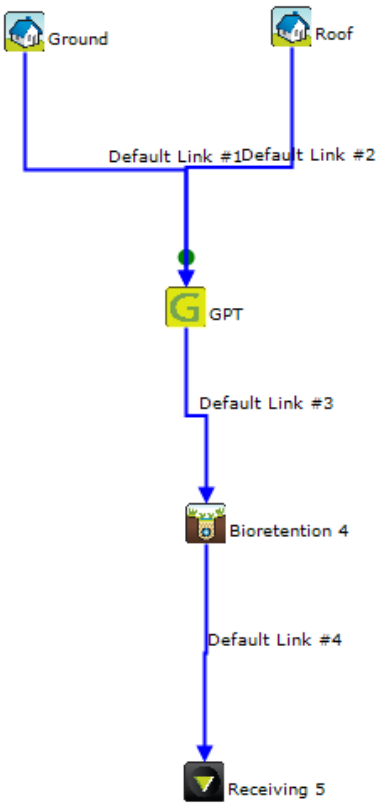

Figure 7.2 MUSIC model structure

Results

The results of the stormwater quality treatment train effectiveness (as output by the model) are presented in Table 7.2. The results are taken from the bioretention node.

Table 7.2 Target pollutant reduction target

Seqwater (2017) target pollutant reduction	MUSIC model result output			
– 85% reduction in total suspended solids; – 65% reduction in total phosphorus; – 45% reduction in total nitrogen; and – 95% reduction in gross pollutants.		Sources	Residual Load	% Reduction
	Flow (ML/yr)	34.86	33.72	3.277
	Total Suspended Solids (kg/yr)	4426	348.5	92.13
	Total Phosphorus (kg/yr)	11.74	2.344	80.04
	Total Nitrogen (kg/yr)	82.48	39.09	52.61
	Gross Pollutants (kg/yr)	909.6	2.942	99.68

As shown in Table 7.2, the pollutant reduction targets for the stormwater catchment areas were achieved through the inclusion of a GPT and bioretention system. The stormwater treatment train would be refined and updated through the detailed design process.

Appendix B

Flood Assessment

Introduction

Flood modelling was undertaken to inform the understanding of flooding conditions, which in turn was used to inform the planning and design of the proposed works.

Methodology

The catchment for the site was delineated as shown in the figure overleaf using publicly available LiDAR data from the Elevation and Depth – Foundation Spatial Data (ELVIS) portal. A Watershed Bounded Network Model (WBNM) hydrological model was compiled using *Australian Rainfall and Runoff: A guide to flood estimation* (Ball et al. 2019) (ARR 2019) methodologies and 10 rainfall distributions. Inputs to the WBNM model were:

– Rainfall was downloaded from the BOM Design Rainfall Data System (2016) for the site, and hydrological parameters were downloaded from the ARR data hub (issued 22 March 2024 for Latitude, -27.9774, Longitude, 152.9099). However, it must be noted that the BOM (2016) design rainfall data (base date 1961 to 1990) is not corrected for global temperatures increases to 2024. This is an emerging science matter currently being investigated, which may in the near term replace the ARR2019 climate change chapter. The BOM rainfall data for this assessment has been applied without any climate change adjustment other than considering the 0.2% AEP as a climate change sensitivity.
– Catchment and impervious areas: The catchment area (approximately 176 ha) is mostly pervious. To account for roads and other less pervious areas, an approximate 5% impervious fraction was adopted.
– Initial and continuing losses: Initial and continuing losses were adopted according to ARR 2019 (Ball et al 2019). The initial losses were corrected for pre-burst, while the continuing losses had a 0.4 factor applied.
– A WBNM lag parameter of 1.6 was adopted, after validating against other methods (see below).

Model simulations were undertaken for the 63.2%, 50%, 20%, 10%, 2%, 1% and 0.2% AEP storm events. In doing so, 10 storm rainfall patterns were simulated for a range of durations. For each duration the median flood peak was identified from the 10 storm patterns. This was adopted as the design flood peak for that duration, whereafter the design flood peaks were enveloped across all durations, to identify the critical duration and corresponding design flood peak. This is an approach acceptable under ARR 2019, however does not preclude a design flood peak greater than the critical flood peak being adopted.

Since no concurrent pluviographic rainfall and runoff data was available, calibration of the model was not possible. Validation was thus undertaken using three separate methods, namely:

– a separate RORB model.
– the Regional Flood Frequency Estimate (RFFE).
– an inhouse GHD flood peak relationship.

The results in the table below show favourable agreement between the WBNM model, the RORB model and the inhouse GHD flood peak relationship. The RFFE produced a higher suggested peak flow. However, this can be explained by the fact that all 15 gauged catchments used in the RFFE were larger than the 176 ha catchment for the site. Based on this outcome, the WBNM model simulations have been adopted.

Table: Peak Flow Comparison

Method	1% AEP Flood Peak (m^3/s)
WBNM	25 (1.5-hour duration)
RORB	24 (1.5-hour duration)
RFFE (WMA, 2021)	40 (suggested, range 12-125)
GHD Inhouse Graph	25

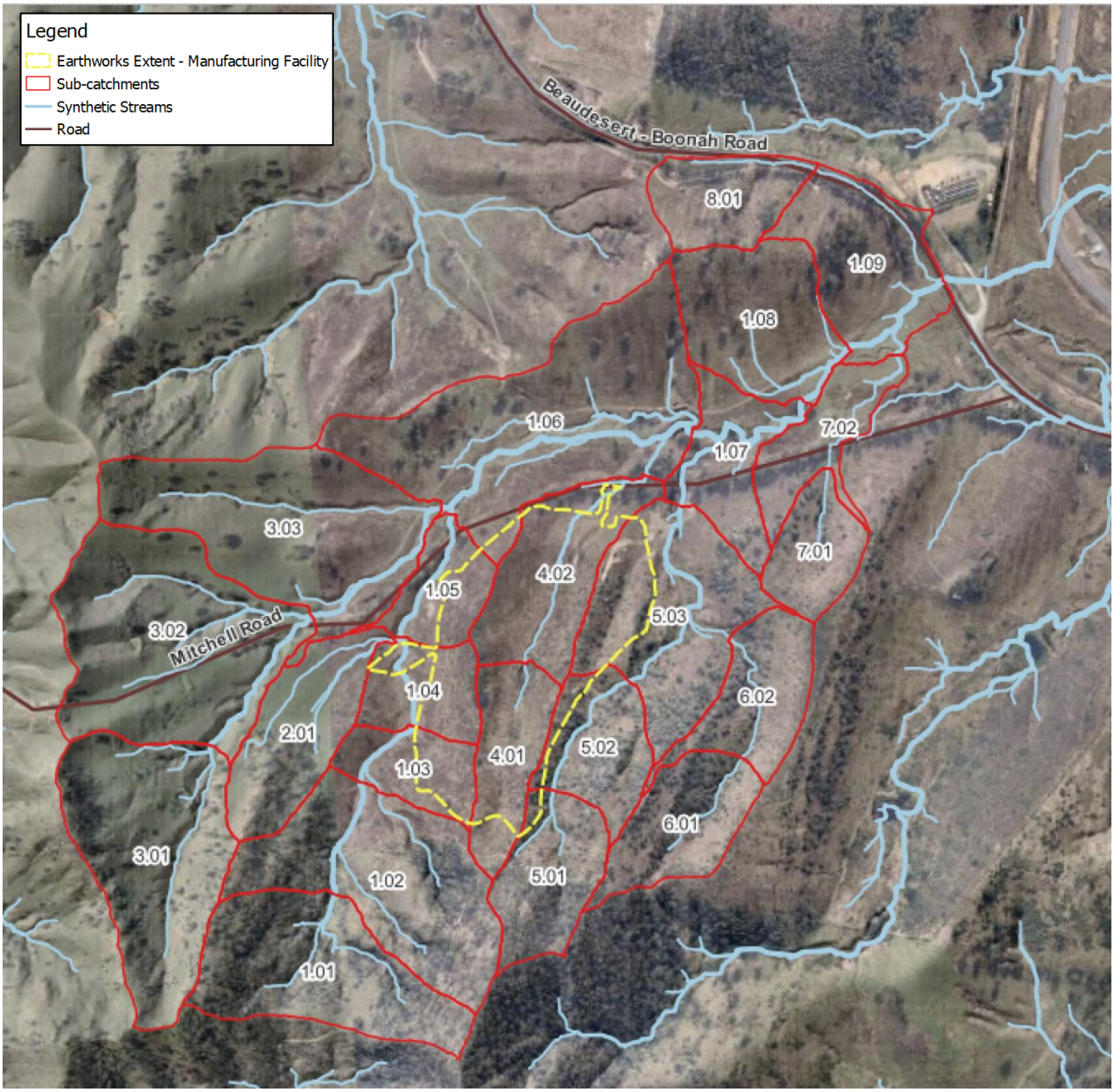

Figure: Catchment Delineation

The WBNM model was simulated to determine the flood hydrographs at the upstream boundaries of the proposal site. The flood peaks at the catchment outlet near Beaudesert Boonah Road are listed in the table below.

Table: Peak Flow Estimate

Event (AEP)	Critical Duration	Median Flood Peak Flow (m^3/s)	Ensemble Number
63.2%	4.50 hours	3.7	TP6
50%	4.50 hours	4.8	TP6
20%	4.50 hours	8.9	TP7
10%	3 hours	12.6	TP6
2%	1.50 hour	20.5	TP5
1%	1.50 hour	25.4	TP3
0.2%	1.50 hour	34.7	TP3

A TUFLOW hydraulic model was compiled for the purpose of calculating the flood inundation at the location of the proposed site, as follows:

- The model covered the site area to the extent shown in the attached flood mapping results, ending approximately 1km downstream of the site. Flooding modelling was limited to waterways of Horton's Stream Order 3 and above.
- Topographic data was sourced from LiDAR data (1 m grid) obtained from the ELVIS data portal.
- A 1m cell size was adopted for the model domain.
- A manning's "n" roughness value of 0.06 was adopted for the majority of the model domain, and 0.025 was applied for Beaudesert Boonah Road.
- Hydrographs from the WBNM hydrology model described above were input as boundary inflows and normal depth was assumed at the downstream boundary.
- The three main culverts under Beaudesert Boonah Road were configured in the model based on the dimensions obtained from GHD's site inspection. Invert levels and lengths were estimated from LiDAR data and aerial imagery.
- Upgrades to Mitchell Road were not represented and flood impacts with relation to these aspects of the proposed works have been considered and included in the concept development for the road prepared by ACS Engineers.

Results

The model was simulated for the 63.2%, 50%, 20%, 10%, 2%, 1% and 0.2% AEP flood events and the flood data was enveloped to produce a series of flood maps which are attached to this appendix. The flood simulations showed that in the upper tributaries across the southern extent of the Project lot, for the 1% AEP storm, the lateral flood extents are topographically constrained, with minimal bank storage of flood waters. Peak flood depths upstream of Mitchell Road were modelled up to approximately 0.8 m in the western tributary, 1.2 m in the eastern tributary and generally less than 0.4 m in the bank areas.

The topography flattens slightly in the northern portion of the Project lot. In the 1% AEP flood event, the lateral extent of the flood waters in this area extend from the north and occur out of stream bank areas, with flood depths predominantly less than 0.2 m to 0.4 m. Outside of the Project lot, at the confluence of the tributaries across the site, in stream peak flood depths of up to approximately 1.9 m were modelled.

Peak flood velocities in the 1% AEP event upstream of Mitchell Road were simulated up to approximately 1.8 m/s in the western tributary, and 2.3 m/s in the eastern tributary. At the confluence of the tributaries, velocities are typically in the range of 1.2 to 2 m/s.

Flood hazard in the 1% AEP event ranges from H1 (generally safe for vehicles, people and buildings) to H5 (unsafe for vehicles and people, all buildings vulnerable to structural damage with some less robust buildings subject to failure). Refer to the attached flood maps for further detail on the flood hazard categories. It is noted that in the 1% AEP, areas with higher flood hazard categories are mainly reflecting in-channel flow. Flood hazard in bank areas and towards the outer edges of the floodplain are mostly H1 (generally safe for vehicles, people and buildings) to H2 (unsafe for small vehicles).

A key outcome of the assessment is that inundation of the proposed facility pad earthworks extent in the 1% AEP does not occur other than two localised areas at the west of the extent. During detailed design minor earthworks alterations would be undertaken to avoid this, also in consideration of minor alterations required to achieve a 25 metre separation distance as outlined in this assessment with relation to waterway requirements.

This assessment has not directly considered future climate flood levels, which would be expected to be higher than the flood levels simulated as part of the current study and can be assessed as part of more detailed investigations. However, the 0.2% AEP flood events are at times used as a proxy for the future climate 1% AEP event, and the flood maps of the 0.2% event have been provided. They confirm that inundation of the facility pad earthworks extent does not occur other than the two localised areas described above.

Attachment: Flood Mapping

Data Disclaimer:
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NOTE: THIS FLOOD MAP WAS PRODUCED WITH BOM 2016 RAINFALL DATA (BASE DATE 1961 to 1990) WHICH HAS NOT BEEN CORRECTED FOR GLOBAL TEMPERATURE INCREASES. PLEASE REFER TO RECOMMENDATIONS IN THE REPORT.

BEAUDESERT BOONAH ROAD

Legend

- Earthworks Extent - Manufacturing Facility
- TUFLOW Model Extent
- Flood Level Contours (mAHD)

Flood Depth (m)

- < 0.05
- 0.05 - 0.25
- 0.25 - 0.50
- 0.50 - 0.75
- 0.75 - 1.00
- 1.00 - 1.25
- 1.25 - 1.50
- 1.50 - 2.00
- 2.00 - 2.50
- 2.50 - 5.00
- >5.00

Paper Size ISO A3

0 100 200

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

N

GHD

Soilco Developments Pty Ltd
Bromelton Compost Manufacturing Facility

63.2% AEP

Flood Depth and Extent

Project No. **12626213**
Revision No. **0**
Date **08/08/2024**

Figure 1

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Data source: Nearmap 2024. Created by: sydhydro

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BEAUDESERT BOONAH ROAD

Legend

- Earthworks Extent - Manufacturing Facility
- TUFLOW Model Extent
- Flood Level Contours (mAHD)

Flood Depth (m)

- < 0.05
- 0.05 - 0.25
- 0.25 - 0.50
- 0.50 - 0.75
- 0.75 - 1.00
- 1.00 - 1.25
- 1.25 - 1.50
- 1.50 - 2.00
- 2.00 - 2.50
- 2.50 - 5.00
- >5.00

Paper Size ISO A3

0 100 200

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

N

GHD

Soilco Developments Pty Ltd
Bromelton Compost Manufacturing Facility

50% AEP

Flood Depth and Extent

Project No. **12626213**
Revision No. **0**
Date **08/08/2024**

Figure 2

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Data source: Nearmap 2024. Created by: sydhydro

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BEAUDESERT BOONAH ROAD

Legend

- Earthworks Extent - Manufacturing Facility
- TUFLOW Model Extent
- Flood Level Contours (mAHD)

Flood Depth (m)

- < 0.05
- 0.05 - 0.25
- 0.25 - 0.50
- 0.50 - 0.75
- 0.75 - 1.00
- 1.00 - 1.25
- 1.25 - 1.50
- 1.50 - 2.00
- 2.00 - 2.50
- 2.50 - 5.00
- >5.00

Paper Size ISO A3

0 100 200

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

N

GHD

Soilco Developments Pty Ltd
Bromelton Compost Manufacturing Facility

20% AEP

Flood Depth and Extent

Project No. **12626213**
Revision No. **0**
Date **08/08/2024**

Figure 3

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Data source: Nearmap 2024. Created by: sydhydro

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BEAUDESERT BOONAH ROAD

Legend

- Earthworks Extent - Manufacturing Facility
- TUFLOW Model Extent
- Flood Level Contours (mAHD)

Flood Depth (m)

- < 0.05
- 0.05 - 0.25
- 0.25 - 0.50
- 0.50 - 0.75
- 0.75 - 1.00
- 1.00 - 1.25
- 1.25 - 1.50
- 1.50 - 2.00
- 2.00 - 2.50
- 2.50 - 5.00
- >5.00

Paper Size ISO A3

0 100 200

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

N

GHD

Soilco Developments Pty Ltd
Bromelton Compost Manufacturing Facility

10% AEP

Flood Depth and Extent

Project No. **12626213**
Revision No. **0**
Date **08/08/2024**

Figure 4

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Data source: Nearmap 2024. Created by: sydhydro

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BEAUDESERT BOONAH ROAD

Legend

- Earthworks Extent - Manufacturing Facility
- TUFLOW Model Extent
- Flood Level Contours (mAHD)

Flood Depth (m)

- < 0.05
- 0.05 - 0.25
- 0.25 - 0.50
- 0.50 - 0.75
- 0.75 - 1.00
- 1.00 - 1.25
- 1.25 - 1.50
- 1.50 - 2.00
- 2.00 - 2.50
- 2.50 - 5.00
- >5.00

Paper Size ISO A3

0 100 200

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

N

GHD

Soilco Developments Pty Ltd
Bromelton Compost Manufacturing Facility

1% AEP

Flood Depth and Extent

Project No. **12626213**
Revision No. **0**
Date **08/08/2024**

Figure 6

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Data source: Nearmap 2024. Created by: sydhydro

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BEAUDESERT BOONAH ROAD

Legend

- Earthworks Extent - Manufacturing Facility
- TUFLOW Model Extent
- Flood Level Contours (mAHD)

Flood Depth (m)

- < 0.05
- 0.05 - 0.25
- 0.25 - 0.50
- 0.50 - 0.75
- 0.75 - 1.00
- 1.00 - 1.25
- 1.25 - 1.50
- 1.50 - 2.00
- 2.00 - 2.50
- 2.50 - 5.00
- >5.00

DRAFT

Paper Size ISO A3

0 100 200

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

N

GHD

Soilco Developments Pty Ltd
Bromelton Compost Manufacturing Facility

2% AEP

Flood Depth and Extent

Project No. **12626213**
Revision No. **0**
Date **08/08/2024**

Figure 5

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Data source: Nearmap 2024. Created by: sydhydro