Project Sprite Pre-FEED

Stormwater Management Plan

Incitec Pivot Ltd

2023-04-12

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Bringing ideas to life

Document control record

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1 Introduction

1.1 Project description

The Gibson Island Project (the Project) is a collaboration between Incitec Pivot Limited (IPL) and Fortescue Future Industries (FFI) to develop a green ammonia hub on IPL's existing Gibson Island site at 250 and 282 Paringa Road, Murarrie. IPL's existing Gibson Island facility will cease traditional fertiliser manufacturing to establish a world leading fully decarbonised green ammonia plant through the construction of a green hydrogen production facility (on Lot 472 on SL88340) and refurbishment of an existing natural gas-based ammonia facility (on Lot 468 on SL5433).

It is intended that both the green hydrogen and green ammonia production facilities will be hosted on separate allotments, but in a practical sense they will have synergy with one another. IPL will be responsible for the refurbishment of the existing ammonia facility to enable the production of green ammonia. FFI will be responsible for the construction and operation of the new green hydrogen production facility.

The refurbishment of the existing ammonia facility and the construction of the new green hydrogen production facility will each be subject to separate development applications under the *Planning Act 2016* for a material change of use.

The refurbishment will involve the modification and upgrade to the existing plant to enable the production of green ammonia via synthesis using nitrogen, extracted from air using an Air Separation Unit (ASU), and green hydrogen from FFI. Approximately 400,000 tonnes of green ammonia will be produced per annum.

A new ammonia storage tank, with a capacity of 35,000 tonnes, will be constructed on Lot 468 along with an upgrade to the ship loading facilities at the existing wharf. Existing steam driven equipment in the ammonia plant will also be converted to operate on renewable electricity. Both facilities will share common utilities including nitrogen and demineralised water.

This technical study has been prepared on behalf of IPL to support the development application for the refurbishment of the existing natural gas-based facility to establish the green ammonia production facility.

1.2 Site description

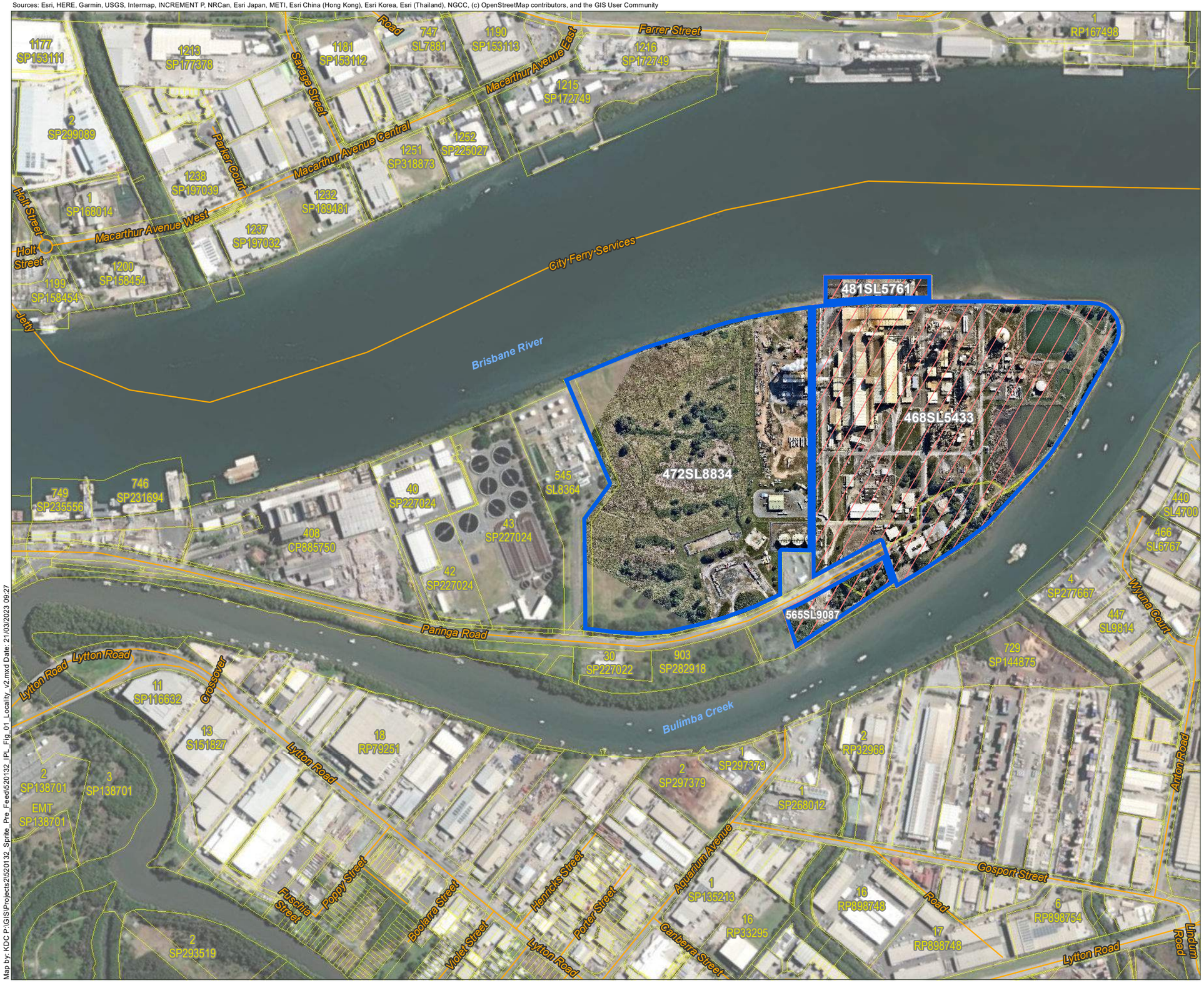
The Proposed Development is located at 285 Paringa Road, Gibson Island, Murarrie approximately 10 km north-east from the Brisbane city (refer Figure 1). It comprises an existing ammonia production facility situated primarily on Lot 468 Plan SL5433 and extends onto the adjacent land parcel to the west (Lot 472 on SL 8834) and south (Lot 565 on SL9087). The existing wharf that supports the ammonia production facility is located on Lot 481 on SL5761. The facility currently manufactures nitrogen-based fertiliser products, including ammonia, urea, ammonium sulphate and carbon dioxide using natural gas as the principal feedstock.

The Development Area relevant to this application includes primary Lot 468 Plan SL5433, adjacent Lot 565 on SL9087 and the wharf Lot 481 on SL5761. The Development Area is bordered by Brisbane River to the north, Bulimba Creek to the east and southeast, Paringa Road to the south, and adjoins the FFI Site to the west.

The existing topography within the site is relatively flat, with elevations ranging from approximately 2.5m AHD to 3.0 m AHD (based on the high-level Lidar data). The existing site is an existing brownfield industrial facility with predominantly paved areas.

There are a number of existing lawful points of discharge (i.e. outfalls to the Brisbane River/Bulimba Creek) with four (4) existing outfalls to the Brisbane River and six (6) existing outfalls to the Bulimba Creek. Refer to Appendix A for the location of the existing stormwater outfalls.

Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, (c) OpenStreetMap contributors, and the GIS User Community



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Legend

- Roads
- Primary Development Area
- Subject Site
- Land parcel boundaries

Subject site imagery from Nearmap, captured imagery on 10th July 2022

Site boundaries are indicative only.

Date: 11/04/2023 Version:2

A3 scale: 1:8,000
0 50 100 150m

Job No: 520132

Coordinate system: GDA2020 MGA Zone 56

Incitec Pivot Ltd **Project Sprite Pre-FEED**

Figure 1:
Subject Site and Primary Development Area

1.3 Methodology

The Stormwater Management Plan (SWMP) has been developed to outline the management of stormwater runoff from the Project and to identify stormwater quality impacts associated with the proposed refurbishment. A range of stormwater quality treatment measures have been assessed to achieve the water quality objectives (WQO). Water quality modelling has also been undertaken to support this assessment.

The methodology for preparing the SWMP is as follows:

- Obtain and review project information including existing topography, existing stormwater infrastructure, and the proposed site layout plan,
- Review the requirements of the Brisbane City Council's (BCC) City Plan 2014, Queensland Urban Drainage Manual, Water by Design guidelines, and the BCC Infrastructure Planning Scheme This is in line with the pre-lodgement advice from Brisbane City Council received on 28 January 2022.
- Review the requirements of the State Planning Policy (SPP) and the State Development Assessment Provisions (SDAP), in particular SDAP State Code 8 (coastal development and tidal works) and SDAP State Code 21 (hazardous chemical facilities). This is in line with advice from the State Assessment and Referral Agency (SARA) received on 9 March 2022.
- Prepare sketches / drawings outlining the management of stormwater runoff from the development site, including conceptual catchment layout plan and conceptual stormwater drainage layout plan.
- Undertake conceptual stormwater quality model using Music software to identify any impacts associated with the proposed changes to the development site. A range of stormwater quality treatment measures and a treatment strategy will be proposed to target specific stormwater pollutants to achieve the water quality objectives (WQO).
- The primary purpose of the stormwater quality treatment measures is to reduce the potential for runoff from the development to adversely affect the health and quality of nearby waterways at the lawful points of discharge.
- Summarise the findings of the MUSIC model in a conceptual SWMP report. The conceptual SWMP outlines the following:
  - High level summary of the proposed site in terms of the site layout, drainage patterns, and the pollutants likely to be generated on-site
  - Assessment of the likely impact of stormwater discharged from the proposed development on the wider surrounding environment, and outline WQO associated with the project area
  - Identify areas where stormwater treatment measures can be implemented to mitigate the impact of stormwater discharged from the site
  - Outline the management of stormwater runoff from the proposed development and demonstrate the effectiveness of the treatment measures.
- The conceptual SWMP report has been undertaken in accordance with the applicable standard and guidelines, including (BCC) City Plan 2014, Queensland Urban Drainage Manual, Water by Design guidelines, BCC Infrastructure Planning Scheme, and State Planning Policy, and State Development Assessment Provisions (SDAP).

1.4 Assumptions and limitations

This proposal is based on the following assumptions:

- Existing topography for catchment delineation has been obtained from high level Lidar data (1m Digital Elevation Model).
- Proposed facility upgrade is based on the proposed drawings
- For the purpose of this SWMP, only stormwater from the new development areas will be assessed. Other areas within the site which are existing or to remain will not be considered in the stormwater

quality modelling. Similarly, only new stormwater quality treatment devices within the development areas will be assessed. Existing systems outside of the development areas, such as the existing stormwater pond and treatment facility, have been excluded (not within the scope of this SWMP).

- The process water / effluent wastewater from the current site operations is managed by a separate system, and as such the assessment of the future Waste Water Treatment Plant (WWTP) including the existing buffer pond and oxidation pond is excluded from this SWMP and will be covered in a separate report.
- Stormwater quantity assessment (detention / attenuation requirements) is excluded (not within the scope of this SWMP).
- This conceptual SWMP is a high-level concept report based on a conceptual stormwater management plan prepared for the purpose of Development Application approval. Further assessment and design - may be required during the detailed design.
- Detailed design of the drainage structures / bio retention basin is excluded from this SWMP. Only indicative sizing, locations, and configurations will be provided.
- Flood / coastal hazard assessment and modelling are excluded from this SWMP and will be covered in a separate report.

1.5 Codes and guidelines

The conceptual stormwater quality management plan will demonstrate compliance to the following codes and guidelines:

- Brisbane City Council's (BCC) City Plan 2014
- BCC Infrastructure Planning Scheme
- Queensland Urban Drainage Manual
- Water by Design guidelines
- State Planning Policy (SPP) and the State Development Assessment Provisions (SDAP), in particular SDAP State Code 8 (coastal development and tidal works) and SDAP State Code 21 (hazardous chemical facilities)

Table 1 Summary of assessment codes and guidelines

Assessment Codes and Guidelines	Applicable Performance Outcomes (PO)	Performance Outcomes
SDAP State Code 8 (coastal development and tidal works)	Performance Outcomes PO13	▪ PO13 – Development maintains or enhances environmental values of receiving waters, achieves the water quality objectives of Queensland waters, and avoids the release of prescribed water contaminants to tidal waters.
State Planning Policy (SPP) and BCC Infrastructure Planning Scheme	For receiving waters, a development application for: ▪ a material change of use for an urban purpose that involves premises 2500 metres2 or greater in size or will result in an impervious area greater than 25 per cent of the net developable area.	▪ Development facilitates the protection or enhancement of environmental values and the achievement of water quality objectives for Queensland waters. ▪ Land zoned for urban purposes is located in areas that avoid or minimise the disturbance to high risk soils, high ecological value aquatic ecosystems, groundwater dependent ecosystems, natural drainage lines and landform features. ▪ Development is located, designed, constructed and operated to avoid or minimise adverse impacts on environmental values of receiving waters arising from altered stormwater quality and hydrology, waste water (other than contaminated stormwater and sewage), the

Assessment Codes and Guidelines	Applicable Performance Outcomes (PO)	Performance Outcomes
		creation or expansion of non-tidal artificial waterways, the release and mobilisation of nutrients and sediments. ■ At the construction phase, development achieves the applicable stormwater management design objectives. ■ At the post-construction phase, development achieves the applicable stormwater management design objectives on-site, or achieves an alternative locally appropriate solution off-site that achieves an equivalent or improved water quality outcome to the relevant stormwater management design objectives. ■ Development in water resource catchments and water supply buffer areas avoids potential adverse impacts on surface waters and groundwaters to protect drinking water supply environmental values.
State Planning Policy (SPP)	Water Quality Objectives	Reductions in mean annual load from unmitigated development as follows: ■ Total Suspended solids (TSS) – 80% ■ Total Phosphorus (TP) – 60% ■ Total Nitrogen (TN) – 45% Total Gross Pollutant >5mm – 90% Refer to section 3.3.3 for further details.

In addition to the above, this conceptual stormwater quality management plan for the Green Ammonia Project will demonstrate that the planned activities will not contribute significant contaminants to the site stormwater network and will not exceed the trigger water quality limits (independently from the broader site activities) presented in *the Environmental Protection Order (EPO), document reference C-CPLPO-100001617*, issued for the site under Environmental Protection Act 1994 as outlined in the Table below.

Table 2 Stormwater Quality Objectives – Trigger Limits (EPO)

Parameter*	Units	Existing Stormwater Pit (Outfall) 1	Existing Stormwater Pit (Outfall) 4	Existing Stormwater Pit (Outfall) 5	Existing Stormwater Pit (Outfall) 7
Total Suspended solids (TSS)	mg/L	50	37	50	50
Total Phosphorus (TP)	mg/L	2.5	1.6	2.5	0.8
Total Nitrogen (TN)	mg/L	30	30	30	30

* Please note that for the purpose of this SWMP, only relevant EPO parameters/contaminants have been assessed and listed in Table 2. Other contaminants generated from existing areas (beyond the extent of the new development areas) have been excluded in the stormwater quality modelling. As such, metal contaminants potentially generated from the existing fertiliser handling activities have been excluded as these activities are located beyond/outside of the proposed development areas. Similarly, as part of the proposed development, the Urea, CO_2, and granulation plants will be decommissioned or demolished. As such, pollutants from these decommissioned plants which are listed in the EPO are no longer relevant.

Refer to Appendix A for the location of the existing stormwater pits / outfalls.

The stormwater drainage management design parameters are outlined in the Table below.

Table 3 Stormwater drainage management design parameters

Items	Requirement	Details
Internal Drainage System	Designed to capture, contain, and manage stormwater runoffs originating within the site. Design storm – 10% AEP.	Existing and proposed stormwater drainage systems commonly comprise: ■ Drainage pits, sumps, pipes, and outfalls. ■ Open channels / open drains, cut-off drains, diversion drains, road table drains. ■ Bunding, such as levees, berms, and containment bunds.
Stormwater Quality Treatment	Where there is contamination of site pavements or soils, stormwater runoff from these areas can potentially mobilise chemicals/toxins/hydrocarbons. Internal drainage systems should be designed to actively capture sediments and, where exposed to potential contaminants, to capture and remove contaminants, prior to discharge of runoff to the downstream environment. Design storm – up to 4 exceedances per year (EY) design event runoff (0.25 year ARI event)	The proposed stormwater quality treatment, such as the bio retention swale is designed to manage the larger of: ■ First flush rainfall – defined as the volume that accumulates in the time it takes the first 15 mm of rain to arrive from the most remote catchment in the network; or ■ 4 EY design event runoff.
Temporary drainage infrastructure (during construction phase)	Design storm – up to 40% AEP design event runoff.	

2 Proposed site stormwater management strategy

2.1 Proposed development

The proposed layout plant of the proposed redevelopment/proposed upgrade is shown in

Figure 2. For further details refer to the proposed drawings provided as part of the development application.

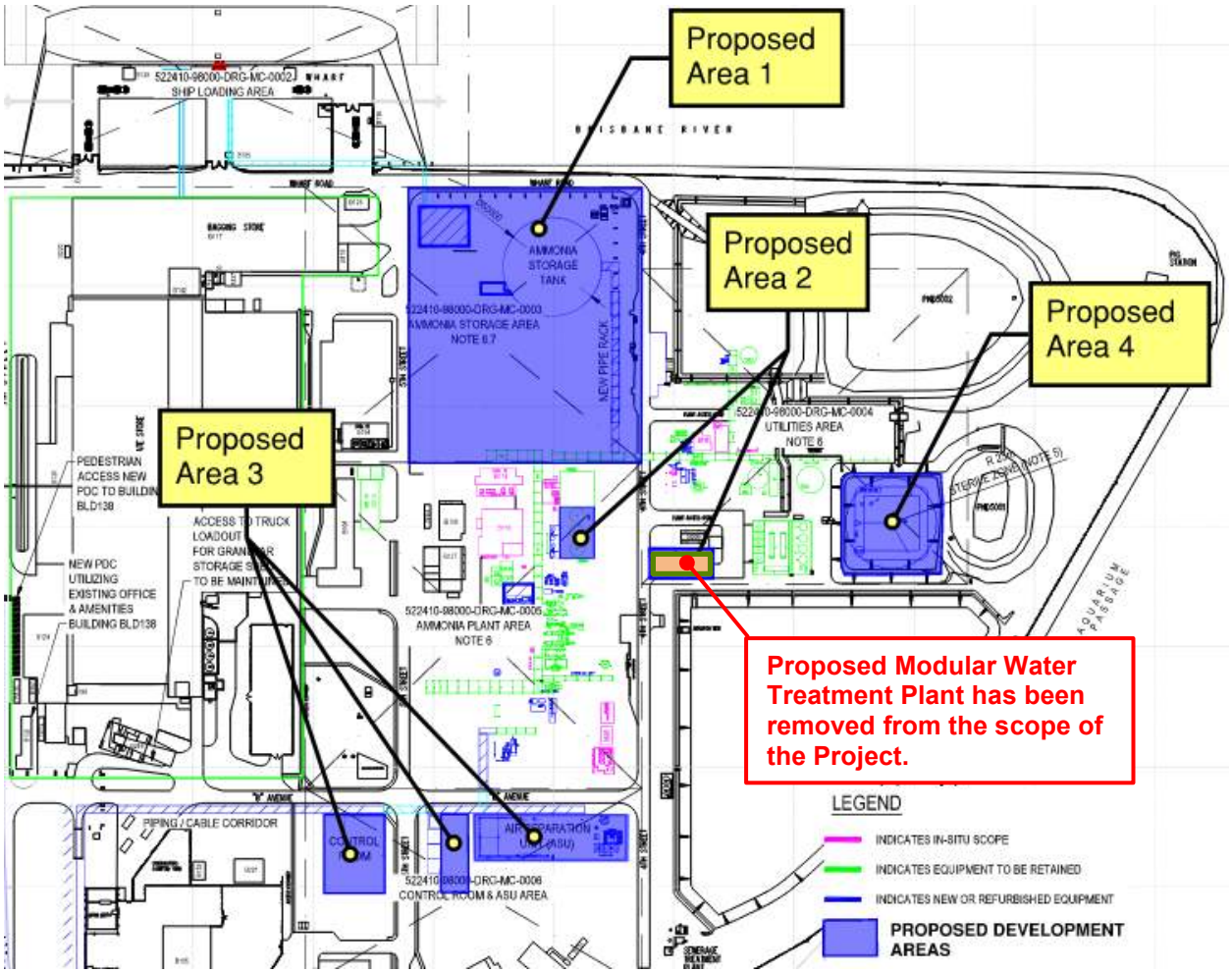


Figure 2 Proposed site layout plan

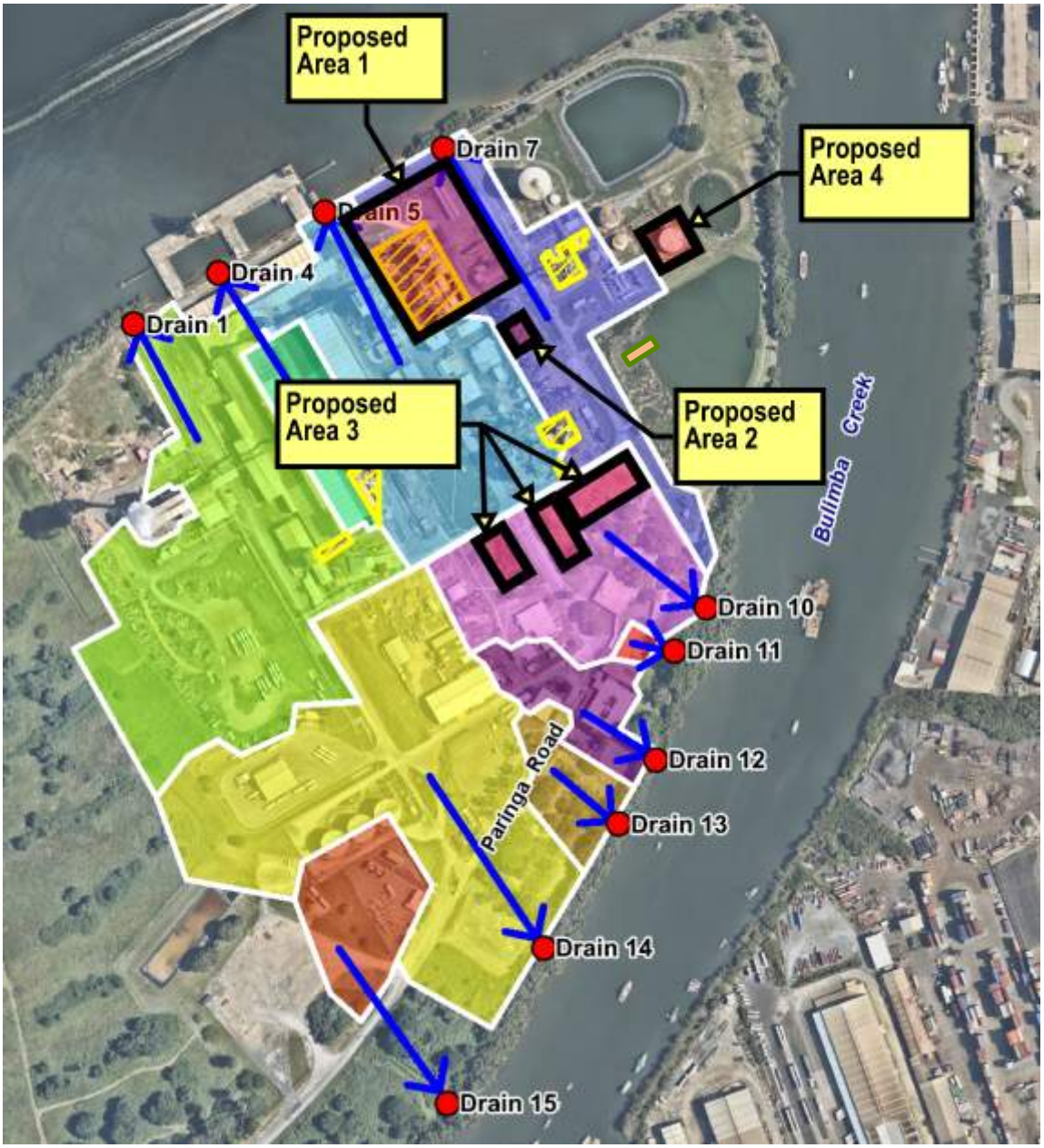


Figure 3 Proposed site layout plan in relation to existing drains

For the purpose of this SWMP, only stormwater from the new development areas will be assessed. Other areas within the site which are existing or to remain will not be considered in the stormwater quality modelling. The first flush of stormwater runoff from the existing areas will be directed as per existing flow paths to the existing stormwater pond (at the north east corner of the site).

At the planned time that this Project will be operational, the first flush stormwater collected in the existing stormwater pond will be treated in the future Waste Water Treatment Plant (not part of this Project) prior to discharge into the Oxidation Pond and released through authorised release point W1. This is described in the separate *'Process Water System Comparison Study, Doc. Ref. 520132-1000-MEM-NN-0002'.*

Stormwater generated in the Project's new development areas will primarily flow to Pits 5 and 7 to the north. New stormwater quality treatment train is proposed to provide treatment for the new development area prior to discharging to Drains 5 and 7 (refer to section 2.2 for the details of new stormwater quality treatment train). From these pits, the treated first flush runoff will be subsequently pumped to the existing stormwater pond if required, with overflow (from the pits) releasing to the Brisbane River. Proposed area 3 discharges to Drain 10 which releases to Bulimba Creek to the South. New stormwater quality treatment train is proposed to provide treatment for the proposed area 3 prior to discharging to Drain 10

(refer to section 2.2 for the details of new stormwater quality treatment train). The areas and activities are explained in the following sections.

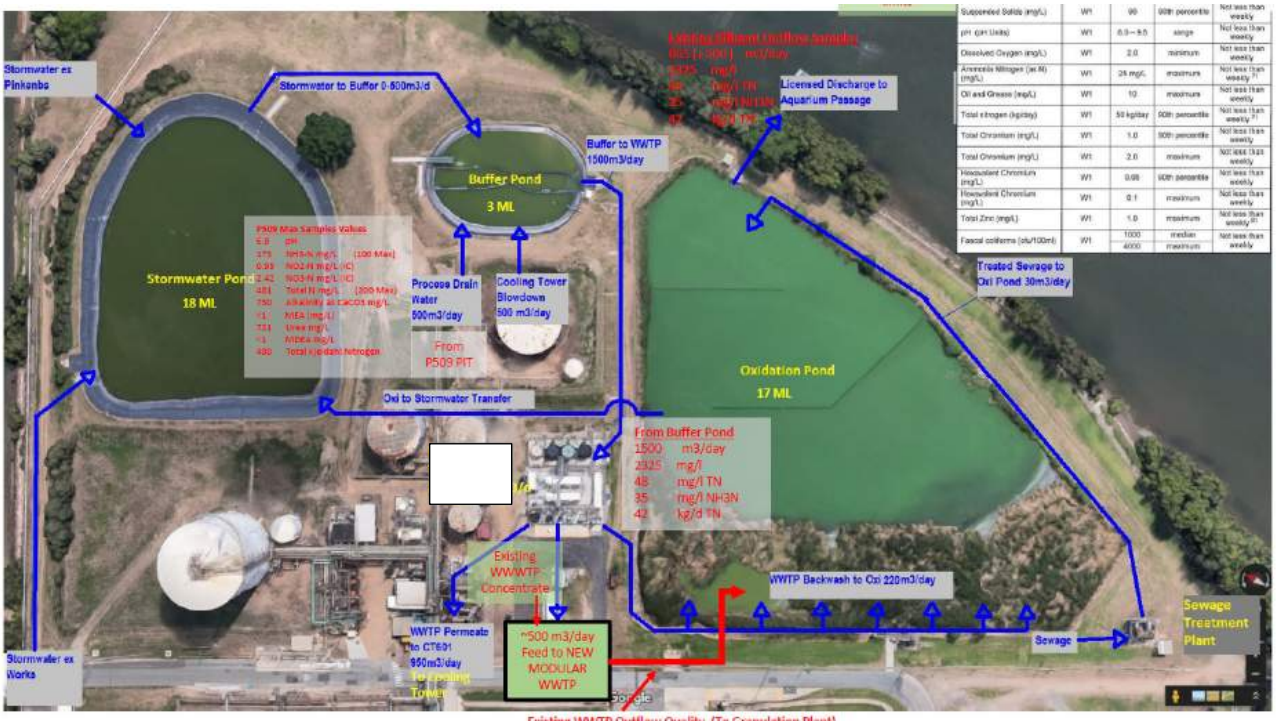


Figure 4 Existing stormwater pond, buffer pond, and oxidation pond (assessment of these existing systems is excluded from this SWMP)

The new development/proposed development areas can be divided into four (4) main areas as outlined below and shown on

Figure 2:

Proposed Area 1 – Ammonia Storage Area

Proposed area 1 includes the new ammonia storage tank and demolition of existing equipment, plants, storage tanks, bunds, minor internal access roads, and hardstand areas within the existing storage area. Equipment related to the ammonia tank will be installed within Area 1, such as an electrical substation, ammonia refrigeration system, transfer pumps and ammonia tank flare. The final location of equipment within this area will be confirmed during detail design.

Proposed Area 2 – Upgrade to equipment within the existing Ammonia Synthesis Process Area

Proposed area 2 includes the new turbine generator and existing cooling system replacement. This area also includes demolition of various existing equipment and plants to make space for new equipment.

Proposed Area 3 – Control room, switch room / drive room, Air Separation Unit (ASU)

Proposed area 3 includes the new Control room, switch room / drive room, Air Separation Unit (ASU).

Proposed Area 4 – New 15m high flare

Proposed area 4 includes the demolition of existing tank and installation of new 15m high flare.

2.2 Proposed stormwater management plan

The proposed drainage management strategy for the proposed development is shown in Appendix C and is described in this section.

Proposed Stormwater Management – Area 1 – Ammonia Storage Area

Figures 5,6 below shows the proposed stormwater management plan within Area 1. As can be seen on Figures 5,6 the proposed stormwater runoff within Area 1 will be directed to existing sumps (existing stormwater sumps A and B).

New bio retention swales (BR 1A, BR 1B, BR 1C, and BR 1D) and 2xJellyfish JF2400-7-2 (Option 1*) are proposed to target and remove the stormwater pollutants (first flush rainfall) within the new containment bund (Catchment 1), prior to discharging to the existing stormwater sumps. The existing stormwater sumps A and B will subsequently discharge via the existing stormwater pipe network to the existing outfalls 5 (which incorporates the catchment of existing pit 6) and existing outfall 7 to the Brisbane River (refer to Appendix A for the location of the existing outfalls).

*Option 2 without the 2xJellyfish JF2400-7-2 has also been considered. Refer to further discussion in section 3.3.7, section 5, and Appendix E.

The bio retention swales are located approximately 20 metres away from the ammonia storage tank to minimise hazards (the minimum buffer distance from any vegetation to the ammonia storage tank is 10 metres).

Perimeter table drains and bunds have been proposed around the ammonia storage area to direct first flush rainfall to the proposed bio retention swales. The perimeter table drain is to be concrete lined to minimise the amount of vegetation in the proximity of ammonia storage tank.

A tertiary containment bund is proposed around Area 1. The ammonia storage tank will be constructed with full integral secondary containment (i.e. an inner cup within an outer tank), and the purpose of the tertiary bund is only for process safety control to reduce societal risk for extremely low likelihood events with high consequence. The proposed tertiary containment bund will contain 100% of the rated capacity of the ammonia storage tank. The bund will be concrete wall, where stormwater runoff within the catchment will be contained and manually released into the existing stormwater system.

New clean water diversion table drain has been proposed along the southern side of the proposed bunds, which will intercept clean stormwater runoffs from undisturbed area of the site.

The new ammonia refrigeration system (equipment) will be installed on the existing hardstand and as such this area will drain as per existing (stormwater runoff will be captured by existing stormwater pit in 5th Street) and no additional stormwater quality treatment is required (location of this new ammonia refrigeration system is to be confirmed during the detailed design).

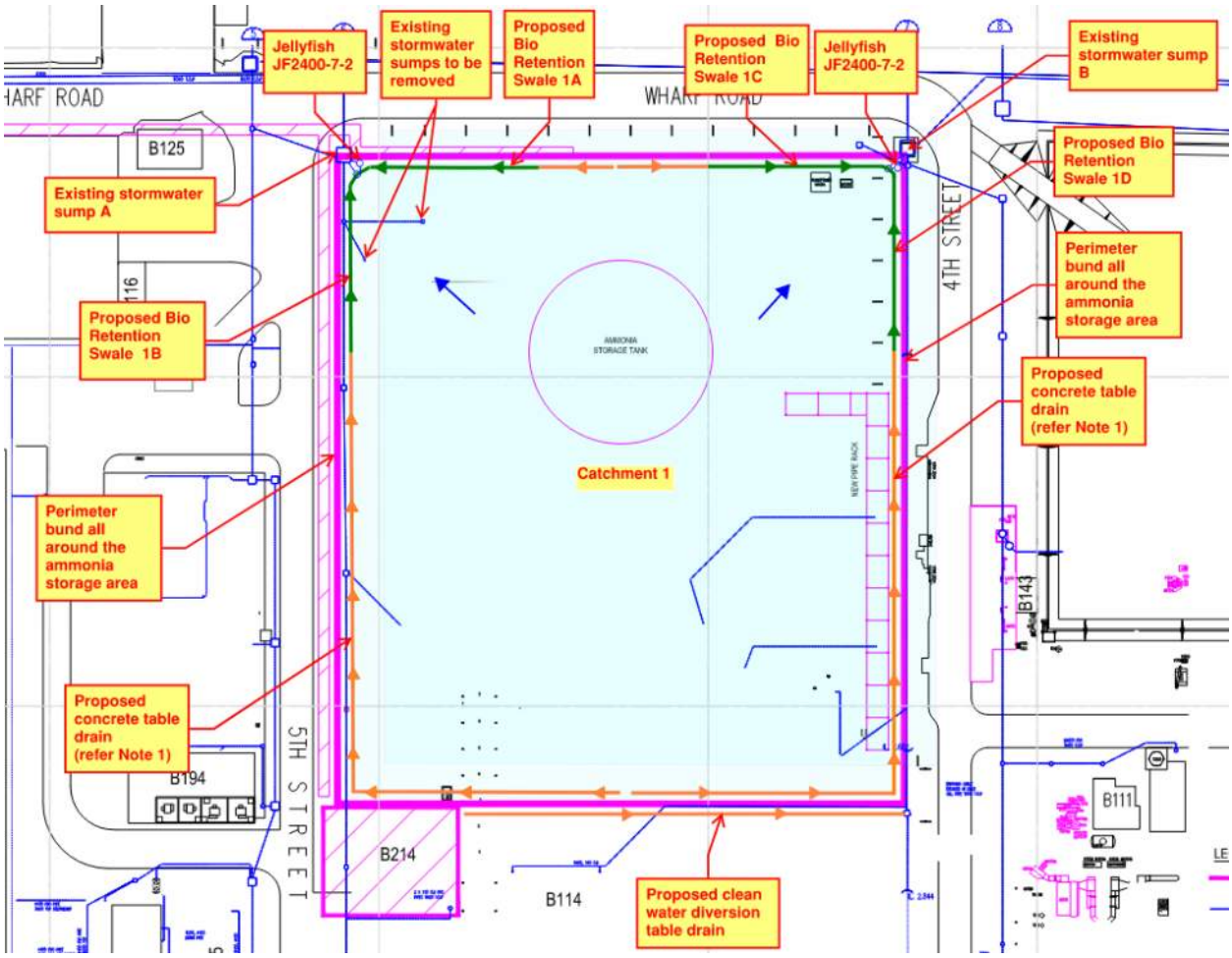


Figure 5 Proposed stormwater management for Area 1 – Option 1 with Jellyfish (refer to Appendix C for a larger version of this plan)

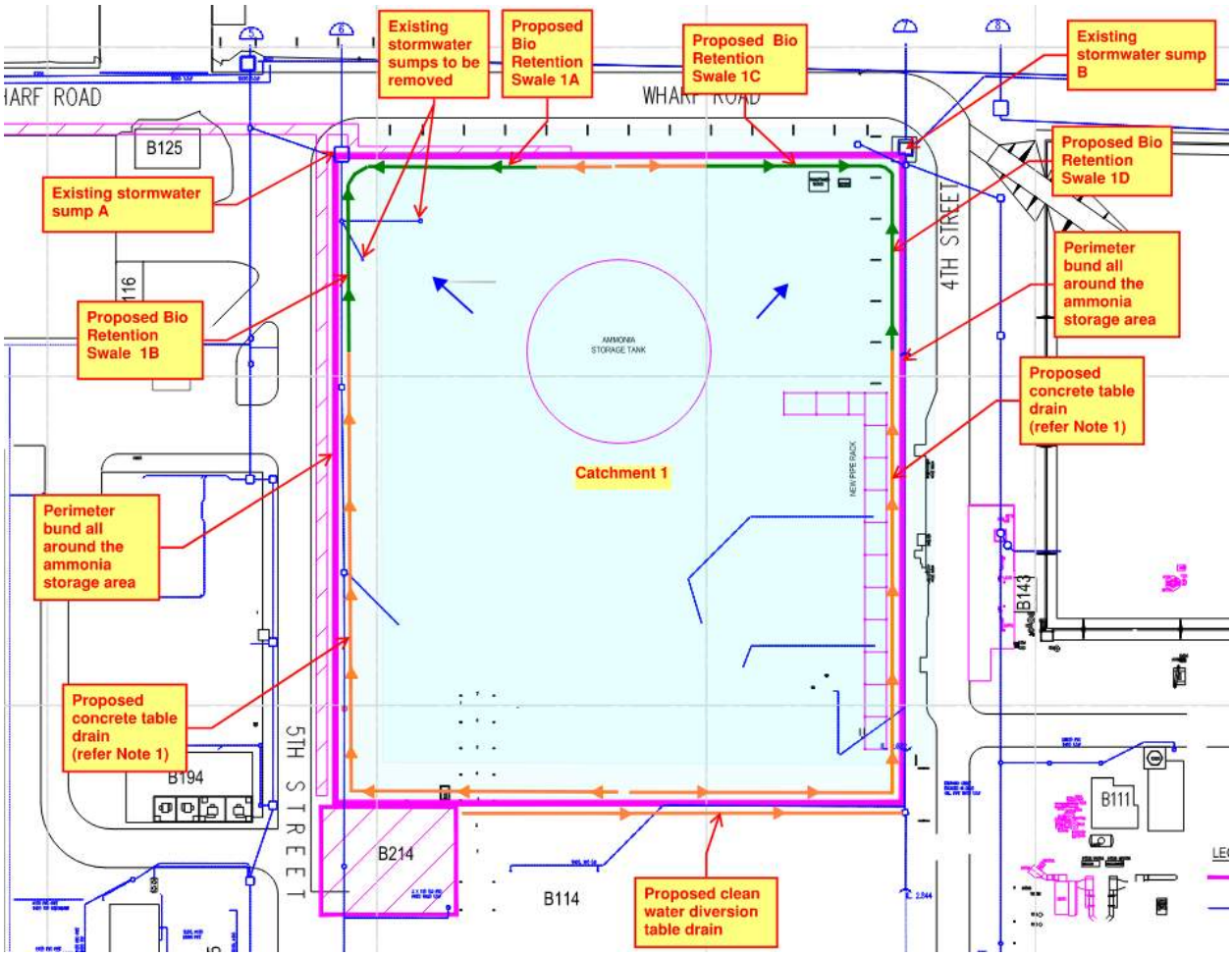


Figure 6 Proposed stormwater management for Area 1 – Option 2 without Jellyfish (refer to Appendix C for a larger version of this plan)

Proposed Stormwater Management – Area 2 – Upgrade to equipment within the existing Ammonia Synthesis Process Area

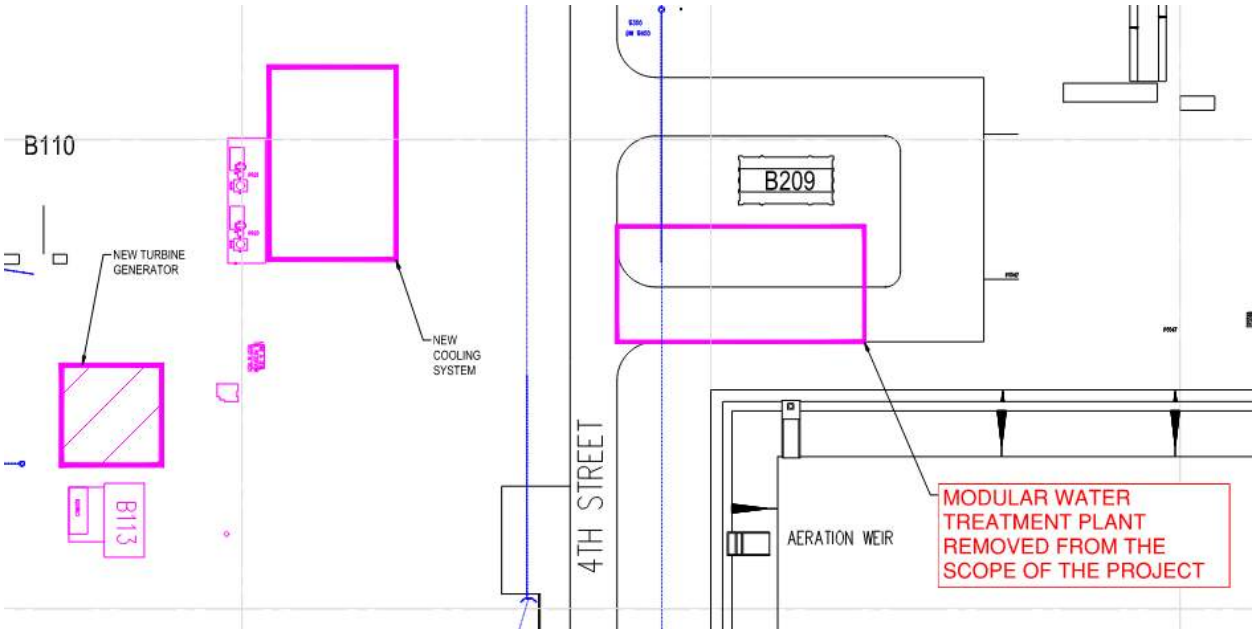


Figure 7 Proposed stormwater management for Area 2 (has been removed from the Project scope)

As can be seen from Figure 7 above, the new turbine generator and the new cooling system (equipment) will be installed on the existing hardstand and as such the drainage of these areas will be as per existing and no additional stormwater quality treatment is required.

The proposed new modular water treatment plant (Catchment 2) has been removed from the scope of the Project as it is no longer required because its originally intended function is now being provided by the future Waste Water Treatment Plant (not part of this Project). As such Catchment 2 and associated stormwater management plan/quality treatment have been removed from this SWMP.

Proposed Area 3 – Control room, switch room / drive room, Air Separation Unit (ASU)

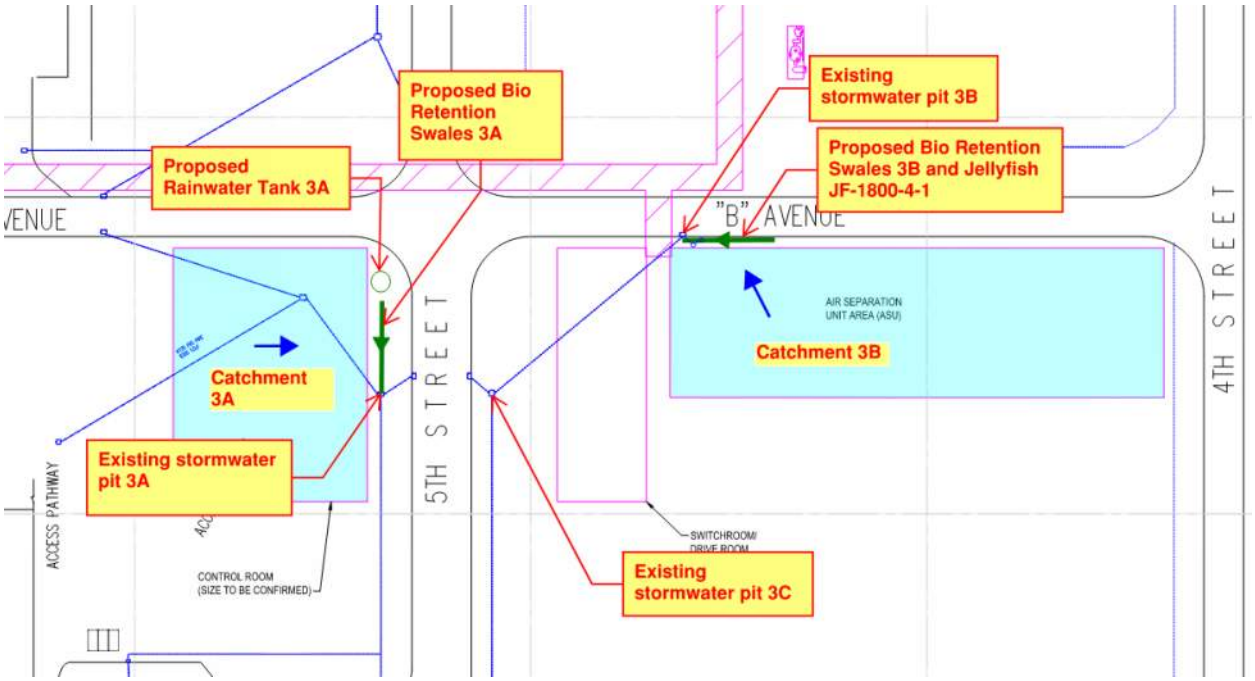


Figure 8 Proposed stormwater management for Area 3 (refer to Appendix C for a larger version of this plan)

As can be seen from Figure 8 above, the proposed stormwater runoff from the new control room will be directed to a proposed rainwater tank (RW3A) and bio retention swales (BR3A) respectively to target and remove the stormwater pollutants from the Catchment 3A area (first flush rainfall), prior to discharging to the existing stormwater pit 3A. The existing stormwater pit will subsequently discharge via the existing stormwater pipe network to the existing outfall (outfall 10) to the Bulimba Creek (refer to Appendix A for the location of the existing outfalls).

Similarly, the proposed stormwater runoff from the new Air Separation Unit (ASU) will be directed to a proposed bio retention swales (BR3B) and Jellyfish JF-1800-4-1 (Option 1*) to target and remove the stormwater pollutants from the Catchment 3B area (first flush rainfall), prior to discharging to the existing stormwater pit 3B. The existing stormwater pit will subsequently discharge via the existing stormwater pipe network to the existing outfall (outfall 10) to the Bulimba Creek.

*Option 2 without the Jellyfish JF-1800-4-1 has also been considered. Refer to further discussion in section 3.3.7, section 5, and Appendix E.

The new switch room will be installed on the existing hardstand and as such the drainage will be as per existing and no additional stormwater quality treatment is required.

Proposed Area 4 – New 15m high flare

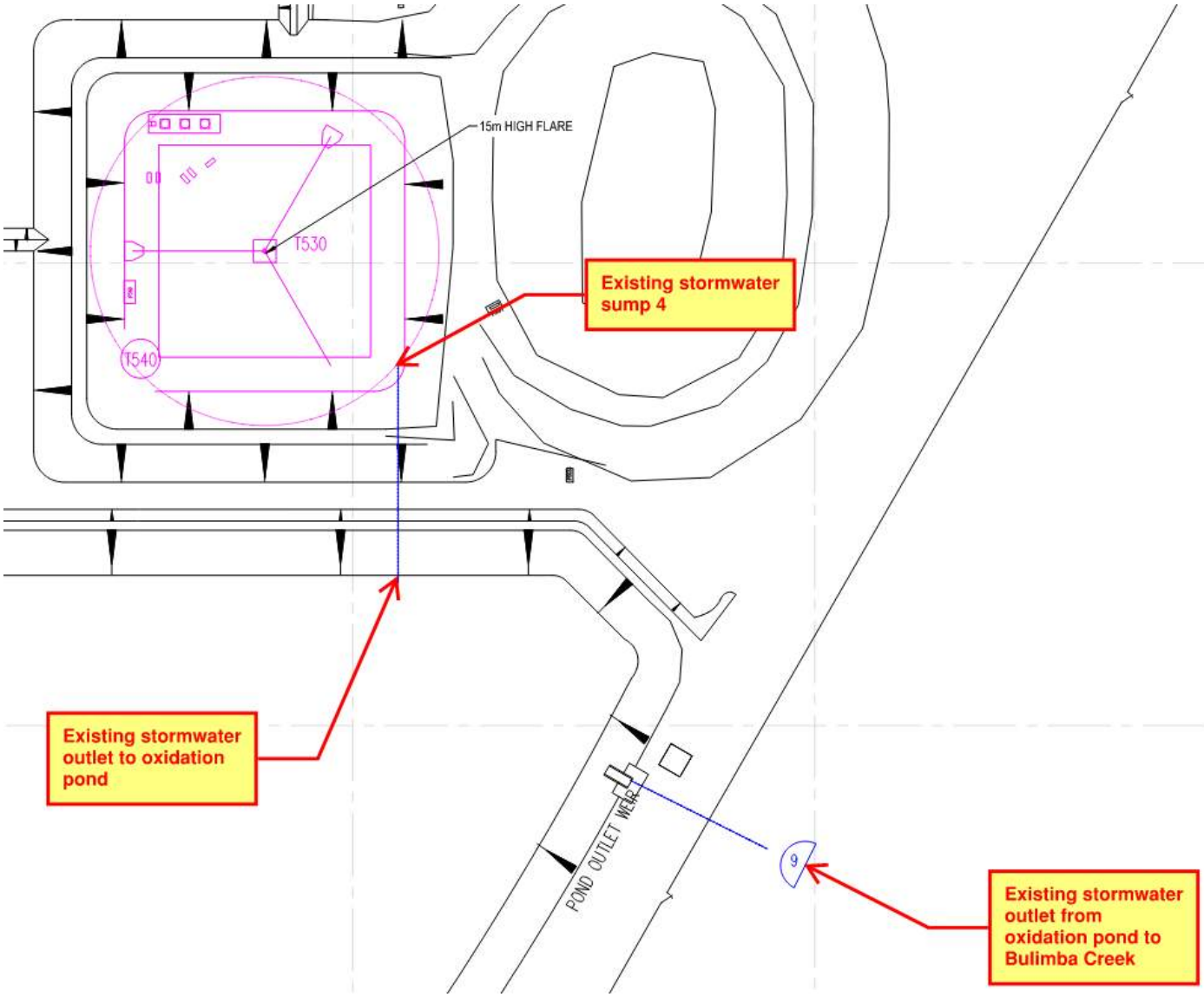


Figure 9 Proposed stormwater management for Area 4

The new flare will be installed on the existing hardstand and as such the drainage will be as per existing and no additional stormwater quality treatment is required.

3 Stormwater quality and compliance

3.1 General

Increases in stormwater runoff volumes have resulted from increasing industrialisation and the accompanying escalation of impervious surfaces, which is a major contributor to the pollution of rivers and bays.

The appropriate management of stormwater runoff can reduce the impact that a development has on nearby waterways. The primary purpose of this stormwater quality assessment is to reduce the potential for runoff from the development to adversely affect the health and quality of nearby waterways (i.e. Brisbane River and Bulimba Creek).

3.2 Construction phase

In accordance with the State Planning Policy, a temporary erosion and sediment control plan (ESCP) will be required to be prepared prior to the construction works. The plan is to be compliant with best practice measures and techniques as specified in best practice guidelines, such as the Best Practice Erosion and Sediment Control (IECA, 2008).

The potential impacts on water quality during the construction phase of this development are likely to be:

- Elevated suspended solids and turbidity in stormwater runoff
- Hydrocarbon pollutants, primarily from the vehicular (construction) traffic.

Potential impacts associated with contamination from the above pollutants as well as spills and leaks shall be managed during the construction phase in accordance with the recommendations and measures set out in the ESCP. The ESCP is to be prepared prior to commencement of construction phase.

The following objectives are to be met in the prepared ESCP:

- Stormwater runoff pH to be in the 6.5 – 8.5 range
- Total Suspended Solids (TSS) does not exceed 50 mg/L
- Hydrocarbons – no visible sheen or odour
- Litter – for storm events <Q3month 100% of anthropogenic gross pollutants/litter in excess of 5 mm.

The following measures shall be applied to ensure that stormwater quality objectives are achieved during the construction phase:

- Reduce the potential for erosion and subsequent sedimentation, such as by construction staging to minimise the area of exposed soil at any one time, effectively cover and stabilise exposed soils prior to predicted rainfall, surface stabilisation prior to removal of sediment controls.
- Ensure adequate temporary erosion control measures are implemented to manage runoff from disturbed areas of the site; and ensure that materials that may contain pollutants or sediment are not released directly to any nearby waters.
- The integration of temporary water quality control measures such as temporary sediment basin and temporary clean water diversion drains.

3.3 Post construction and operational phase

3.3.1 Key pollutants

The quality of stormwater runoff is affected by the presence of a number of potential contaminants including nutrients, metals, industrial/urban-organic chemicals, sediment, and chemicals from industrial and commercial sources.

Depending on the geochemistry of the runoff and the receiving water, nitrogen may occur as a nutrient in water as nitrite or nitrate anions, the ammonium cation, and (or) a number of natural organic compounds. Phosphorus may occur as phosphoric acid, anionic forms including orthophosphate, or as a component of organic compounds. Phosphorus is generally believed to be the limiting nutrient in many aquatic systems because natural geochemical processes are able to more readily control naturally occurring phosphorus compounds. Increased loads of these nutrients generated from stormwater runoff and their resultant effects on aquatic biota can be substantial.

Sediment comprises inorganic and organic material and can be transported by, suspended in, or deposited by stormwater. Many contaminants, including some metal ions, organic chemicals, and nutrients, are transported by sediment.

Organic compounds in hardstand runoff that are derived from synthetic chemicals are recognised as an environmental concern in many urban-runoff studies. These compounds are generally classified as semivolatile organic compounds (SVOCs) and volatile organic compounds (VOCs).

Ammonia Storage

Liquids, in particular hazardous substances, have the potential to pollute the environment and harm human health. The storage and handling of any liquid can lead to spills or leaks and the subsequent pollution of water and land. Some of the negative effects of this kind of pollution include (but are not limited to):

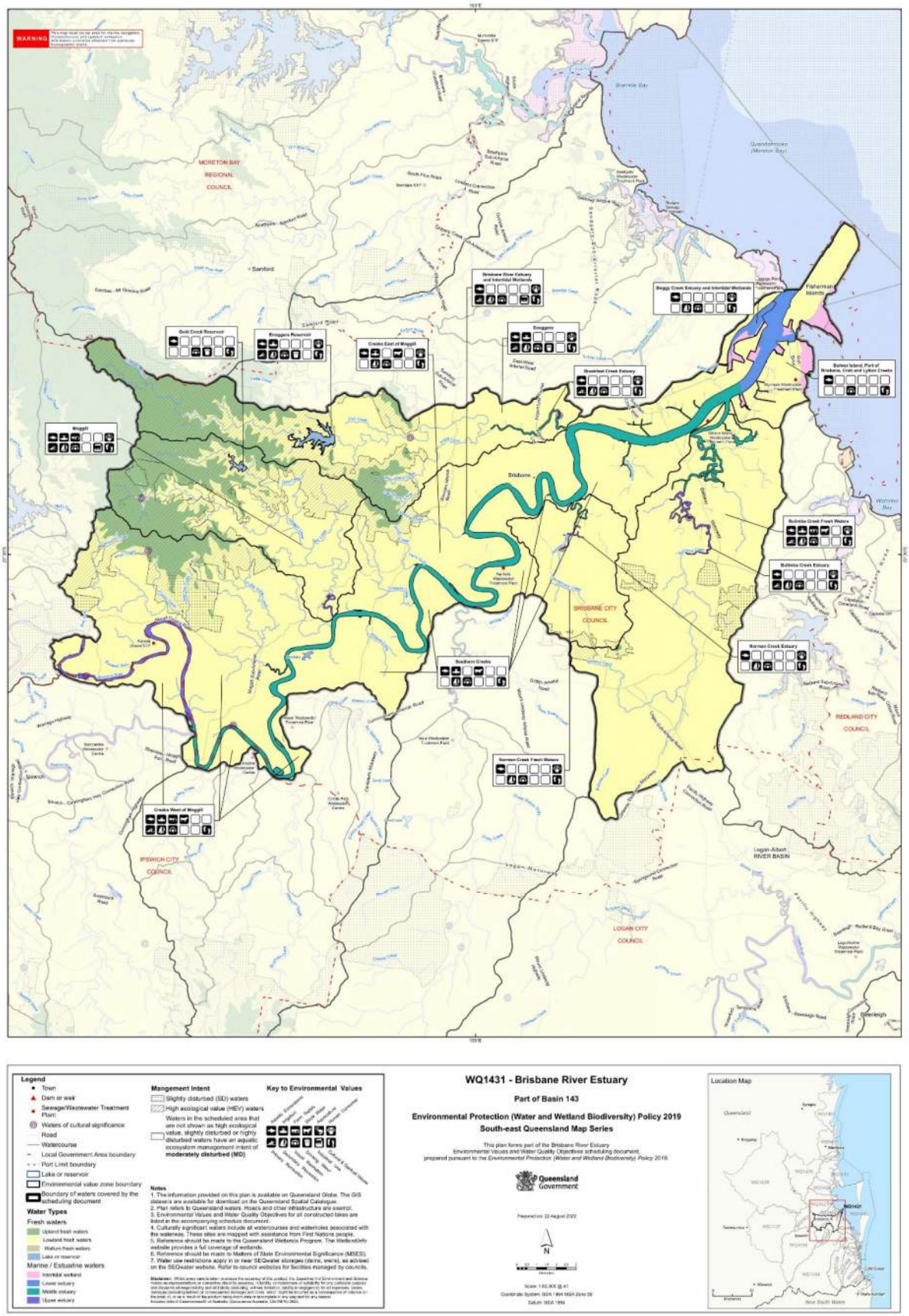
- Damage to ecosystems and a loss of plant and animal life
- Impacts to amenity as a result of odour or toxic vapours in the atmosphere
- The addition of some chemicals (nutrients) to waterbodies can lead to eutrophication (excessive growth of aquatic plant species and algae) which reduces the amount of oxygen that is dissolved in water negatively impacting other organisms (fish, birds, humans).

3.3.2 Environmental Values of Receiving Waters

The IPL Gibson Island site is located within the lower reaches of the Brisbane River. This section of the river is a tidal system. Runoff from the Brisbane River catchment flows into Moreton Bay and eventually into the Coral Sea.

Environmental Values (Evs) for the lower Brisbane River have been identified in Schedule 1 of the Environmental Protection (Water and Wetland Biodiversity) Policy 2019 (EPP Water) and in Brisbane River Estuary Environmental Values and Water Quality Objectives (Part of Basin 143).

The Brisbane River Estuary Environmental Values and Water Quality Objectives (Part of Basin 143) document contains Evs and WQOs for surface fresh and estuarine waters in the Brisbane River Estuary Basin. The accompanying plan (WQ1431) identifies the Evs and management intent for the different water types in the Brisbane River Estuary Basin (such as fresh and estuarine waters, etc.). Refer to the image below and Appendix G for WQ1431 plan.



Evs are the qualities that make waters suitable for supporting aquatic ecosystems and human water uses and need to be protected. The Evs which have been identified for the Brisbane River Estuary are as follows:

- Aquatic ecosystems
- Human consumer

- Primary recreation
- Secondary recreation
- Visual recreation
- Industrial use
- Cultural and spiritual values.

Environmental Values	Aquatic ecosystem	Human Consumer	Primary Recreation	Secondary Recreation	Visual Recreation	Industrial Use	Cultural and Spiritual Values
Brisbane River Estuary and Intertidal Wetlands	✓	✓	✓	✓	✓	✓	✓

Management goals for the above Evs are as outlined below:

Aquatic ecosystem

Protection or enhancement of aquatic ecosystem values.

Human consumer

The management goal is that the water quality is suitable for producing or taking aquatic foods that are safe and suitable for human consumption.

Recreational water quality

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.

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 in this document for industrial use.

Cultural and Spiritual Values and Uses of water

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.

The identified EVs provide guidance on the water quality objectives (WQOs) applicable to a certain area. Where there is more than one EV, the most stringent WQO for each water quality indicator applies, which will then protects all identified Evs. WQOs are stated in the following section.

3.3.3 Water Quality Objectives (WQOs)

As per the Brisbane River Estuary Plan (WQ1431), the IPL site is located in an area of the Brisbane River classified as being ‘middle estuary’ type waters. These waters can be described as waters extending the majority of the length of estuaries with a moderate amount of water movement from either freshwater inflow or tidal exchange. The water type also dictates which WQOs, as specified in the guidelines, are applicable.

Water quality objectives (WQOs) are long-term goals for water quality management. They are measures, levels or narrative statements of particular indicators of water quality (such as salinity or turbidity) that protect Evs. They define what the water quality should be to protect the Evs, after consideration of the socio-economic assessment of protecting the water quality.

The Brisbane River – Middle Estuary receiving environment is classified as a moderately disturbed ecosystem, or a Condition 2 ecosystem, as defined in Australian and New Zealand Guidelines for Fresh and Marine Water Quality (ANZG, 2018). Condition 2 ecosystems are those in which aquatic biological diversity may have been adversely affected to a relatively small but measurable degree by human activity. The biological communities remain in a healthy condition and ecosystem integrity is largely retained.

In Queensland, the Environmental Protection (Water and Wetland Biodiversity) Policy 2019 (EPP Water) is the principal legislative basis for water quality management in Queensland. Evs and WQOs are specified under Schedule 1 of the EPP Water, and the Brisbane River Estuary Environmental Values and Water Quality Objectives (Part of Basin 143).

WQOs for the Brisbane River – Middle Estuary are presented for a number of select parameters below.

Water Quality Objectives for Brisbane River Mid Estuary		
Physio-chemical Parameters (median values)		
Parameter	Units	Value
Physio-chemical Parameters (median values)		
Turbidity	NTU	<8
TSS	mg/L	<20
Chlorophyll-a	µg/L	<4
Total Nitrogen	mg/L	<0.3
Oxidised N	mg/L	<0.01
Ammonia N (median)	mg/L	<0.01
Ammonia N (95 th %ile)	mg/L	0.91
Organic N	mg/L	<0.28
Total Phosphorus	mg/L	<0.025
Filterable Reactive Phosphorus (FRP)	mg/L	<0.006
Dissolved Oxygen	%	85-105%
pH	-	7.0-8.4
Secchi depth	m	>1.0

In relation to the pollutant load reduction requirements, the State Planning Policy (SPP) outlines the pollutant load reduction requirements which can be found in the Table below and have been adopted for this stormwater treatment assessment.

Table 4 Pollutant load based percentage reduction requirements (SPP)

Stormwater Pollutant	**Water Quality Objectives (WQOs)**
Total Suspended Solids (TSS)	▪ 80%
Total Phosphorous (TP)	▪ 60%
Total Nitrogen (TN)	▪ 45%
Gross Pollutants (GP)	▪ 90%

The design of stormwater quality improvement devices for the proposed redevelopment will be assessed against the pollutant reduction WQO in Table 4 above.

In addition to the above, the stormwater treatment has been assessed against the EPO, which specifies the trigger limits as outlined in the Table below.

Table 5 Stormwater Quality Objectives – Trigger Limits (EPO)

Parameter	Units	Existing Stormwater Pit (Outfall) 1	Existing Stormwater Pit (Outfall) 4	Existing Stormwater Pit (Outfall) 5	Existing Stormwater Pit (Outfall) 7
Total Suspended solids (TSS)	mg/L	50	37	50	50
Total Phosphorus (TP)	mg/L	2.5	1.6	2.5	0.8
Total Nitrogen (TN)	mg/L	30	30	30	30

Refer to Appendix A for the location of the existing stormwater pits / outfalls.

3.3.4 Proposed stormwater quality treatment devices

Traditional stormwater management would typically focus on kerb and channel or piped drainage strategies to manage site stormwater. This approach provides negligible stormwater pollutant removal, therefore alternative drainage options (Water Sensitive Urban Design treatment strategies) have been adopted for this development.

The stormwater quality treatment options for this site have been prepared with the following focus:

- Installing first flush treatment devices. This includes primary treatments (where applicable) followed by secondary treatments targeting finer pollutants if necessary (fine sediment and nutrients)
- Providing treatment of runoff to remove sediment and gross pollutants before they enter downstream devices
- Incorporating grass and vegetation to stabilise surfaces and minimise erosion and sediment
- Incorporating treatment measures into the landscaping of the site to enhance visual amenity
- Incorporating clean water diversion drainage to minimise the amount of contaminated runoff
- Installing spill containment bund around liquid storage area to ensure that any spills or leaks that do occur on site cannot leave the site or escape to the environment (air, land, water, including groundwater)
- Providing another layer of spills / leak containment through installing a double walled storage tank, if required.

Based on the above, the following stormwater quality treatment devices and control measures have been adopted for the subject site:

- Spill containment system (double walled storage tank and containment bund) The ammonia storage tank will be a double walled tank. In an event of catastrophic incident, the proposed containment bund will provide the tertiary spill containment system.
- Rainwater tank. Rainwater tank enables reuse of stormwater runoff for a number of activities such as irrigation, washing of the hardstand area, and cleaning at the proposed buildings and amenities.
- Bio retention swales. Bio retention swales treat stormwater by filtering runoff through densely planted vegetation and percolating the runoff through a filter media, such as loamy sand. As water is percolated through the soil, pollutants are captured by fine filtration, absorption, and biological uptake.
- Jellyfish stormwater quality treatment device (Option 1*). The Jellyfish Filter is a stormwater quality treatment technology featuring high surface area and high flow rate membrane filtration at low driving head. By incorporating pre-treatment with light-weight membrane filtration, the Jellyfish Filter removes

floatables, trash, oil, debris, TSS and a high percentage of particulate-bound pollutants, including phosphorus and nitrogen, metals and hydrocarbons.

*Option 2 without the Jellyfish stormwater quality treatment device has also been considered. Refer to further discussion in section 3.3.7, section 5, and Appendix E.

3.3.5 MUSIC modelling

Modelling assessment has been undertaken using the Model for Urban Stormwater Improvement Conceptualisation (MUSIC) software.

The MUSIC modelling package developed by eWater estimates the impacts of development and evaluates the relative performance of various treatment options.

The model can be used to generate both pollutant concentrations and long-term pollutant loads and is recognised as the most appropriate modelling software for the planning of stormwater treatment measures. The model can generate pollutant loads and event mean concentrations for TSS, TP, and TN.

MUSIC model data

Meteorological data for Brisbane and a 6 minute time step has been set up in the model as per the recommendations in the MUSIC Modelling Guidelines.

Table 6 Meteorological and rainfall runoff parameters

Input	Data used in modelling
Rainfall station	■ Brisbane
Time step	■ 6 minute time
Rainfall runoff parameters	■ Commercial and Industrial land use
Pollutant export parameters	■ Industrial

Table 7 below details the key catchment parameters.

Table 7 Catchment parameters

Catchment		Existing Outfall / Pit	Catchment area (ha)	Impervious percentage (%)	Type
Catchment 1	■ Mixed	Existing Outfall/Pit 5, 6, and 7	■ 1.25 (0.625)	■ 97	■ Industrial (Mixed)
Catchment 2	Catchment 2 has been removed from the scope of the Project				
Catchment 3A	■ Mixed	Existing Outfall/Pit 10	■ 0.1165	■ 97	■ Industrial (Mixed)
Catchment 3B	■ Mixed	Existing Outfall/Pit 10	■ 0.175	■ 97	■ Industrial (Mixed)

Please note that for Catchment 1 only 50% of the catchment area (0.625 ha) is modelled in Music as the ammonia storage tank is built on existing hardstand.

For a full summary of fraction of impervious for each catchment (pre development and post development), refer to Appendix F.

3.3.6 Sizing and configurations of the proposed stormwater quality treatment devices

Key parameters for the proposed stormwater treatment systems are outlined in this section. Treatment systems proposed include spill containment (containment bund), rainwater tank, bio retention swales, and Jellyfish treatment device (Option 1*). The proposed locations of these are

shown in Appendix C. Locations and sizes are indicative only and to be further confirmed during detailed design.

*Option 2 without the Jellyfish stormwater quality treatment device has also been considered. Refer to further discussion in section 3.3.7, section 5, and Appendix E.

Rainwater tank

Rainwater tank is proposed to capture runoff from the roof of the proposed facility (i.e. new control room), with water to be reused within the site. Overflow from the tanks will discharge to the bio retention swales.

Water captured within the rainwater tank is to be used for washing of hardstand areas.

Table 8 Rainwater tank adopted design parameters

Items	Rainwater Tank 1
Volume below overflow pipe (kL)	5kL
Depth above overflow (m)	0.2m
Surface area (m^2). For lumped tanks the surface area must be adjusted	5
Overflow pipe diameter (mm). For lumped tanks this must be equivalent to the diameter of the overflow pipe of a single tank multiplied by the square root of the number of tanks	150mm
Stored water used for irrigation and other purposes (Y/N)	Y
Indoor connections eg toilet, laundry etc	N
Indoor demand (kL/day)	0
Outdoor demand (kL/day)	2.4kL/day
Daily demand (kL/day)	2.4kL/day
Confirmation that K and C* remain default? (Y/N)	Y

Bio Retention swales

Table 9 Bio Retention Swales 1 and 2 adopted design parameters

Items	Bio Retention Swales BR1 (BR1A, BR1B, BR1C, and BR1D)	Bio Retention Swale BR2
Items	Bio Retention Swales BR1	Bio Retention Swale BR2
Extended detention depth (m)	0.3m	The proposed new modular water treatment plant (Catchment 2) has been removed from the scope of the Project and as such Catchment 2 and associated stormwater management plan/quality treatment have been removed from this SWMP.
Surface area (m^2)	240	
Filter area (m^2)	40	
Filter depth (m)	0.6m	
Base width	0.5m	
Top width	2.9m	
Side slopes	1 on 4	
Vegetation properties	Vegetated with effective nutrient removal plants	

Items	Bio Retention Swales BR1 (BR1A, BR1B, BR1C, and BR1D)	Bio Retention Swale BR2
■ Overflow Weir width	■ 0.5m	
■ Underdrain present	■ Y	

Table 10 Bio Retention Swales 3A and 3B adopted design parameters

Items	Bio Retention Swale BR3A	Bio Retention Swale BR3B
Items	Bio Retention Swale BR3A	Bio Retention Swale BR3B
■ Extended detention depth (m)	■ 0.3m	■ 0.3m
■ Surface area (m^2)	■ 60	■ 45
■ Filter area (m^2)	■ 22.5	■ 7.5
■ Filter depth (m)	■ 0.6m	■ 0.6m
■ Base width	■ 1.5m	■ 0.5m
■ Top width	■ 3.9m	■ 2.9m
■ Side slopes	■ 1 on 4	■ 1 on 4
■ Vegetation properties	■ Vegetated with effective nutrient removal plants	■ Vegetated with effective nutrient removal plants
■ Overflow Weir width	■ 0.5m	■ 0.5m
■ Underdrain present	■ Y	■ Y

Jellyfish stormwater treatment device

For Option 1*, the adopted Jellyfish stormwater treatment devices are 2xJF2400-7-2 (Catchment 1) and JF-1800-4-1 (Catchment 3B) with a nominal structure diameter of 2.4m and 1.8m respectively.

*Option 2 without the Jellyfish stormwater quality treatment device has also been considered. Refer to further discussion in section 3.3.7, section 5, and Appendix E.

Please note that the locations, dimensions, sizing, and details of the proposed bio retention swales above are indicative only and to be further confirmed during detailed design.

A screenshot of the MUSIC model layout can be found in Figures below.

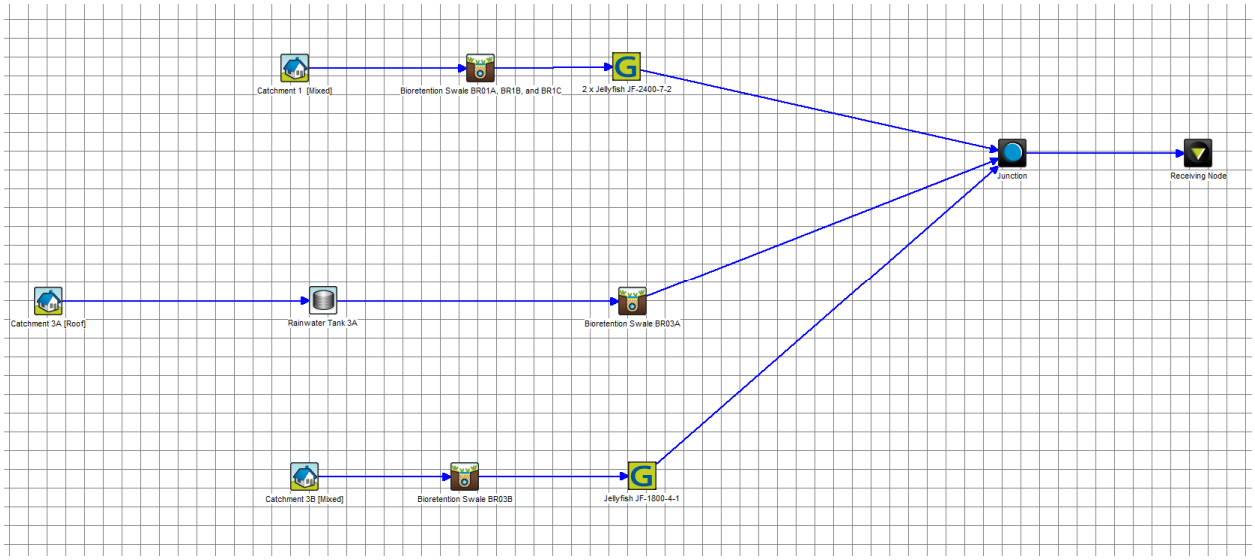


Figure 10 Music model layout screenshot (Option 1, with Jellyfish stormwater quality treatment device)

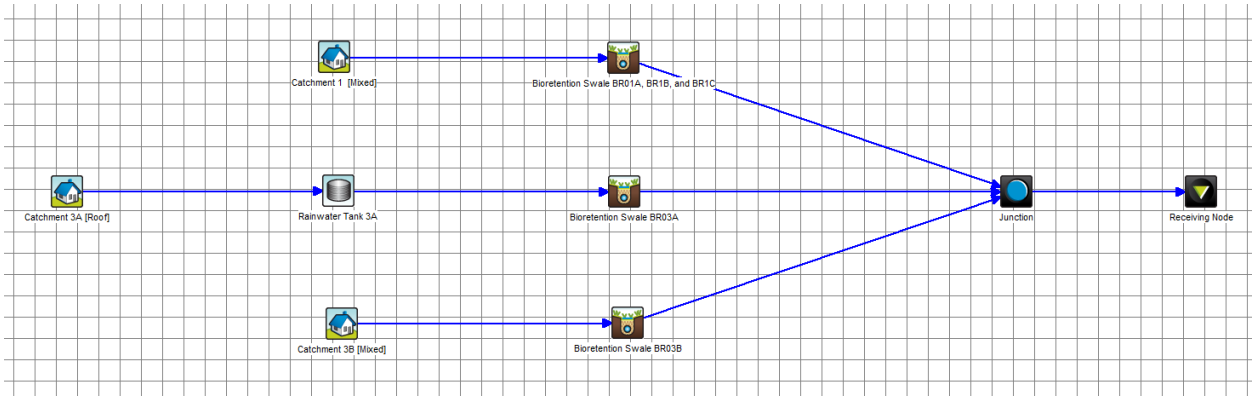


Figure 11 Music model layout screenshot (Option 2, without Jellyfish stormwater quality treatment device).

3.3.7 Results and discussions

This section outlines and interprets the MUSIC modelling results for the proposed stormwater treatment system. Tables 11, 12, 13, and 14 below display the pollutant load reductions.

Table 11 Estimated annual pollutant reduction efficiencies (Option 1, with Jellyfish stormwater quality treatment device)

Pollutant	Water Quality Objectives – Pollutant Reduction Targets (%)	Proposed Treatment train reduction efficiencies (%)
Total Suspended Solids	■ 80	■ 98.7
Total Phosphorus	■ 60	■ 94.1
Total Nitrogen	■ 45	■ 77.3
Gross Pollutants	■ 90	■ 100

Table 12 Estimated pollutant concentrations (mg/L), Option 1 - with Jellyfish

Catchment	Existing Pits/ Outfalls	Outflow		
		TSS Concentration (mg/L)	TN Concentration (mg/L)	TP Concentration (mg/L)
Catchment 1	Pits / Outfalls 5, 6, and 7	0.361	0.210	7.06E-3
Catchment 2	Pit / Outfall 7	Catchment 2 has been removed from the scope of the Project		
Catchment 3A	Pit / Outfall 10	1.4	0.301	12.1E-3
Catchment 3B	Pit / Outfall 10	0.632	0.205	8.30E-3

Tables above show that for Option 1, the proposed treatment measures can be expected to achieve the target pollutant removal efficiencies for TSS, TP, TN and Gross Pollutants (litter).

On this basis, the proposed treatment measures are considered to provide an appropriate level of treatment for the runoff generated within the proposed development and achieve the Evs and WQOs specified under Schedule 1 of the EPP Water, and the Brisbane River Estuary Environmental Values and Water Quality Objectives (Part of Basin 143). Refer section 3.3.3 for the WQOs for the Brisbane River – Middle Estuary (WQ1431).

The bio retention swale measures proposed are also considered to provide some treatment of hydrocarbons generated from the catchments.

For further results and discussions in relation to the EPO trigger limits, refer to Appendix E.

Table 13 Estimated annual pollutant reduction efficiencies (Option 2, without Jellyfish stormwater quality treatment device)

Pollutant	Water Quality Objectives – Pollutant Reduction Targets (%)	Proposed Treatment train reduction efficiencies (%)
Total Suspended Solids	■ 80	■ 92.1
Total Phosphorus	■ 60	■ 85.4
Total Nitrogen	■ 45	■ 54.6
Gross Pollutants	■ 90	■ 100

Table 14 Estimated pollutant concentrations (mg/L), Option 2 - without Jellyfish

Catchment	Existing Pits/ Outfalls	Outflow		
		TSS Concentration (mg/L)	TN Concentration (mg/L)	TP Concentration (mg/L)
Catchment 1	Pits / Outfalls 5, 6, and 7	3.24	0.462	0.0204
Catchment 2	Pit / Outfall 7	Catchment 2 has been removed from the scope of the Project		
Catchment 3A	Pit / Outfall 10	1.4	0.299	0.012
Catchment 3B	Pit / Outfall 10	5.05	0.446	0.0219

Tables above show that for Option 2, the proposed treatment measures can be expected to achieve the target pollutant removal efficiencies for TSS, TP, TN and Gross Pollutants (litter). However, for Option 2, the outflow TN concentration does not achieve the Evs/WQOs specified for the Brisbane

River Estuary Environmental Values and Water Quality Objectives (Part of Basin 143). According to the WQOs for the Brisbane River – Middle Estuary (WQ1431) outlined in section 3.3.3 the Total Nitrogen (TN) is required to be <0.3 mg/L. As such, further discussions and written approval are to be sought from the statutory authorities if Option 2 is adopted.

Maintenance plans

All stormwater quality controls require maintenance in order to function efficiently. Refer to Table 15 below for the maintenance requirements of the stormwater quality devices.

Table 15 Maintenance requirements

Devices	Maintenance requirements	Maintenance Frequencies[3]
Spill Containment Bund	Inspection of integrity of the bund	6 months
	Inspection of the storage tank of any signs of spill or leaks (including inspection of the spill prevention sensors)	6 months
	Spills within the containment bund should be cleaned up immediately – never hose liquid substances down the stormwater drain.	After a spillage incident where the integrity of the storage tank is compromised.
Bio Retention Swales	Watering to establish vegetation	2-7 days[2]
	Trimming and replacement of vegetation	1-3 months[1]
	Litter and debris removal	3 months
	Inspection of inlet/outlets to ensure proper function (checking for scouring or sedimentation)	3-6 months[1]
	Inspection of filter media	6 months
	Removal of accumulated sediment and re-profiling	Annual

[1] *More frequent maintenance required during first 1 – 2 years (during establishment)*

[2] *Only for landscaping establishment period (first 12 weeks), gradually increase interval from 3 times per week to once per week.*

[3] *Exact maintenance frequency to be established via monitoring during the first 1 to 2 years of operation*

Any ammonia spills or leakage should be addressed in accordance with the spill containment and management system as outlined in the separate risk management report (*Doc. Reference 520132-1000-REP-NN-0010, Hazard Study Level 1 Report*) and the Quantitative Risk Assessment (QRA) report. Any spills and leakage shall be completely contained and pumped out. Never hose spilt liquid ammonia down the stormwater drain or waterways. As soon as a spillage incident occurs or spill prevention sensor is activated, the valve to the drainage sump (s) must be closed to prevent any spills entering the stormwater drain.

Maintenance access will be required for the bioretention swales to provide access for small machinery to perform any re-profiling and sediment removal activities.

In addition to the maintenance plans outlined above, other ongoing inspection and monitoring schedules as listed in the EPO shall be implemented.

A detailed maintenance and inspection program for the ammonia storage tank has been excluded from this SWMP and will be included in the Quantitative Risk Assessment (QRA) report.

4 Response to Information Request

Information request has been received from Brisbane City Council (BCC) and State Assessment Referral Agency (SARA) regarding this SWMP.

Table 16 Response to BCC and SARA Information Request

Brisbane City Council (BCC) Information Request, dated 16/12/2022 (Application Reference : A006129295)	**Response to BCC Information Request**
Submit further information to supplement the Site Based Stormwater Management Plan, including the following: a. As the site drains directly into the Brisbane River and Bulimba Creek, provide a response to the Environmental Protection (Water and Wetland Biodiversity) Policy 2019 – Brisbane River environmental values and water quality objectives Basin No. 143 (part), including all creeks of the Brisbane River estuary other than Oxley Creek; b. Provide further information on how firewater will be contained in the event of a fire such that it won't contaminate stormwater and waterways; and c. Provide the electronic MUSIC model file.	Please find response below: a. A response has now been added to this SWMP (please refer to section 3.3.2 and 3.3.3 of this report) relating to the Environmental Protection (Water and Wetland Biodiversity) Policy 2019 – Brisbane River environmental values and water quality objectives Basin No. 143 (part), including all creeks of the Brisbane River estuary other than Oxley Creek. b. Firewater from the new development areas will be handled similar to the stormwater runoff from the new development areas. The proposed stormwater quality treatment train will capture and remove contaminants from the first flush rainfall, prior to discharge of runoff to the downstream stormwater system and the waterways. Furthermore, drain lines 5 and 7 have a capacity to hold d 320m^3 and 495m^3 respectively in dry weather according to previous study by BMT (attached in Appendix D). c. Electronic MUSIC model file provided.

State Assessment Referral Agency (SARA) Advice Notice, dated 13/01/2023 (SARA Reference: 2212-32363 SRA)	Response to SARA Advice Notice
The Stormwater Management Plan (520132-1000-REP-NN-0001) has been written to address only certain quality characteristics within specific locations including, total suspended solids, total phosphorus, and total nitrogen within proposed areas 1, 2, 3 & 4 (figure 2 – Proposed site layout plan). Action: Provide an updated Stormwater Management Plan that considers the entire subject site and any contaminants of concern that may be present in a surface water release, including: a. a. consideration of all relevant quality characteristics that may be present in a release to surface waters and all disturbed areas. This must include: i. proposed management of stormwater on the entirety of the subject site as identified in Figure 1: Proposed Development Area – Stormwater Management Plan (520132-1000-REP-NN-0001) ii. description of catchment areas on the site and the relevant release locations iii. description of contaminants of concern. b. justification as to the suitability of the proposed first flush system c. describe what quantities of first flush stormwater will be able to be contained on site	Please find response below: The Stormwater Management Plan considers only the new development areas, i.e. the proposed development which is covered under this DA Application. Other areas within the site which are existing (i.e. not part of the proposed development) will be excluded from the DA Application and therefore will not be considered in the stormwater quality modelling. The first flush stormwater runoff from the existing areas will be directed as per existing flow paths to the existing stormwater treatment pond (at the north east corner of the site), if required, and undergo treatment in the future WWTP (not part of this Project) prior to discharge into the existing Oxidation Pond and release through existing authorised release point W1. This is described in the separate *'Process Water System Comparison Study, Doc. Ref. 520132-1000-MEM-NN-0002*'. Also refer to section 1.4 and section 2.1 of this SWMP. a. Refer to section 2.1, section 2.2, section 3.3.5, Appendix A, and Appendix C of this SWMP for the description of catchments within the new development areas on the site and the relevant release locations. Refer to section 3.3.1, section 3.3.2, and section 3.3.3 of this SWMP for the description of contaminants of concern within the new development areas. b. Refer to section 1.5 and section 3 of this SWMP for the justification of the proposed first flush system. According to MUSIC modelling guidelines, the pollutant loads delivered to receiving waters from many of the small storm events (e.g. of magnitude less than 3 month ARI peak discharge) can make up in excess of 90% of the annual loads discharged from the catchment. c. Refer to section 1.5, section 3.3.5, section 3.3.6, section 3.3.7, and the updated Appendix F of this SWMP for the description of quantities of first flush stormwater contained on site for the new development areas (quantities of first flush stormwater for existing areas are outside the scope of this Project and have been excluded).

State Assessment Referral Agency (SARA) Advice Notice, dated 13/01/2023 (SARA Reference: 2212-32363 SRA)	Response to SARA Advice Notice
Further information is required in relation to: a. Site-specific release limits and monitoring requirements. Stormwater Management Plan refers to an existing *Environmental Protection Order (EPO) document reference C-CPLPO-100001617* for proposed release limits. b. Proposed release limits for all surface water releases including stormwater from site should consider the water quality objectives prescribed under the Environmental Protection (Water Wetland Biodiversity) Policy 2019 ((Brisbane River Estuary Environmental Values and Water Quality Objectives 2022, (Brisbane River Estuary and Intertidal Wetlands and Bulimba Creek Estuary) and ANZECC 2018 and not the current EPO. Action: Provide the following: a. Background water quality data (ideally this should include at least 12 samples across 12 months). b. Proposed surface water release limits for stormwater releases that meet prescribed water quality objectives at end of pipe or within a suitable mixing zone; Where contaminant limits are not prescribed ANZECC 2018 should be used. c. Mixing zone assessment: i. consider the release structures and tidal and hydrodynamic conditions that occur during release to determine potential mixing and dilution ii. where prescribed water quality objectives are not proposed at end of pipe, investigate and determine the spatial extent of mixing zones required to achieve compliance with prescribed water quality objectives iii. identify acceptable mixing zones using guidance from ANZG 2018. d. A description of the proposed stormwater monitoring frequency, locations (GDA 2020) and methodology, in line with the Queensland Monitoring and Sampling Manual, June 2018. e. Recent (last 6 months) monitoring data from existing pit 10,11,12,13,14 and 15 if available.	Please find response below: (Please note that response to Process Water is excluded from this SWMP and is covered in a separate report) a. Refer to Appendix D for background water quality data. b. Refer to the updated section 3.3.2 and 3.3.3 of this SWMP report. c. Release structures and outfalls are existing structures (not part of the proposed Project) and the proposed development will adhere to the existing release conditions (and any future amendments) for these existing release structures and outfalls. Refer to Appendix A for locations of existing outfalls. d. Refer to Appendix H for description of the proposed stormwater monitoring frequency, locations, and methodology, in line with the Queensland Monitoring and Sampling Manual, June 2018. e. Refer to Appendix I for the most recent monitoring data from existing pit 10,11,12,13,14 and 15 where available.

5 Conclusions

Results of the MUSIC modelling demonstrate that the development site and the adopted mitigation strategy / stormwater quality treatment train are compliant with the pollutant reduction targets as specified in the State Planning Policy and the recent EPO trigger limits.

The proposed stormwater quality treatment train, including the containment bund, rainwater tank, Jellyfish (Option 1), and bio retention swales will sufficiently reduce and prevent any adverse impact to the health and quality of nearby waterways. As such, for Option 1, the development is considered compliant with the assessment codes.

Option 2 without the Jellyfish stormwater quality treatment device has also been considered. This Option is considered to provide a significant level of treatment for the runoff generated within the proposed development and are expected to lower the pollutant levels below the threshold values set out in the EPO. However, for Option 2, the TN concentration outflow exceeds the EVs/WQOs specified for the Brisbane River Estuary Environmental Values and Water Quality Objectives (Part of Basin 143). As such, further discussions and written approval are to be sought from the statutory authorities if Option 2 is adopted.

In-ground proprietary oil and sediment separator and interceptor have been excluded as oil and sediment loads are expected to be low and because the total increase in impervious area due to the new development is negligible (i.e. the majority of new plants and equipment are installed on existing hardstands).

6 Appendices

The following appendices have been added to this project.

Appendices	
Appendix A	Proposed development overlaid on existing stormwater drainage infrastructure
Appendix B	Proposed development overlaid on existing stormwater drainage infrastructure and Lidar contours
Appendix C	Proposed stormwater management plans
Appendix D	Previous Stormwater Quality Assessment Report (July 2021)
Appendix E	Further discussions on Music modelling results
Appendix F	Fraction Impervious of each catchment (pre and post development)
Appendix G	WQ1431 plan
Appendix H	BMT – Stormwater Monitoring Program (March 2022)
Appendix I	BMT – Annual Stormwater Quality Monitoring Report (January 2023)

Appendix A

Proposed development overlaid on existing stormwater drainage infrastructure

BCC DS
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26/03/2024
APPLICATION REF
A006129295

Existing outfall / pit 1

Existing outfall / pit 4

Existing outfall / pit 5

Existing outfall / pit 7

Existing pit 2, refer note below

Existing pit 6, refer note below

Existing pit 8, refer note below

Existing swale

New property boundary

New swale to intercept catchment entering the adjoining site

Minor regrade in this area to flow towards existing outfall / pit 15

Existing outfall / pit 15

Existing outfall / pit 14

Existing outfall / pit 13

Existing outfall / pit 12

Existing outfall / pit 11

Existing outfall / pit 10

Existing outfall / pit 9

PERIMETER BUND

AMMONIA STORAGE AREA

AMMONIA STORAGE TANK

NEW PIPE RACK

EXISTING TANK TO BE DEMOLISHED

NEW NH3 REFRIG. (location tbc)

NEW TURBINE GENERATOR

NEW FLARE

MODULAR WATER TREATMENT PLANT

NEW COOLING SYSTEM

AIR SEPARATION UNIT AREA (ASU)

SWITCHROOM/ DRIVE ROOM

CONTROL ROOM (SIZE TO BE CONFIRMED)

TRUCK PARK AREA

AMMONIA DISTRIBUTION DEPOT

CAR PARK

SERVICE CORRIDOR

WHARF

WHARF ROAD

PLANT ACCESS ROAD

7TH STREET

4TH STREET

5TH STREET

"B" AVENUE

"C" AVENUE

BRISBANE RIVER

AQUARIUM PASSAGE

LEGEND

INDICATES PROPOSED DEVELOPMENT (INCLUDING REFURBISHED EQUIPMENT)

STORMWATER DRAINAGE

NOTES:

1. Existing Pit 2 is connected to Existing outfall/Pit 1.
2. Existing Pit 6 is connected to Existing outfall/Pit 5.
3. Existing Pit 8 is connected to Existing outfall/Pit 7.

NOT FOR CONSTRUCTION

SCALE 1:1500

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REV	DATE	REVISION DETAILS	APPROVED
A	13.05.22	DRAFT ISSUE FOR CLIENT REVIEW	

SCALE	1:1500
SIZE	A1
DRAWN	A. HARTANTO
DESIGNED	A. HARTANTO
REVIEWED	D. BELL

PRELIMINARY
NOT FOR CONSTRUCTION
APPROVED
DATE

PROJECT	PROJECT SPRITE PRE-FEED
TITLE	GIBSON ISLAND FACILITY CONCEPTUAL STORMWATER MANAGEMENT PLAN

DRAWING No.	PROJECT No.	AREA	TYPE	DISC	NUMBER	REV
	520132	1000	DRG	SW	0001	A

Appendix B

Proposed development overlaid on existing stormwater drainage infrastructure and lidar contours

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Existing swale

New property boundary

New swale to intercept catchment entering the adjoining site

Minor regrade in this area to flow towards existing outfall / pit 15

PERIMETER BUND

AMMONIA STORAGE AREA

AMMONIA STORAGE TANK NOTE 2, 4

NEW PIPE RACK

EXISTING TANK TO BE DEMOLISHED

NEW NH3 REFRIG. (location tbc)

NEW TURBINE GENERATOR

NEW FLARE

MODULAR WATER TREATMENT PLANT

NEW COOLING SYSTEM

AIR SEPARATION UNIT AREA (ASU)

SWITCHROOM/ DRIVE ROOM

CONTROL ROOM (SIZE TO BE CONFIRMED)

TRUCK PARK AREA

LEGEND

INDICATES PROPOSED DEVELOPMENT (INCLUDING REFURBISHED EQUIPMENT)

STORMWATER DRAINAGE

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DESIGNED: A. HARTANTO
REVIEWED: D. BELL

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PROJECT: PROJECT SPRITE PRE-FEED

TITLE: GIBSON ISLAND FACILITY
CONCEPTUAL STORMWATER MANAGEMENT PLAN

DRAWING No.	PROJECT No.	AREA	TYPE	DISC	NUMBER	REV
	520132	1000	DRG	SW	0002	A

Appendix C
Proposed stormwater management plans

Jellyfish JF2400-7-2 (option 1)

Existing stormwater sumps to be removed

Proposed Bio Retention Swale 1A

Proposed Bio Retention Swale 1C

Jellyfish JF2400-7-2 (option 1)

Existing stormwater sump B

Existing stormwater sump A

Proposed Bio Retention Swale 1D

Proposed Bio Retention Swale 1B

Perimeter bund all around the ammonia storage area

Proposed concrete table drain (refer Note 1)

Perimeter bund all around the ammonia storage area

Proposed concrete table drain (refer Note 1)

Proposed clean water diversion table drain

Catchment 1

B195 B125 B137 B116 B194 B214 B114 B143 B111

WHARF ROAD

4TH STREET

5TH STREET

AMMONIA STORAGE TANK

NEW PIPE RACK

NOTES:

1. PROPOSED TABLE DRAIN ALONG THE PERIMETER OF THE AMMONIA STORAGE AREA IS TO BE CONCRETE LINED TO MINIMISE THE AMOUNT OF VEGETATION AND FIRE HAZARD.

AS AN ALTERNATIVE TO THE CONCRETE LINED TABLE DRAIN, KERBING IS AN ACCEPTABLE SOLUTION TO DIRECT STORMWATER RUNOFF WITHIN THE AMMONIA STORAGE AREA TO THE BIO RETENTION SWALES.

2. BIO RETENTION SWALES ARE TO BE LOCATED WITH A MINIMUM BUFFER DISTANCE OF 10 METRES FROM THE AMMONIA STORAGE TANK.

LEGEND

INDICATES PROPOSED DEVELOPMENT (INCLUDING REFURBISHED EQUIPMENT)

STORMWATER DRAINAGE

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DESIGNED	A. HARTANTO
REVIEWED	D. BELL

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DATE

PROJECT: PROJECT SPRITE PRE-FEED

TITLE: GIBSON ISLAND FACILITY
CONCEPTUAL STORMWATER MANAGEMENT PLAN
OPTION 1 - WITH JELLYFISH

DRAWING No.: PROJECT No. 520132 – AREA 1000 – TYPE SKT – DISC SW – NUMBER 0003 – REV A

Existing stormwater sumps to be removed

Proposed Bio Retention Swale 1A

Proposed Bio Retention Swale 1C

Existing stormwater sump B

Existing stormwater sump A

Proposed Bio Retention Swale 1D

Proposed Bio Retention Swale 1B

Perimeter bund all around the ammonia storage area

Proposed concrete table drain (refer Note 1)

Perimeter bund all around the ammonia storage area

Proposed concrete table drain (refer Note 1)

Catchment 1

Proposed clean water diversion table drain

B195 B125 B116 B137 B194 B214 B114 B143 B111

WHARF ROAD

4TH STREET

5TH STREET

AMMONIA STORAGE TANK

NEW PIPE RACK

NOTES:

1. PROPOSED TABLE DRAIN ALONG THE PERIMETER OF THE AMMONIA STORAGE AREA IS TO BE CONCRETE LINED TO MINIMISE THE AMOUNT OF VEGETATION AND FIRE HAZARD.

AS AN ALTERNATIVE TO THE CONCRETE LINED TABLE DRAIN, KERBING IS AN ACCEPTABLE SOLUTION TO DIRECT STORMWATER RUNOFF WITHIN THE AMMONIA STORAGE AREA TO THE BIO RETENTION SWALES.

2. BIO RETENTION SWALES ARE TO BE LOCATED WITH A MINIMUM BUFFER DISTANCE OF 10 METRES FROM THE AMMONIA STORAGE TANK.

LEGEND

INDICATES PROPOSED DEVELOPMENT (INCLUDING REFURBISHED EQUIPMENT)

STORMWATER DRAINAGE

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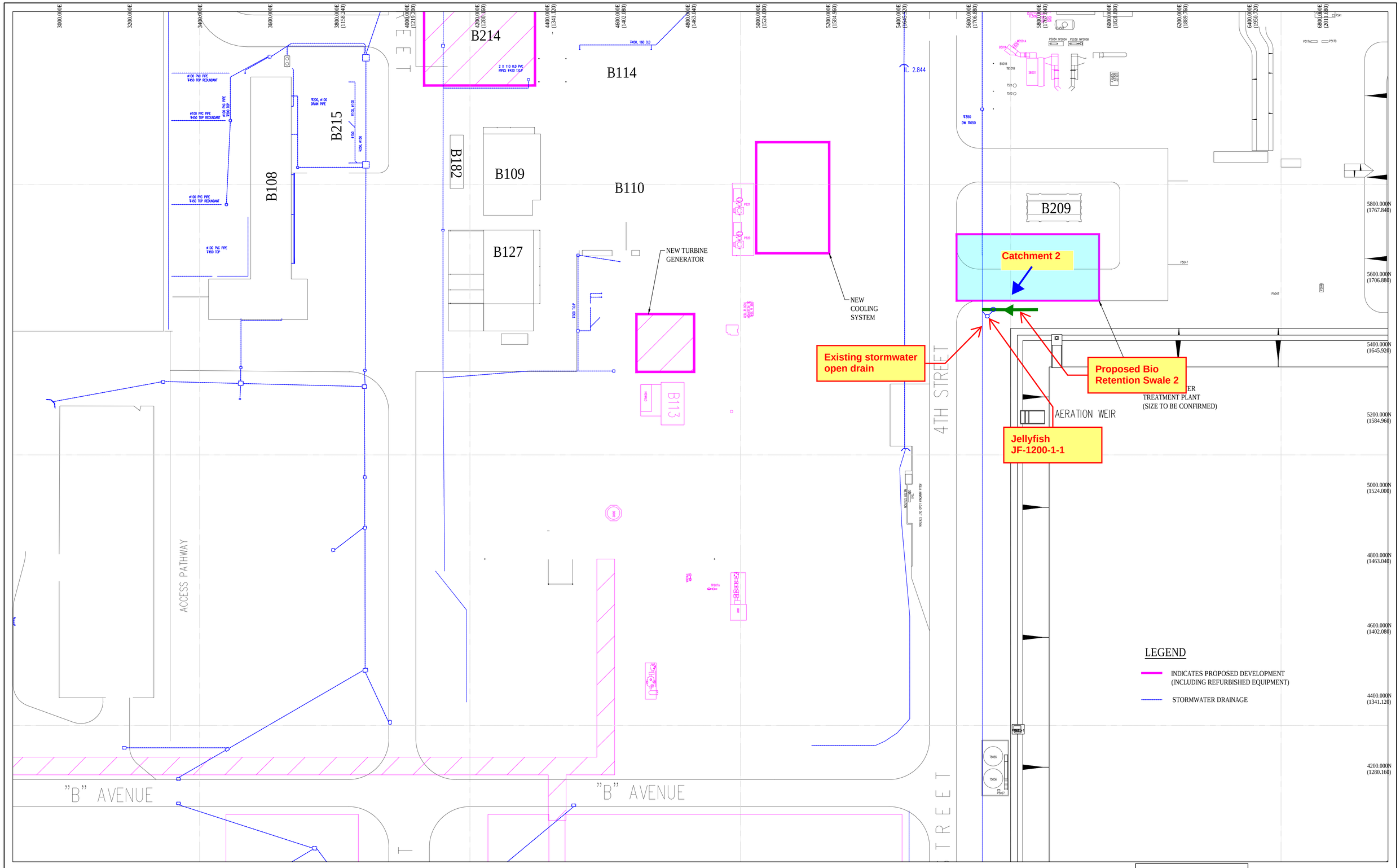
PROJECT: PROJECT SPRITE PRE-FEED

TITLE: GIBSON ISLAND FACILITY
CONCEPTUAL STORMWATER MANAGEMENT PLAN
OPTION 2 - WITHOUT JELLYFISH

DRAWING No. 520132 – 1000 – SKT – SW – 0003 – A

PROJECT No. | AREA | TYPE | DISC | NUMBER | REV



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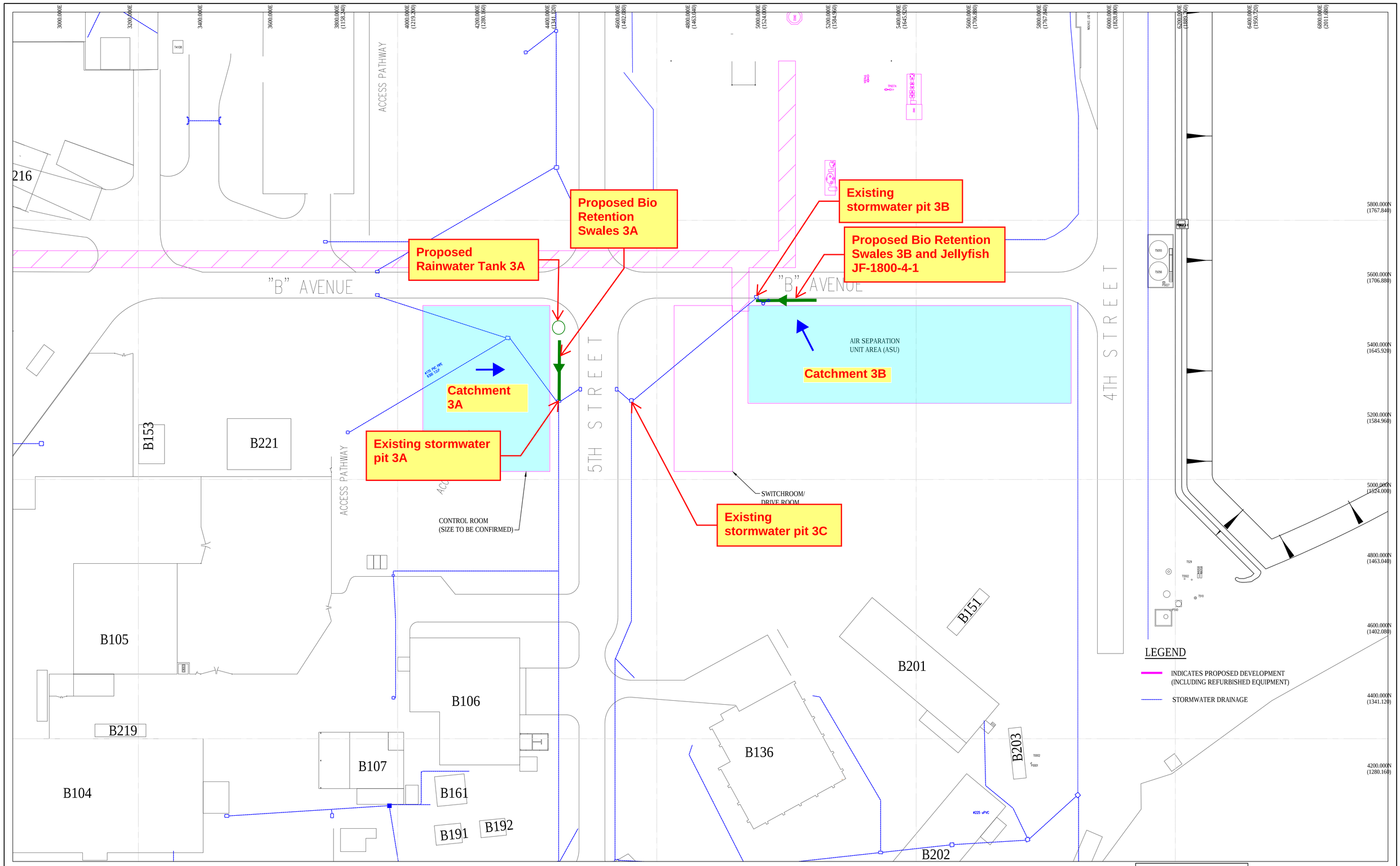
PROJECT	PROJECT SPRITE PRE-FEED
TITLE	GIBSON ISLAND FACILITY CONCEPTUAL STORMWATER MANAGEMENT PLAN

DRAWING No.	PROJECT No.	AREA	TYPE	DISC	NUMBER	REV
	520132	1000	SKT	SW	0004	A



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DRAWING No.	PROJECT No.	AREA	TYPE	DISC	NUMBER	REV
	520132	1000	SKT	SW	0005	A

3000.000E
3200.000E
3400.000E
3600.000E
3800.000E (1158.240)
4000.000E (1219.200)
4200.000E (1280.160)
4400.000E (1341.120)
4600.000E (1402.080)
4800.000E (1463.040)
5000.000E (1524.000)
5200.000E (1584.960)
5400.000E (1645.920)
5600.000E (1706.880)
5800.000E (1767.840)
6000.000E (1828.800)
6200.000E (1889.760)
6400.000E (1950.720)
6600.000E (2011.680)

5800.000N (1767.840)
5600.000N (1706.880)
5400.000N (1645.920)
5200.000N (1584.960)
5000.000N (1524.000)
4800.000N (1463.040)
4600.000N (1402.080)
4400.000N (1341.120)
4200.000N (1280.160)

B1
B133
B111
B209
T530
T540
T555
15m HIGH FLARE
AERATION WEIR
POND OUTLET WEIR
9

Existing stormwater sump 4

Existing stormwater outlet to oxidation pond

Existing stormwater outlet from oxidation pond to Bulimba Creek

LEGEND

INDICATES PROPOSED DEVELOPMENT (INCLUDING REFURBISHED EQUIPMENT)

STORMWATER DRAINAGE

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DRAWING No.	PROJECT No.	AREA	TYPE	DISC	NUMBER	REV
	520132	1000	SKT	SW	0006	A

Appendix D

Previous Stormwater Quality Assessment Report (July 2021)

Stormwater Quality Assessment - Gibson Island Facility

Reference: R.A10219.002.02.Gibson Island Receiving Water Modelling.docx
Date: July 2021
Confidential

Document Control Sheet

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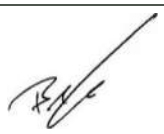
Document:	R.A10219.002.02.Gibson Island Receiving Water Modelling.docx
Title:	Stormwater Quality Assessment - Gibson Island Facility
Project Manager:	Brad Grant
Author:	Lucy Peljo, Brad Grant, Dan Botelho
Client:	Incitec Pivot Ltd
Client Contact:	Ben Gready
Client Reference:	

Synopsis: **This report presents the findings of receiving water quality modelling and assessment of stormwater discharged from IPL's Gibson Island facility undertaken in response to the 'notice to conduct or commission an environmental evaluation' provided by DES to Incitec Pivot on 1 June 2020.**

REVISION/CHECKING HISTORY

Revision Number	Date	Checked by		Issued by	
0	14th May 2021	DLR		BMG	
1	25th May 2021	DLR		BMG	
2	14th July 2021	DLR		BMG	

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